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

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"Perchlorate Material-special handling may apply, see www.dtsc.ca.gov/hazardouswaste/perchlorate"

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Thank you for purchasing ASRock X299E-ITX/ac 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.

1.1 Package Contents

- ASRock X299E-ITX/ac Motherboard (Mini-ITX Form Factor)
- ASRock X299E-ITX/ac Quick Installation Guide
- ASRock X299E-ITX/ac Support CD
- 1 x I/O Panel Shield
- 2 x Serial ATA (SATA) Data Cables (Optional)
- 1 x ASRock WiFi 2.4/5 GHz Antenna (Optional)
- 3 x Screws for Ultra M.2 Sockets (Optional)

4.11 Exit Screen
Chapter 1 Introduction

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• 1 x ASRock WiFi 2.4/5 GHz Antenna (Optional)
• 3 x Screws for Ultra M.2 Sockets (Optional)
1.2 Specifications

**Platform**
- Mini-ITX Form Factor
- 10 Layer PCB

**CPU**
- Supports Intel® Core™ X-Series Processor Family (79xx, 78xx Series) for the LGA 2066 Socket
  * Supports 28 and 44 PCIe lane processors (6-core and above) only. 16 PCIe lane processors (4-core) are not supported. Please refer to CPU Support List on ASRock’s website for more information. (http://www.asrock.com/)
- Digi Power design
- 7 Power Phase design
- Supports Intel® Turbo Boost Max Technology 3.0
- Supports ASRock Hyper BCLK Engine III

**Chipset**
- Intel® X299

**Memory**
- Quad Channel DDR4 Memory Technology
- 4 x DDR4 SO-DIMM Slots
- Supports DDR4 4000+(OC)/3866(OC)/3800(OC)/3733 (OC)/3600(OC)/3200(OC)/2933(OC)/2800 (OC)/2666/2400/2133 non-ECC, un-buffered memory
  * The maximum memory frequency supported may vary by processor type.
  * Please refer to Memory Support List on ASRock’s website for more information. (http://www.asrock.com/)
- Max. capacity of system memory: 64GB
- Supports Intel® Extreme Memory Profile (XMP) 2.0

**Expansion Slot**
- 1 x PCI Express 3.0 x16 Slot (PCIE1: x16 mode)
- 1 x Vertical M.2 Socket (Key E) with the bundled WiFi-802.11ac module (on the rear I/O)
- 15μ Gold Contact in VGA PCIe Slot (PCIE1)

**Audio**
- 7.1 CH HD Audio with Content Protection (Realtek ALC1220 Audio Codec)
- Premium Blu-ray Audio support
- Supports Surge Protection
• Supports Purity Sound™ 4
  - 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
  - Impedance Sensing on Front Out port
  - Gold Audio Jacks
  - 15μ Gold Audio Connector
• Supports DTS Connect

LAN
• Gigabit LAN 10/100/1000 Mb/s
• 1 x Giga PHY Intel® I219V, 1 x GigaLAN 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® Dual Band Wireless-AC 8265
• Supports IEEE 802.11a/b/g/n/ac
• Supports Dual-Band (2.4/5 GHz with 80Mhz bandwidth and MU-MIMO)
• Supports high speed wireless connections up to 867Mbps
• 2 antennas to support 2 (Transmit) x 2 (Receive) diversity technology
• Supports Bluetooth 4.2 / 3.0 + High speed class II

Rear Panel I/O
• 2 x Antenna Ports
• 1 x Optical SPDIF Out Port
• 1 x USB 3.1 Gen2 Type-A Port (10 Gb/s) (ASMedia ASM3142) (Supports ESD Protection)
• 1 x USB 3.1 Gen2 Type-C Port (10 Gb/s) (ASMedia ASM3142) (Supports ESD Protection)
• 4 x USB 3.1 Gen1 Ports (ASMedia ASM1074 Hub) (Supports ESD Protection)*
• 2 x RJ-45 LAN Ports with LED (ACT/LINK LED and SPEED LED)*
* If you remove X299E-ITX REAR card, USB 3.1 Gen1 ports and RJ-45 LAN Ports will not work.

- 1 x Clear CMOS Button / Power 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 15 and Intel Smart Response Technology), NCQ, AHCI and Hot Plug*
- 1 x Ultra M.2 Socket (M2_1), supports M Key type 2230/2242/2260/2280 M.2 SATA3 6.0 Gb/s module and M.2 PCI Express module up to Gen3 x4 (32 Gb/s)**
- 2 x Ultra M.2 Sockets (M2_2 and M2_3), support M Key type 2280 M.2 PCI Express module up to Gen3 x4 (32 Gb/s)**
  ** Supports Intel® Optane™ Technology (M2_1)
  ** Supports NVMe SSD as boot disks
  ** Supports Virtual RAID On CPU (M2_2 and M2_3)

**Connector**

- 1 x Virtual RAID On CPU Header
- 1 x TPM Header
- 1 x Power LED and Speaker Header
- 1 x RGB LED Header
  * Supports in total up to 12V/3A, 36W 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 Optional/Water Pump Fan Connector (4-pin) (Smart Fan Speed Control)
  * The CPU Optional/Water Pump Fan supports the water cooler fan of maximum 1.5A (18W) fan power.
- 1 x Chassis Fan Connector (4-pin) (Smart Fan Speed Control)
  * CPU_OPT/W_PUMP and CHA_FAN1 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 Front Panel Audio Connector (15μ Gold Audio Connector)
• 1 x USB 2.0 Header (Supports 2 USB 2.0 ports) (Supports ESD Protection)
• 1 x USB 3.1 Gen1 Header (Supports 2 USB 3.1 Gen1 ports) (Supports ESD Protection)
• 1 x Rear Button (A: Clear CMOS Button; B: Power Button)

**BIOS Feature**
• AMI UEFI Legal BIOS with multilingual GUI support
• ACPI 6.1 Compliant wake up events
• SMBIOS 3.0 Support
• CPU, DRAM, PCH 1.0V, VCCIO, VCCSA, Voltage Multi-adjustment

**Hardware Monitor**
• Temperature Sensing: CPU, CPU Optional/Water Pump, Chassis Fans
• Fan Tachometer: CPU, CPU Optional/Water Pump, Chassis Fans
• Quiet Fan (Auto adjust chassis fan speed by CPU temperature): CPU, CPU Optional/Water Pump, Chassis Fans
• Fan Multi-Speed Control: CPU, CPU Optional/Water Pump, Chassis Fans
• Voltage monitoring: +12V, +5V, +3.3V, CPU Vcore, DRAM, PCH 1.0V, VCCIO, VCCSA

**OS**
• Microsoft® Windows® 10 64-bit

**Certifications**
• FCC, CE, WHQL
• ErP/EuP ready (ErP/EuP ready power supply is required)

* For detailed product information, please visit our website: [http://www.asrock.com](http://www.asrock.com)

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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

Top Side View
Back Side View
Rear Card (For Rear Socket)

Front Card (For Front Socket)
<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chassis Fan / Waterpump Fan Connector (CHA_FAN1/W_PUMP)</td>
</tr>
<tr>
<td>2</td>
<td>Virtual RAID On CPU Header (VROC1)</td>
</tr>
<tr>
<td>3</td>
<td>2 x 260-pin DDR4 SO-DIMM Slots (DDR4_A1, DDR4_B1)</td>
</tr>
<tr>
<td>4</td>
<td>RGB LED Header (RGB_LED1)</td>
</tr>
<tr>
<td>5</td>
<td>System Panel Header (PANEL1)</td>
</tr>
<tr>
<td>6</td>
<td>ATX 12V Power Connector (ATX12V1)</td>
</tr>
<tr>
<td>7</td>
<td>Front Socket (FRONTI_IO1)</td>
</tr>
<tr>
<td>8</td>
<td>CPU Fan Connector (CPU_FAN1)</td>
</tr>
<tr>
<td>9</td>
<td>CPU Fan / Waterpump Fan Connector (CPU_OPT/W_PUMP)</td>
</tr>
<tr>
<td>10</td>
<td>Power LED and Speaker Header (SPK_PLED1)</td>
</tr>
<tr>
<td>11</td>
<td>ATX Power Connector (ATXPWR1)</td>
</tr>
<tr>
<td>12</td>
<td>2 x 260-pin DDR4 SO-DIMM Slots (DDR4_C1, DDR4_D1)</td>
</tr>
<tr>
<td>13</td>
<td>Rear Button Switch (REAR_BTN_SEL1)</td>
</tr>
<tr>
<td>14</td>
<td>Front Panel Audio Header (HD_AUDIO1)</td>
</tr>
<tr>
<td>15</td>
<td>Rear Socket (REAR_IO)</td>
</tr>
<tr>
<td>16</td>
<td>TPM Header (TPMS1)</td>
</tr>
<tr>
<td>17</td>
<td>Ultra M.2 Socket (M2_3)</td>
</tr>
<tr>
<td>18</td>
<td>Ultra M.2 Socket (M2_2)</td>
</tr>
<tr>
<td>19</td>
<td>Ultra M.2 Socket (M2_1)</td>
</tr>
<tr>
<td>20</td>
<td>USB 2.0 Header (USB_5_6)</td>
</tr>
<tr>
<td>21</td>
<td>SATA3 Connectors (SATA3_2_3)</td>
</tr>
<tr>
<td>22</td>
<td>SATA3 Connectors (SATA3_4_5)</td>
</tr>
<tr>
<td>23</td>
<td>SATA3 Connectors (SATA3_6_7)</td>
</tr>
<tr>
<td>24</td>
<td>USB 3.1 Gen1 Header (USB_7_8)</td>
</tr>
</tbody>
</table>
### 1.4 I/O Panel

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>USB 3.1 Gen2 Type-A Port (USB31_TA_1)</td>
<td>8</td>
<td>Microphone (Pink)</td>
</tr>
<tr>
<td>2</td>
<td>LAN RJ-45 Port (Intel® I211AT)*</td>
<td>9</td>
<td>Optical SPDIF Out Port</td>
</tr>
<tr>
<td>3</td>
<td>LAN RJ-45 Port (Intel® I219V)*</td>
<td>10</td>
<td>USB 3.1 Gen1 Ports (USB_34)</td>
</tr>
<tr>
<td>4</td>
<td>Central / Bass (Orange)</td>
<td>11</td>
<td>USB 3.1 Gen1 Ports (USB_12)</td>
</tr>
<tr>
<td>5</td>
<td>Rear Speaker (Black)</td>
<td>12</td>
<td>USB 3.1 Gen2 Type-C Port (USB31_TC_1)</td>
</tr>
<tr>
<td>6</td>
<td>Line In (Light Blue)</td>
<td>13</td>
<td>Clear CMOS Button / Power Button***</td>
</tr>
<tr>
<td>7</td>
<td>Front Speaker (Lime)**</td>
<td>14</td>
<td>Antenna Ports</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>ACT/LINK LED</th>
<th>SPEED LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAN Port</td>
<td></td>
</tr>
</tbody>
</table>

**Activity / Link LED**

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>No Link</td>
</tr>
<tr>
<td>Blinking</td>
<td>Data Activity</td>
</tr>
<tr>
<td>On</td>
<td>Link</td>
</tr>
</tbody>
</table>

**Speed LED**

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>10Mbps connection</td>
</tr>
<tr>
<td>Orange</td>
<td>100Mbps connection</td>
</tr>
<tr>
<td>Green</td>
<td>1Gbps connection</td>
</tr>
</tbody>
</table>
** 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.

<table>
<thead>
<tr>
<th>Audio Output Channels</th>
<th>Front Speaker (No. 7)</th>
<th>Rear Speaker (No. 5)</th>
<th>Central / Bass (No. 4)</th>
<th>Line In (No. 6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>V</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>4</td>
<td>V</td>
<td>V</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>6</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>--</td>
</tr>
<tr>
<td>8</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
</tbody>
</table>

To enable Multi-Streaming, you need to connect a front panel audio cable to the front panel audio header. After restarting your computer, you will find the “Mixer” tool on your system. Please select “Mixer ToolBox”, click “Enable playback multi-streaming”, and click “ok”. Choose “2CH”, “4CH”, “6CH”, or “8CH” and then you are allowed to select “Realtek HDA Primary output” to use the Rear Speaker, Central/Bass, and Front Speaker, or select “Realtek HDA Audio 2nd output” to use the front panel audio.

*** Use the Rear Button Switch to adjust the function of this switch.

A: Clear CMOS Button (default); B: Power Button.
1.5 Intel® Dual Band Wireless-AC 8265 (AC Wave 2 + BLE BT4.2) and ASRock WiFi 2.4/5 GHz Antenna

WiFi-802.11ac + BT Module

This motherboard comes with an exclusive WiFi 802.11 a/b/g/n/ac + BT v4.2 module (pre-installed on the rear I/O panel) that offers support for WiFi 802.11 a/b/g/n/ac connectivity standards and Bluetooth v4.2. WiFi + BT module is an easy-to-use wireless local area network (WLAN) adapter to support WiFi + BT. Bluetooth v4.2 standard features Smart Ready technology that adds a whole new class of functionality into the mobile devices. BT 4.2 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 867Mbps.

* The transmission speed may vary according to the environment.

ASRock WiFi 2.4/5 GHz Antenna
Chapter 2 Installation

This is a Mini-ITX 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 overtighten the screws! Doing so may damage the motherboard.
2.1 Installing the CPU

**CAUTION:**
Please note that X299 platform is only compatible with the **LGA 2066 socket**, which is incompatible with the LGA 2011-3 socket (for X99 platform).

1. Before you insert the **2066-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.
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. Apply thermal paste to the CPU.
2. Attach the heatsink and secure it with screws.
2.3 Installation of Memory Modules (SO-DIMM)

This motherboard provides four 260-pin DDR4 (Double Data Rate 4) SO-DIMM slots, and supports Quad Channel Memory Technology.

Quad Channel Memory Configuration

<table>
<thead>
<tr>
<th>DDR4_A1</th>
<th>DDR4_B1</th>
<th>DDR4_D1</th>
<th>DDR4_C1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Populated</td>
<td>Populated</td>
<td>Populated</td>
<td>Populated</td>
</tr>
</tbody>
</table>

- If only two memory modules are installed in the DDR4 SO-DIMM slots, then Dual Channel Memory Technology is activated. If three memory modules are installed, then Triple Channel Memory Technology is activated.

1. For quad channel configuration, you always need to install identical (the same brand, speed, size and chip-type) DDR4 SO-DIMM pairs.
2. It is not allowed to install a DDR, DDR2 or DDR3 memory module into a DDR4 slot; otherwise, this motherboard and SO-DIMM may be damaged.
3. The SO-DIMM only fits in one correct orientation. It will cause permanent damage to the motherboard and the SO-DIMM if you force the SO-DIMM into the slot at incorrect orientation.
2.4 Expansion Slot (PCI Express Slot)

There is 1 PCI Express slot 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 slot:

PCIE1 (PCIe 3.0 x16 slot) is used for PCI Express x16 lane width graphics cards.
2.5 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.6, No. 5)

Connect the power switch, reset switch 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.

GND
RESET #
PWRBTN #
PLED -
PLED +
HDLED-
HDLED +

1
GND
RESET#
HDLED-
HDLED +
PWRBTN (Power Switch):
Connect to the power switch on the chassis front panel. You may configure the way to turn off your system using the power switch.

RESET (Reset Switch):
Connect to the reset switch on the chassis front panel. Press the reset switch to restart the computer if the computer freezes and fails to perform a normal restart.

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 switch, reset switch, power LED, hard drive activity LED, speaker and etc. When connecting your chassis front panel module to this header, make sure the wire assignments and the pin assignments are matched correctly.
Power LED and Speaker Header
(7-pin SPK_PLED1)
(see p.6, No. 10)

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

Serial ATA3 Connectors
(SATA3_2_3: SATA3_6_7  SATA3_4_5  SATA3_2_3)
(see p.8, No. 21)
(SATA3_4_5: see p.8, No. 22)
(SATA3_6_7: see p.8, No. 23)

These six SATA3 connectors support SATA data cables for internal storage devices with up to 6.0 Gb/s data transfer rate.

USB 2.0 Header
(9-pin USB_5_6)
(see p.8, No. 20)

This USB 2.0 header can support two ports.

USB 3.1 Gen1 Header
(19-pin USB_7_8)
(see p.8, No. 24)

This USB 3.1 Gen1 header can support two ports.

Front Panel Audio Header
(9-pin HD_AUDIO1)
(see p.6, No. 14)

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”.

<table>
<thead>
<tr>
<th>Chassis Optional/Water Pump Fan Connector</th>
<th>CPU Fan Connector</th>
<th>CPU Optional/Water Pump Fan Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>(4-pin CHA_FAN1/W_PUMP)</td>
<td>(4-pin CPU_FAN1)</td>
<td>(4-pin CPU_OPT/W_PUMP)</td>
</tr>
<tr>
<td>(see p.6, No. 1)</td>
<td>(see p.6, No. 8)</td>
<td>(see p.6, No. 9)</td>
</tr>
</tbody>
</table>

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

This motherboard provides 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.

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.6, No. 11)

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.6, No. 6)

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

TPM Header
(17-pin TPMS1)
(see p.6, No. 16)

This connector supports 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.

RGB LED Header
(4-pin RGB_LED1)
(see p.6, No. 4)

This 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 43 for further instructions on this header.
**Virtual RAID On CPU Header**  
(4-pin VROC1)  
(see p.6, No. 2)

This connector supports Intel® Virtual RAID on CPU and NVME/AHCI RAID on CPU PCIE.

With the introduction of the Intel VROC product, there are three modes of operation:

<table>
<thead>
<tr>
<th>SKU</th>
<th>HW key required</th>
<th>Key features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pass-thru</td>
<td>Not needed</td>
<td>• Pass-thru only (no RAID)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• LED Management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Hot Plug Support</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• RAID 0 support for Intel Fultondale NVMe SSDs</td>
</tr>
<tr>
<td>Standard</td>
<td>VROCSTANMOD</td>
<td>• Pass-thru SKU features</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• RAID 0, 1, 10</td>
</tr>
<tr>
<td>Premium</td>
<td>VROCPREMMOD</td>
<td>• Standard SKU features</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• RAID 5</td>
</tr>
<tr>
<td></td>
<td>VROCISSDMOD</td>
<td>• RAID 5 Write Hole Closure</td>
</tr>
</tbody>
</table>

*Only Intel SSDs are supported.*

*For further details on VROC, please refer to the official information released by Intel.*
2.6 Smart Switches

The motherboard has two smart switches: Rear Button Switch and Clear CMOS Button/Power Button.

Rear Button Switch
(REAR_BTN_SEL1)
(see p.6, No. 13)

Rear Button Switch allows users to easily adjust the function of the Clear CMOS Button/Power Button on the rear panel I/O. A: Clear CMOS Button (default); B: Power Button

Clear CMOS Button/Power Button
(REAR_BTN)
(see p.10, No. 13)

The function of this button can be adjusted by the Rear Button Switch. Clear CMOS Button (default) allows users to quickly clear the CMOS values. Power Button allows users to quickly turn on/off the system.

Clear CMOS is workable only when you power off your computer and unplug the power supply.
2.7 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).

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.

<table>
<thead>
<tr>
<th>No.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nut Location</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>PCB Length</td>
<td>3cm</td>
<td>4.2cm</td>
<td>6cm</td>
<td>8cm</td>
</tr>
<tr>
<td>Module Type</td>
<td>Type2230</td>
<td>Type 2242</td>
<td>Type2260</td>
<td>Type 2280</td>
</tr>
</tbody>
</table>
Step 3

Move the standoff based on the module type and length. The standoff is placed at the nut location D by default. Skip Step 3 and 4 and go straight to Step 5 if you are going to use the default nut. Otherwise, release the standoff by hand.

Step 4

Peel off the yellow protective film on the nut to be used. Hand tighten the standoff into the desired nut location on the motherboard.

Step 5

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 6

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

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Interface</th>
<th>P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADATA</td>
<td>SATA3</td>
<td>AXNS330E-32GM-B</td>
</tr>
<tr>
<td>ADATA</td>
<td>SATA3</td>
<td>AXNS381E-128GM-B</td>
</tr>
<tr>
<td>ADATA</td>
<td>SATA3</td>
<td>AXNS381E-256GM-B</td>
</tr>
<tr>
<td>ADATA</td>
<td>SATA3</td>
<td>ASU800NS38-256GT-C</td>
</tr>
<tr>
<td>ADATA</td>
<td>SATA3</td>
<td>ASU800NS38-512GT-C</td>
</tr>
<tr>
<td>ADATA</td>
<td>PCIe x4</td>
<td>ASX8000NP-256GM-C</td>
</tr>
<tr>
<td>ADATA</td>
<td>PCIe x4</td>
<td>ASX8000NP-512GM-C</td>
</tr>
<tr>
<td>Crucial</td>
<td>SATA3</td>
<td>CT120M500SSD4</td>
</tr>
<tr>
<td>Crucial</td>
<td>SATA3</td>
<td>CT240M500SSD4</td>
</tr>
<tr>
<td>Kingston</td>
<td>SATA3</td>
<td>SM2280S3</td>
</tr>
<tr>
<td>Kingston</td>
<td>PCIe x4</td>
<td>SH2280S3/480G</td>
</tr>
<tr>
<td>OCZ</td>
<td>PCIe x4</td>
<td>RVD400-M2280-512G (NVME)</td>
</tr>
<tr>
<td>Plextor</td>
<td>PCIe x4</td>
<td>PX-128M8PeG</td>
</tr>
<tr>
<td>Plextor</td>
<td>PCIe x4</td>
<td>PX-1T8M8PeG</td>
</tr>
<tr>
<td>Plextor</td>
<td>PCIe x4</td>
<td>PX-256M8PeG</td>
</tr>
<tr>
<td>Plextor</td>
<td>PCIe x4</td>
<td>PX-512M8PeG</td>
</tr>
<tr>
<td>Plextor</td>
<td>PCIe</td>
<td>PX-G256M6e</td>
</tr>
<tr>
<td>Plextor</td>
<td>PCIe</td>
<td>PX-G512M6e</td>
</tr>
<tr>
<td>Samsung</td>
<td>PCIe x4</td>
<td>SM961 MZVPW128HEGM (NVM)</td>
</tr>
<tr>
<td>Samsung</td>
<td>PCIe x4</td>
<td>PM961 MZVLW128HEGR (NVME)</td>
</tr>
<tr>
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<td>PCIe x4</td>
<td>960 EVO (MZ-V6E250BW) (NVME)</td>
</tr>
<tr>
<td>Samsung</td>
<td>PCIe x4</td>
<td>960 EVO (MZ-V6E250) (NVME)</td>
</tr>
<tr>
<td>Samsung</td>
<td>PCIe x4</td>
<td>SM951 (MZHPV256HDGL)</td>
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<tr>
<td>Samsung</td>
<td>PCIe x4</td>
<td>SM951 (NVME)</td>
</tr>
<tr>
<td>Samsung</td>
<td>PCIe x4</td>
<td>SM951 (MZHPV512HDGL)</td>
</tr>
<tr>
<td>Samsung</td>
<td>PCIe x4</td>
<td>SM951 (NVME)</td>
</tr>
<tr>
<td>Samsung</td>
<td>PCIe x4</td>
<td>XP941-512G (MZHPU512HCGL)</td>
</tr>
<tr>
<td>SanDisk</td>
<td>PCIe</td>
<td>SD6PP4M-128G</td>
</tr>
<tr>
<td>SanDisk</td>
<td>PCIe</td>
<td>SD6PP4M-256G</td>
</tr>
<tr>
<td>Team</td>
<td>SATA3</td>
<td>TM4PS4128GMC105</td>
</tr>
<tr>
<td>Team</td>
<td>SATA3</td>
<td>TM4PS4256GMC105</td>
</tr>
<tr>
<td>Team</td>
<td>SATA3</td>
<td>TM8PS4128GMC105</td>
</tr>
<tr>
<td>Team</td>
<td>SATA3</td>
<td>TM8PS4256GMC105</td>
</tr>
<tr>
<td>Transcend</td>
<td>SATA3</td>
<td>TS256GMTS400</td>
</tr>
<tr>
<td>Transcend</td>
<td>SATA3</td>
<td>TS512GMTS600</td>
</tr>
<tr>
<td>Transcend</td>
<td>SATA3</td>
<td>TS512GMTS800</td>
</tr>
<tr>
<td>V-Color</td>
<td>SATA3</td>
<td>VLM100-120G-2280-B-RD</td>
</tr>
<tr>
<td>V-Color</td>
<td>SATA3</td>
<td>VLM100-240G-2280-B-RD</td>
</tr>
<tr>
<td>V-Color</td>
<td>SATA3</td>
<td>VSM100-240G-2280</td>
</tr>
<tr>
<td>WD</td>
<td>SATA3</td>
<td>WDS100T1B0B-00AS40</td>
</tr>
<tr>
<td>WD</td>
<td>SATA3</td>
<td>WDS240G1G0B-00RC30</td>
</tr>
<tr>
<td>WD</td>
<td>PCIe x4</td>
<td>WDS256G1X0C-00ENX0 (NVME)</td>
</tr>
</tbody>
</table>
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
2.8 M.2_SSD (NGFF) Module Installation Guide (M2_2 and 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 Sockets (M2_2 and M2_3) support M.2 PCI Express module up to Gen3 x4 (32 Gb/s).

Installing the M.2_SSD (NGFF) Module

**Step 1**

This motherboard supports M.2_SSD (NGFF) module type 2280 only. Prepare a proper PCB length of module (8cm) and the screw.

**Step 2**

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 3**

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

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Size</th>
<th>Interface</th>
<th>P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel</td>
<td>256GB</td>
<td>PCIe3 x4</td>
<td>SSDPEKKF256G7</td>
</tr>
<tr>
<td>Intel</td>
<td>512GB</td>
<td>PCIe3 x4</td>
<td>SSDPEKKF512G7</td>
</tr>
<tr>
<td>Kingston</td>
<td>480GB</td>
<td>PCIe2 x4</td>
<td>SH2280S3/480G</td>
</tr>
<tr>
<td>OCZ</td>
<td>512GB</td>
<td>PCIe3 x4</td>
<td>RVD400 -M2280-512G (NVME)</td>
</tr>
<tr>
<td>Plextor</td>
<td>128GB</td>
<td>PCIe3 x4</td>
<td>PX-128M8PeG</td>
</tr>
<tr>
<td>Plextor</td>
<td>1TB</td>
<td>PCIe3 x4</td>
<td>PX-1TM8PeG</td>
</tr>
<tr>
<td>Plextor</td>
<td>256GB</td>
<td>PCIe3 x4</td>
<td>PX-256M8PeG</td>
</tr>
<tr>
<td>Plextor</td>
<td>256GB</td>
<td>PCIe</td>
<td>PX-G256M6e</td>
</tr>
<tr>
<td>Plextor</td>
<td>512GB</td>
<td>PCIe3 x4</td>
<td>PX-512M8PeG</td>
</tr>
<tr>
<td>Plextor</td>
<td>512GB</td>
<td>PCIe</td>
<td>PX-G512M6e</td>
</tr>
<tr>
<td>Samsung</td>
<td>256GB</td>
<td>PCIe3 x4</td>
<td>SM951 (MZHPV256HDGL)</td>
</tr>
<tr>
<td>Samsung</td>
<td>256GB</td>
<td>PCIe3 x4</td>
<td>SM951 (NVME)</td>
</tr>
<tr>
<td>Samsung</td>
<td>512GB</td>
<td>PCIe3 x4</td>
<td>SM951 (MZHPV512HDGL)</td>
</tr>
<tr>
<td>Samsung</td>
<td>512GB</td>
<td>PCIe3 x4</td>
<td>SM951 (NVME)</td>
</tr>
<tr>
<td>Samsung</td>
<td>512GB</td>
<td>PCIe x4</td>
<td>XP941-512G (MZHPU512HCGL)</td>
</tr>
</tbody>
</table>

For the latest updates of M.2_SSD (NGFF) module support list, please visit our website for details: [http://www.asrock.com](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 A-Tuning

A-Tuning is ASRock’s multi purpose software suite with a new interface, more new features and improved utilities.

3.2.1 Installing A-Tuning

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

3.2.2 Using A-Tuning

There are five sections in A-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 A-Tuning. Click to select "Auto run at Windows Startup" if you want A-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 \[\text{Free}\] to start downloading.

![App icon](image1)

**Step 4**

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

![App icon](image2)

To uninstall it, simply click on the trash can icon \[\text{Trash}\].

*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 ASRock RGB LED

ASRock RGB LED 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 Header (RGB_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 standard 5050 RGB LED strip (12V/G/R/B), with a maximum power rating of 3A (12V) and length within 2 meters.
ASRock RGB LED Utility

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

Drag the tab to customize your preference.

Select a RGB LED light effect from the drop-down menu.

Toggle on/off the RGB LED switch

Sync RGB LED effects for all LED regions of the motherboard

Select a RGB LED light effect from the drop-down menu.
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 <Del> 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.

<table>
<thead>
<tr>
<th>No.</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Help</td>
</tr>
<tr>
<td>2</td>
<td>Load UEFI Defaults</td>
</tr>
<tr>
<td>3</td>
<td>Save Changes and Exit</td>
</tr>
<tr>
<td>4</td>
<td>Discard Changes</td>
</tr>
<tr>
<td>5</td>
<td>Change Language</td>
</tr>
<tr>
<td>6</td>
<td>Switch to Advanced Mode</td>
</tr>
</tbody>
</table>
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:

<table>
<thead>
<tr>
<th>Selection</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main</strong></td>
<td>For setting system time/date information</td>
</tr>
<tr>
<td><strong>OC Tweaker</strong></td>
<td>For overclocking configurations</td>
</tr>
<tr>
<td><strong>Advanced</strong></td>
<td>For advanced system configurations</td>
</tr>
<tr>
<td><strong>Tool</strong></td>
<td>Useful tools</td>
</tr>
<tr>
<td><strong>H/W Monitor</strong></td>
<td>Displays current hardware status</td>
</tr>
<tr>
<td><strong>Boot</strong></td>
<td>For configuring boot settings and boot priority</td>
</tr>
<tr>
<td><strong>Security</strong></td>
<td>For security settings</td>
</tr>
<tr>
<td><strong>Exit</strong></td>
<td>Exit the current screen or the UEFI Setup Utility</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Navigation Key(s)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ / -</td>
<td>To change option for the selected items</td>
</tr>
<tr>
<td>&lt;Tab&gt;</td>
<td>Switch to next function</td>
</tr>
<tr>
<td>&lt;PGUP&gt;</td>
<td>Go to the previous page</td>
</tr>
<tr>
<td>&lt;PGDN&gt;</td>
<td>Go to the next page</td>
</tr>
<tr>
<td>&lt;HOME&gt;</td>
<td>Go to the top of the screen</td>
</tr>
<tr>
<td>&lt;END&gt;</td>
<td>Go to the bottom of the screen</td>
</tr>
<tr>
<td>&lt;F1&gt;</td>
<td>To display the General Help Screen</td>
</tr>
<tr>
<td>&lt;F5&gt;</td>
<td>Add / Remove Favorite</td>
</tr>
<tr>
<td>&lt;F6&gt;</td>
<td>Enter / Exit EZ Mode</td>
</tr>
<tr>
<td>&lt;F7&gt;</td>
<td>Discard changes and exit the SETUP UTILITY</td>
</tr>
<tr>
<td>&lt;F9&gt;</td>
<td>Load optimal default values for all the settings</td>
</tr>
<tr>
<td>&lt;F10&gt;</td>
<td>Save changes and exit the SETUP UTILITY</td>
</tr>
<tr>
<td>&lt;F12&gt;</td>
<td>Print screen</td>
</tr>
<tr>
<td>&lt;ESC&gt;</td>
<td>Jump to the Exit Screen or exit the current screen</td>
</tr>
</tbody>
</table>
4.4 Main Screen

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

**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.

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

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 Mesh Max Ratio
Sets the maximum OC Ratio for the CPU Mesh Domain.

CPU Mesh Min Ratio
Sets the minimum OC Ratio for the CPU Mesh Domain.

Flex Ratio
Sets the value for the CPU Flex 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 Step
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 Reset Range
Configure the BCLK Reset Range. Issue a reset when BCLK overclocking exceed this range.

Stable Delay
Configure the delay time after BCLK settings for stable signals.

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

SRC PLL Spread Spectrum
Enable SRC PLL 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.

SRC BCLK Amplitude
Configure the BCLK Amplitude for SRC.

SATA BCLK Amplitude
Configure the BCLK Amplitude for SATA.

CPU1 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.

CPU2/SRC1 Slew Rate
Configure the CPU2/SRC1 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.

SRCO Slew Rate
Configure the SRCO 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.

SATA Slew Rate
Configure the SRCO 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.

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

CPU Output Divider
Configure the CPU output divider.

SRC Output Divider
Configure the SRC output divider.
PCIE PLL Divider
Configure the PCIE PLL divider.

SRCO Source
Select CPU PLL or PCIE PLL as the SRCO source.

ClockGen Delay
Configure the delay at the beginning of Clockgen.

ClockGen GPIO
Configure the General-purpose input/output (GPIO) at the beginning of Clockgen.

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

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

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.

Intel Turbo Boost Max 3.0 Technology
Processors supporting the Intel Turbo Boost Max Technology 3.0 feature contain at least one processor core whose maximum turbo frequency is higher than the others.

Adjust Pll
Adjust the Pll for higher -BCLK ratio combination.

Change Pll Trim Value
Adjust the Pll value between +63 to -63.

Change Pll Trim Prefix
Adjust the Pll Trim Prefix.
Change MC-Pll Trim Value
Adjust the MC-Pll value between +63 to -63.

Change MC-Pll Trim Prefix
Adjust the MC-Pll Trim Prefix.

TJ-Max offset
Adjust the TJ-Max offset.

DCST LUT0
Configure the DCST LUT0.

DCST LUT1
Configure the DCST LUT1.

DCST LUT2
Configure the DCST LUT2.

DCST LUT3
Configure the DCST LUT3.

AVX2 Negative Offset
AVX2 Negative Offset reduces core frequency. The AVX2 Negative Offset specifies a negative offset from the Turbo Ratio Limit for AVX2 workloads.

AVX3 Negative Offset
AVX3 Negative Offset reduces core frequency. The AVX3 Negative Offset specifies a negative offset from the Turbo Ratio Limit for AVX3 workloads.

Current Limit
Configure the current limit of the CPU under Turbo Mode in ampere. A lower limit can protect the CPU and save power, while a higher limit may improve performance.

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.

DRAM Configuration

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

DRAM Reference Clock
Select Auto for optimized settings.

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 (tRCD)
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 (tRP)
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)
The number of clocks between two rows activated in different banks of the same rank.

RAS to RAS Delay (tRRD_L)
The number of clocks between two rows activated in different banks of the same rank.

Write to Read Delay (tWTR)
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_L)
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.

**tCCD**
Configure back to back CAS to CAS (i.e. READ to RAED or WRITE to WRITE) from same rank separation parameter.

**tCCD_L**
Configure back to back CAS to CAS (i.e. READ to RAED or WRITE to WRITE) from same rank separation parameter.

**tCCD_WR_L**
Configure back to back CAS to CAS (i.e. READ to RAED or WRITE to WRITE) from same rank separation parameter.

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

**tRRDR**
Configure Read to Read different rank dead cycle Back to back READ to WRITE from different DIMM separation parameter.

**tRRDD**
Use this item to change tRRDD setting. The default is [Auto].

**tRWSR**
Use this item to change tRWSR setting. The default is [Auto].
tRWDS
Use this item to change tRWDS setting. The default is [Auto].

tRWDR
Use this item to change tRWDR setting. The default is [Auto].

tRWDD
Use this item to change tRWDD setting. The default is [Auto].

tWRDS
Use this item to change tWRDS setting. The default is [Auto].

tWRDR
Use this item to change tWRDR setting. The default is [Auto].

tWRDD
Use this item to change tWRDD setting. The default is [Auto].

tWWDS
Use this item to change tWWDS setting. The default is [Auto].

tWWDR
Use this item to change tWWDR setting. The default is [Auto].

tWWDD
Use this item to change tWWDD setting. The default is [Auto].

Advanced 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 WR (C1)
Configure the memory on die termination resistors' WR for channel C1.
ODT WR (C2)
Configure the memory on die termination resistors’ WR for channel C2.

ODT WR (D1)
Configure the memory on die termination resistors’ WR for channel D1.

ODT WR (D2)
Configure the memory on die termination resistors’ WR for channel D2.

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.

ODT PARK (C1)
Configure the memory on die termination resistors’ PARK for channel C1.

MRC Promote Warnings
Determines if MRC warnings are promoted to system level.

Promote Warnings
Determines if warnings are promoted to system level.

Halt on mem Training Error
Use this item to enable or disable Halt on memory Training Error.

Memory Test
Use this item to enable or disable memory test during normal boot.

MemTestLoops
Set the number of memory test loops during normal boot.

Memory Test On Fast Boot
Use this item to enable or disable memory test during fast boot.
Attempt Fast Boot
Use this item to enable or disable memory test during fast boot.

Attempt Fast Cold Boot
When enabled, portions of memory reference code will be skipped when it is possible to increase boot speed.

Voltage Configuration

CPU Input Voltage
The external voltage input to the CPU.

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

DRAM AB Voltage
Configure the voltage for the DRAM AB.

DRAM CD Voltage
Configure the voltage for the DRAM CD.

1.0 PCH Voltage
Configure the chipset voltage (1.0V).

VCCIO Voltage
Configure the voltage for the VCCIO.

VCCSA Voltage
Configure the voltage for the VCCSA.

FIVR Configuration

Core Voltage Mode
Selects between Adaptive and Override Voltage modes. In Override Mode, the voltage selected will be applied over all operating frequencies. In Adaptive mode, the voltage is interpolated only in turbo mode.

Core Voltage Override
Specifies the Override Voltage applied to the IA Core domain. This voltage is specified in millivolts.
Core Extra Turbo Voltage
Specifies the extra turbo voltage applied while the IA Core is operating in turbo mode.

Core Voltage Offset
Specifies the offset voltage applied to the IA Core domain. This voltage is specified in millivolts.

Offset Prefix
Sets the offset value as positive or negative.

CPU Mesh Voltage Mode
Selects between Adaptive and Override Voltage modes. In Override Mode the voltage selected will be applied over all operating frequencies. In Adaptive Mode the voltage is interpolated only in turbo mode.

CPU Mesh Voltage Override
Specifies the Override Voltage applied to the GT domain. This voltage is specified in millivolts.

CPU Mesh Extra Turbo Voltage
Specifies the extra turbo voltage applied while GT is operating in turbo mode. Unit is in millivolts.

CPU Mesh Voltage Offset
Specifies the Offset Voltage applied to the GT domain. This voltage is specified in millivolts.

Offset Prefix
Sets the offset value as positive or negative.

Uncore Voltage Offset
Specifies the Offset Voltage applied to the Uncore domain. This voltage is specified in millivolts.

Offset Prefix
Sets the offset value as positive or negative.
FIVR Faults
Enable/Disable FIVR Faults. When FIVR faults are disabled, OVP and OCP protection mechanism will be masked. This is a dangerous configuration and the risk of using it is assumed by the user.

FIVR Efficiency Management
FIVR efficiency management is good for power delivery efficiency, but it may be an impediment to proper power delivery control under overclocking, particularly BCLK overclocking.

SVID Support
Enable/Disable SVID. Disabling SVID disables input voltage overrides.

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, ACPI Configuration, USB Configuration and Trusted Computing.

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

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 and C7 all enabled for better power saving.

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

CPU C6 State Support
Enable C6 deep 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.

Intel Safer Mode Extensions (SMX)
Enable/disable the Intel SMX (Safer Mode Extensions).

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.
4.6.2 Chipset Configuration

Above 4GB MMIO BIOS Assignment
Enable/disable above 4GB MemoryMappedI0 BIOS assignment. This is disabled automatically when Aperture Size is set to 2048MB.

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 Width
Select the link width for PCIE1.

PCIE1 Link Speed
Select the link speed for PCIE1.

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

Onboard LAN
Enable or disable the onboard network interface controller.

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

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.

WAN Radio
Enable/disable the WiFi module's connectivity.

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 LED in S5
Turn on/off the LED in the ACPI S5 state.
4.6.3 Storage Configuration

SATA Controller(s)
Enable/disable the SATA controllers.

SATA Controller Speed
Indicates the maximum speed the SATA controller can support.

SATA Mode Selection
[AHCI]: Supports new features that improve performance.
[RAID]: Combine multiple disk drives into a logical unit.

Alternate ID
Alternate ID allows you to enable or disable the report for the alternate device ID.

[Enabled]: Enable the RSTe (Rapid Storage Technology enterprise) feature.
[Disabled]: Enable the RST (Rapid Storage Technology) feature.

*Please note that if you install CPU with 44 lanes or 28 lanes, RSTe does not support PCH PCIe NVME and VROC (Intel® Virtual RAID on CPU) is supported.
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.
4.6.4 ACPI Configuration

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

PCIE Devices Power On
Allow the system to be waked up by a PCIE device and enable wake on 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.
4.6.5 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.

PS/2 Simulator
Enable PS/2 Simulator. This should be enabled for the complete USB keyboard legacy support for non-USB aware OSes.

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

Security Device Support
Enable or disable BIOS support for security device.
4.7 Tools

RGB LED
ASRock RGB LED 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.

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.
Network Configuration

Use this to configure internet connection settings for Internet Flash.

Internet Setting

Enable or disable sound effects in the setup utility.

UEFI Download Server

Select a server to download the UEFI firmware.
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-Tastic Tuning

Select a fan mode for CPU Fans 1&2, 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 Step Up

Set the value of CPU Fan Step Up.

CPU Fan Step Down

Set the value of CPU Fan Step Down.

CPU_OPT / W_Pump Switch

Select CPU Optional or Water Pump mode.
CPU Optional Fan Control Mode
Select PWM mode or DC mode for CPU Optional fan.

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

CPU Optional Fan Temp Source
Select a fan temperature source for CPU Optional fan.

CPU Optional Fan Step Up
Set the value of CPU Optional fan Step Up.

CPU Optional Fan Step Down
Set the value of CPU Optional fan Step Down.

CHA_FAN1 / W_Pump Switch
Select Chassis Optional or Water Pump mode.

Chassis Fan 1 Control Mode
Select PWM mode or DC mode for Chassis Optional fan.

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.

Over Temperature Protection
When Over Temperature Protection is enabled, the system automatically shuts down when the motherboard is overheated.
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.

![Security Screen Image]

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 Windows 8.1 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.

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](image)

CSM
Enable to launch the Compatibility Support Module. Please do not disable unless you’re running a WHCK test. If you are using Windows 8.1 64-bit and all of your devices support UEFI, you may also disable CSM for faster boot speed.

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.

**Launch Video 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.
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 http://www.asrock.com/support/tsd.asp

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