TUF GAMING B450M-PLUS II

Motherboard

E17210
First Edition
August 2020

Contents

Safety information

Electrical safety

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

Operation safety

- Before installing the motherboard and adding components, carefully read all the manuals that came with the package.
- Before using the product, ensure all cables are correctly connected and the power cables are not damaged. If you detect any damage, contact your dealer immediately.
- To avoid short circuits, keep paper clips, screws, and staples away from connectors, slots, sockets and circuitry.
- Avoid dust, humidity, and temperature extremes. Do not place the product in any area where it may be exposed to moisture.
- Place the product on a stable surface.
- If you encounter technical problems with the product, contact a qualified service technician or your retailer.
- Your motherboard should only be used in environments with ambient temperatures between 0°C and 40°C.

About this guide

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

How this guide is organized

This guide contains the following parts:

- **Chapter 1: Product Introduction**

  This chapter describes the features of the motherboard and the new technology it supports. It includes descriptions of the switches, jumpers, and connectors on the motherboard.

- **Chapter 2: BIOS and RAID Support**

  This chapter tells how to boot into the BIOS, upgrade BIOS using the EZ Flash Utility and support on RAID.

Where to find more information

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

1. **ASUS website**

   The ASUS website provides updated information on ASUS hardware and software products. Refer to the ASUS contact information.

2. **Optional documentation**

   Your product package may include optional documentation, such as warranty flyers, that may have been added by your dealer. These documents are not part of the standard package.

Conventions used in this guide

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

CAUTION: Information to prevent damage to the components and injuries to yourself when trying to complete a task.

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

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

Package contents

Check your motherboard package for the following items.

Motherboard	1 x TUF GAMING B450M-PLUS II motherboard
Cables	2 x SATA 6Gb/s cables
Miscellaneous	1 x I/O Shield 1 x M.2 SSD screw package 1 x TUF Gaming sticker
Application DVD	1 x Support DVD
Documentation	1 x TUF Certification card 1 x User manual

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

TUF GAMING B450M-PLUS II specifications summary

CPU	AMD Socket AM4 for 3rd/2nd/1st Gen AMD Ryzen™/ 2nd and 1st Gen AMD Ryzen™ with Radeon™ Vega Graphics/ Athlon™ with Radeon™ Vega Graphics Processors* ***Refer to www.asus.com for CPU support list.**
Chipset	AMD B450 Chipset
Memory	4 x DIMM, Max. 128GB, DDR4 4400(O.C.)/4000(O.C.)/3866(O.C.)/3733(O.C.)/3600(O.C.)/3533(O.C.)/3466(O.C.)/3400(O.C.)/3200(O.C.)/3000(O.C.)/2800(O.C.)/2666/2400/2133 MHz Un-buffered Memory* Dual Channel Memory Architecture ***ECC Memory (ECC mode) support varies by CPU.** ***The maximum memory frequency supported varies by processor.** ***Refer to www.asus.com for the Memory QVL (Qualified Vendors Lists).**
Graphics	**Integrated Graphics in the 2nd and 1st Gen AMD Ryzen™ with Radeon™ Vega Graphics/ Athlon™ with Radeon™ Vega Graphics Processors** 1 x HDMI™ 2.0b 1 x DVI-D ***Graphics specifications may vary between CPU types.**
Expansion Slots	**3rd/2nd/1st Gen AMD Ryzen™ Processors** 1 x PCIe 3.0 x16 slot (supports x16 mode) **2nd and 1st Gen AMD Ryzen™ with Radeon™ Vega Graphics Processors** 1 x PCIe 3.0 x16 slot (supports x8 mode) **AMD Athlon™ with Radeon™ Vega Graphics Processors** 1 x PCIe 3.0 x16 slot (supports x4 mode) **AMD B450 Chipset** 1 x PCIe 2.0 x16 slot (supports x4 mode) 1 x PCIe 2.0 x1 slot
Multi-GPU Support	Supports AMD 2-Way CrossFireX™ Technology

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TUF GAMING B450M-PLUS II specifications summary

Storage	**Total supports 1 x M.2 slot and 6 x SATA 6Gb/s ports** **3rd/2nd/1st Gen AMD Ryzen™/ 2nd and 1st Gen AMD Ryzen™ with Radeon™ Vega Graphics** 1 x M.2 slot (Key M), type 2242/2260/2280/22110 (supports PCIe 3.0 x4 & SATA modes)* **AMD Athlon™ with Radeon™ Vega Graphics Processors** 1 x M.2 slot (Key M), type 2242/2260/2280/22110 (supports SATA mode) **3rd/2nd/1st Gen AMD Ryzen™/ 2nd and 1st Gen AMD Ryzen™ with Radeon™ Vega Graphics/ Athlon™ with Radeon™ Vega Graphics Processors** 2 x SATA 6Gb/s ports with Raid 0, 1, 10 support **AMD B450 Chipset** 4 x SATA 6Gb/s ports with Raid 0, 1, 10 support ***The M.2 slot shares bandwidth with SATA6G_56. When the M.2 slot is populated, SATA6G_56 ports will be disabled.**
Ethernet	1 x Realtek RTL8111H 1Gb Ethernet TUF LANGuard
USB	**Rear USB (Total 6 ports)** 1 x USB 3.2 Gen 2 port (1 x Type-A) 3 x USB 3.2 Gen 1 ports (2 x Type-A + 1 x USB Type-C®) 2 x USB 2.0 ports (2 x Type-A) **Front USB (Total 6 ports)** 1 x USB 3.2 Gen 1 header supports additional 2 USB 3.2 Gen 1 ports 2 x USB 2.0 headers support additional 4 USB 2.0 ports
Audio	**Realtek 7.1 Surround Sound High Definition Audio CODEC*** - Supports: Jack detection, Multi-streaming, Front Panel Jack-retasking - Supports up to 24-Bit/192kHz playback **Audio Features** - Audio Shielding - Premium Japanese audio capacitors - Dedicated audio PCB layers - Audio cover ***A chassis with an HD audio module in the front panel is required to support 7.1 Surround Sound audio output.**
Back Panel I/O Ports	1 x USB 3.2 Gen 2 port (1 x Type-A) 3 x USB 3.2 Gen 1 ports (2 x Type-A + 1 x USB Type-C®) 2 x USB 2.0 ports (2 x Type-A) 1 x DVI-D 1 x HDMI™ port 1 x Realtek RTL8111H 1Gb Ethernet port 3 x Audio jacks 1 x BIOS FlashBack™ button 1 x PS/2 Keyboard/Mouse combo port

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TUF GAMING B450M-PLUS II specifications summary

Internal I/O Connectors	**Fan and cooling related** 1 x 4-pin CPU Fan header 2 x 4-pin Chassis Fan headers **Power related** 1 x 24-pin Main Power connector 1 x 8-pin +12V Power connector **Storage related** 1 x M.2 slot (Key M) 6 x SATA 6Gb/s ports **USB** 1 x USB 3.2 Gen 1 header supports additional 2 USB 3.2 Gen 1 ports 2 x USB 2.0 headers support additional 4 USB 2.0 ports **Miscellaneous** 1 x AURA RGB header 1 x Clear CMOS header 1 x COM Port header 1 x Front Panel Audio header (AAFP) 1 x Speaker header 1 x S/PDIF out header 1 x SPI TPM header (14-1 pin) 1 x 10-1 pin System Panel header
Special Features	**ASUS TUF PROTECTION** - ASUS DIGI+ VRM - ASUS Enhanced DRAM Overcurrent Protection - ASUS ESD Guards - TUF LANGuard - ASUS Overvoltage Protection - ASUS SafeSlot - ASUS Stainless-Steel Back I/O **ASUS Q-Design** - ASUS Q-DIMM - ASUS Q-Slot **ASUS Thermal Solution** - Aluminum heatsink design **ASUS EZ DIY** - BIOS FlashBack™ button - BIOS FlashBack™ LED **AURA Sync** - AURA RGB header

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TUF GAMING B450M-PLUS II specifications summary

Software Features	**ASUS Exclusive Software** Armoury Crate - Aura Creator - Aura Sync - AI Noise-Canceling Microphone AI Suite 3 - Performance And Power Saving Utility TurboV EVO EPU DIGI+ VRM Fan Xpert 2+ - EZ update - PC Cleaner TUF GAMING CPU-Z AI Charger ASUS Turbo LAN DAEMON Tools DTS Custom for GAMING Headsets Norton Anti-virus software (Free Trial for 60 days) WinRAR **UEFI BIOS** ASUS EZ DIY - ASUS CrashFree BIOS 3 - ASUS EZ Flash 3 - ASUS UEFI BIOS EZ Mode
BIOS	256 Mb Flash ROM, UEFI AMI BIOS
Manageability	WOL by PME, PXE
Operating System	Windows 10 64-bit Windows 7 64-bit* ***To support Windows 7 64-bit, please install an AMD Ryzen™ 2nd Generation or Ryzen™ 1st Generation Processor.**
Form Factor	mATX Form Factor 9.6 inch x 9.6 inch (24.4 cm x 24.4 cm)

Specifications are subject to change without notice. Refer to the ASUS website for the latest specifications.

Product Introduction

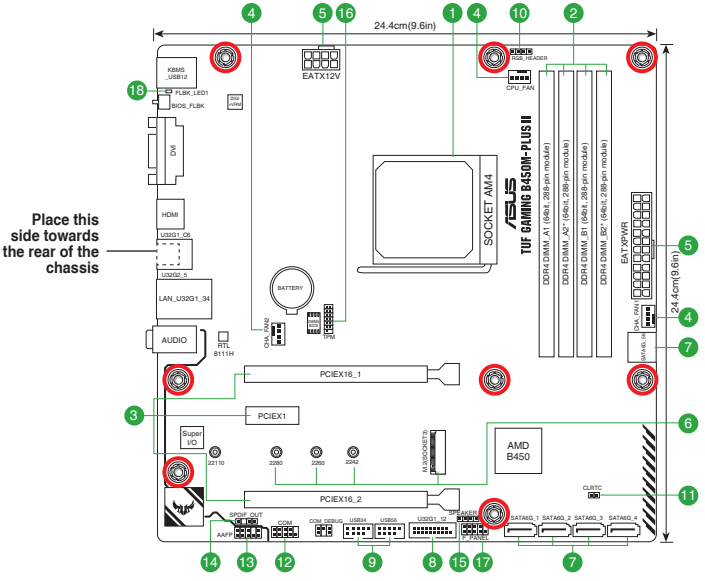
1

1.1 Before you proceed

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

- Unplug the power cord from the wall socket before touching any component.
- Before handling components, use a grounded wrist strap or touch a safely grounded object or a metal object, such as the power supply case, to avoid damaging them due to static electricity.
- Before you install or remove any component, ensure that the ATX power supply is switched off or the power cord is detached from the power supply. Failure to do so may cause severe damage to the motherboard, peripherals, or components.

1.2 Motherboard overview



Unplug the power cord before installing or removing the motherboard. Failure to do so can cause you physical injury and damage motherboard components.

1.2.1 Layout contents

1. CPU socket

The motherboard comes with an AMD Socket AM4 designed for 3rd/2nd/1st Gen AMD Ryzen™/ 2nd and 1st Gen AMD Ryzen™ with Radeon™ Vega Graphics/ Athlon™ with Radeon™ Vega Graphics Processors.

For more details, refer to **Central Processing Unit (CPU)**.

2. DDR4 DIMM slots

The motherboard comes with Dual Inline Memory Modules (DIMM) slots designed for DDR4 (Double Data Rate 4) memory modules.

For more details, refer to **System memory**.

3. Expansion slots

This motherboard supports two PCIe x16 graphics cards and one PCIe 2.0 x1 network card, SCSI card or other card that comply with the PCI Express specification. Please refer to the following table for the Hyper M.2 configuration.

Hyper M.2 x16 series card configuration

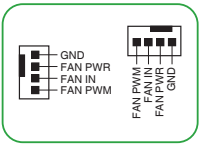
Slot	PCIe bifurcation settings in PCIe x16 slots with different Ryzen™ CPUs
PCIEX16_1	3rd/2nd/1st Gen AMD Ryzen™ Processors (Support PCIe Gen 3 SSDs)
	Supported SSDs
	4

- Hyper M.2 X16 series cards are sold separately.
- When using 3rd/2nd/1st Gen AMD Ryzen™ Processors and a Hyper M.2 X16 series card with 4 M.2 SSDs, if you wish to connect a display, we suggest installing a VGA card to PCIe X16_2, which will run at x4.
- Set PCIEX16_1 to **[PCIe RAID Mode]** under BIOS settings to enable the Hyper M.2 X16 series card.

4. Fan headers

The Fan headers allow you to connect fans to cool the system.

Header	Max. Current	Max. Power	Default Speed	Shared Control
CPU_FAN	1A	12W	Q-Fan Controlled	A
CHA_FAN1	1A	12W	Q-Fan Controlled	-
CHA_FAN2	1A	12W	Q-Fan Controlled	-



5. Power connectors

These Power connectors allow you to connect your motherboard to a power supply. The power supply plugs are designed to fit in only one orientation. Find the proper orientation and push down firmly until the power supply plugs are fully inserted.

Ensure to connect the 8-pin power plug.

- For a fully configured system, we recommend that you use a power supply unit (PSU) that complies with ATX 12V Specification 2.0 (or later version) and provides a minimum power of 350W.
- We recommend that you use a PSU with a higher power output when configuring a system with more power-consuming devices. The system may become unstable or may not boot up if the power is inadequate.
- If you are uncertain about the minimum power supply requirement for your system, we recommend you to refer to online resources for Power Supply Wattage Calculator.

6. M.2 Slot (Key M)

The M.2 slot allows you to install an M.2 device such as an M.2 SSD module.

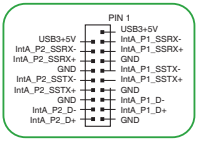
- For 3rd/2nd/1st Gen AMD Ryzen™/ 2nd and 1st Gen AMD Ryzen™ with Radeon™ Vega Graphics, M.2 slot supports PCIe 3.0 x4 and SATA modes M Key design and type 2242/2260/2280/22110 storage devices.
- For AMD Athlon™ with Radeon™ Vega Graphics Processors, M.2 slot supports SATA mode M Key design and type 2242/2260/2280/22110 storage devices.
- The M.2 slot shares bandwidth with SATA6G_56. When the M.2 slot is populated, SATA6G_56 will be disabled.

7. SATA 6Gb/s ports

The SATA 6Gb/s ports allow you to connect SATA devices such as optical disc drives and hard disk drives via a SATA cable.

8. USB 3.2 Gen 1 header

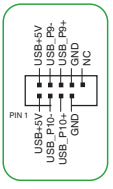
The USB 3.2 Gen 1 header allows you to connect a USB 3.2 Gen 1 module for additional USB 3.2 Gen 1 ports. The USB 3.2 Gen 1 header provides data transfer speeds of up to 5 Gb/s.



The USB 3.2 Gen 1 module is purchased separately.

9. USB 2.0 headers

The USB 2.0 headers allow you to connect a USB module for additional USB 2.0 ports. The USB 2.0 headers provide data transfer speeds of up to 480 Mb/s.

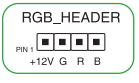


DO NOT connect a 1394 cable to the USB connectors. Doing so will damage the motherboard!

The USB 2.0 module is purchased separately.

10. AURA RGB header

The RGB header allows you to connect RGB LED strips.



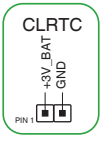
The RGB header supports 5050 RGB multi-color LED strips (12V/G/R/B), with a maximum power rating of 3A (12V), and no longer than 3m.

Before you install or remove any component, ensure that the ATX power supply is switched off or the power cord is detached from the power supply. Failure to do so may cause severe damage to the motherboard, peripherals, or components.

- Actual lighting and color will vary with LED strip.
- If your LED strip does not light up, check if the RGB LED extension cable and the RGB LED strip are connected in the correct orientation, and the 12V connector is aligned with the 12V header on the motherboard.
- The LED strip will only light up when the system is powered on.
- The LED strip is purchased separately.

11. Clear CMOS header

This header allows you to clear the CMOS RTC RAM data of the system setup information such as date, time, and system passwords.



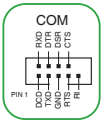
To erase the RTC RAM:

1. Turn OFF the computer and unplug the power cord.
2. Use a metal object such as a screwdriver to short the two pins.
3. Plug the power cord and turn ON the computer.
4. Hold down the <**Del**> key during the boot process and enter BIOS setup to re-enter data.

If the steps above do not help, remove the onboard battery and short the two pins again to clear the CMOS RTC RAM data. After clearing the CMOS, reinstall the battery.

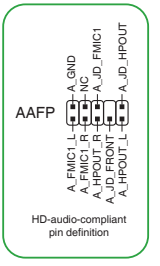
12. COM Port header

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



13. Front panel audio header

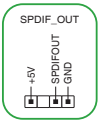
This header is for a chassis-mounted front panel audio I/O module that supports HD audio standard. Connect one end of the front panel audio I/O module cable to this header.



- We recommend that you connect a high-definition front panel audio module to this header to avail of the motherboard's high-definition audio capability.
- If you want to connect a high-definition front panel audio module to this header, set the Front Panel Type item in the BIOS setup to [HD Audio]. By default, this header is set to [HD Audio].

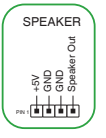
14. Digital audio connector

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



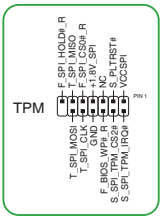
15. Speaker header

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



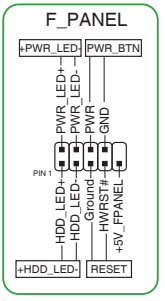
16. SPI TPM header

This header supports a Trusted Platform Module (TPM) system with a Serial Peripheral Interface (SPI), allowing you to securely store keys, digital certificates, passwords, and data. A TPM system also helps enhance network security, protects digital identities, and ensures platform integrity.



17. 10-1 pin System Panel header

This header supports several chassis-mounted functions.



- **System power LED (2-pin +PWR_LED-)**

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

- **Hard disk drive activity LED (2-pin +HDD_LED-)**

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

- **Power button/Soft-off button (2-pin PWR_BTN)**

  This header is for the system power button.

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

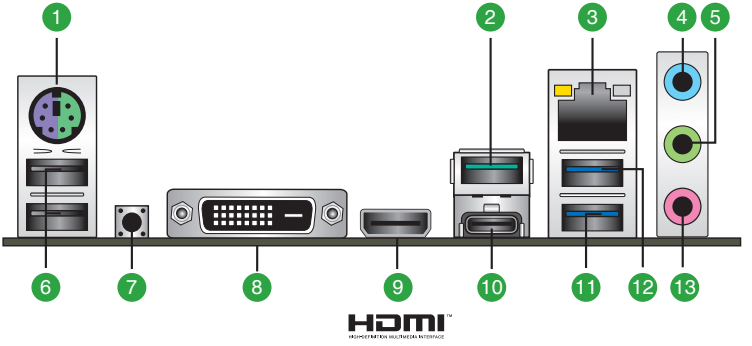
  This 2-pin header is for the chassis-mounted reset button for system reboot without turning off the system power.

18. BIOS Flashback™ LED

The FlashBack™ LED lights up or blinks to indicate the status of the BIOS FlashBack™.

Scan the QR code for more information on BIOS FlashBack™ function.

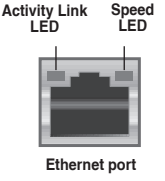
1.2.2 Rear panel connectors



1. **PS/2 keyboard/mouse combo port.** This port is for a PS/2 mouse or keyboard.
2. **USB 3.2 Gen 2 (up to 10Gbps) port (teal blue, Type A).** This 9-pin Universal Serial Bus 3.2 (USB 3.2) port is for USB 3.2 Gen 2 devices.
3. **Ethernet port.** This port allows Gigabit connection to a Local Area Network (LAN) through a network hub. Refer to the table below for the Ethernet port LED indications.

Ethernet port LED indications

Activity/Link LED		Speed LED	
Status	Description	Status	Description
Off	No link	Off	10Mbps connection
Orange	Linked	Orange	100Mbps connection
Orange (Blinking)	Data activity	Green	1Gbps connection
Orange (Blinking then steady)	Ready to wake up from S5 mode		



4. **Line In port (light blue).** This port connects the tape, CD, DVD player, or other audio sources.
5. **Line Out port (lime).** This port connects a headphone or a speaker. In 4-channel, 5.1-channel, and 7.1-channel configurations, the function of this port becomes Front Speaker Out.
6. **USB 2.0 ports.** These 4-pin Universal Serial Bus (USB) ports are for USB 2.0 devices.
7. **BIOS FlashBack™ button.** Press the BIOS FlashBack™ button for three seconds until the FlashBack™ LED blinks three times, indicating that the BIOS FlashBack™ function is enabled.
8. **DVI-D port.** This port is for any DVI-D compatible device.

DVI-D can not be converted to output from RGB Signal to CRT and is not compatible with DVI-I.

9. **HDMI™ port.** This port is for a High-Definition Multimedia Interface (HDMI™) connector, and is HDCP compliant allowing playback of HD DVD, Blu-ray, and other protected content.

10. **USB 3.2 Gen 1 (up to 5Gbps) port (USB Type-C®).** The 24-pin Universal Serial Bus (USB) port is for USB 3.2 Gen 1 Type-C® devices.

11. **USB 3.2 Gen 1 (up to 5Gbps) port with BIOS FlashBack™ function.** Insert a USB storage device to this 9-pin Universal Serial Bus (USB) port to run BIOS FlashBack™.

12. **USB 3.2 Gen 1 (up to 5Gbps) port.** The 9-pin Universal Serial Bus (USB) port is for USB 3.2 Gen 1 devices.

13. **Microphone port (pink).** This port connects a microphone.

Refer to the audio configuration table below for the function of the audio ports in 2, 4, 5.1, or 7.1-channel configuration.

Audio 2, 4, 5.1 or 7.1-channel configuration

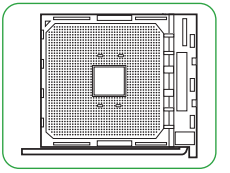
Port	Headset 2-channel	4-channel	5.1-channel	7.1-channel
Light Blue (Rear panel)	Line In	Rear Speaker Out	Rear Speaker Out	Rear Speaker Out
Lime (Rear panel)	Line Out	Front Speaker Out	Front Speaker Out	Front Speaker Out
Pink (Rear panel)	Mic In	Mic In	Bass/Center	Bass/Center
Lime (Front panel)	—	—	—	Side Speaker Out

To configure a 7.1-channel audio output:

Use a chassis with HD audio module in the front panel to support a 7.1-channel audio output.

1.3 Central Processing Unit (CPU)

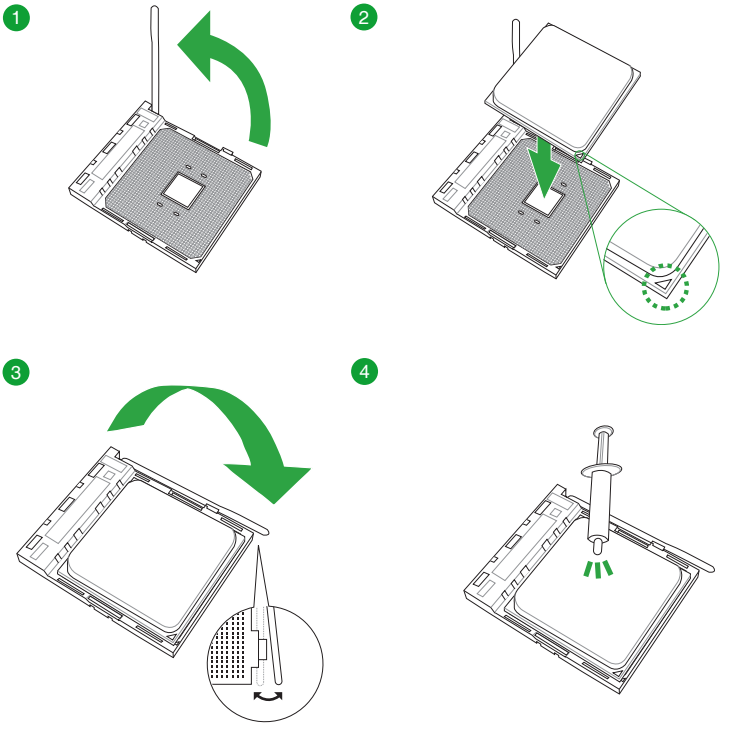
This motherboard comes with an AMD Socket AM4 designed for 3rd/2nd/1st Gen AMD Ryzen™/ 2nd and 1st Gen AMD Ryzen™ with Radeon™ Vega Graphics/ Athlon™ with Radeon™ Vega Graphics Processors.



Unplug all power cables before installing the CPU.

The AM4 socket has a different pinout design. Ensure that you use a CPU designed for the AM4 socket. The CPU fits in only one correct orientation. DO NOT force the CPU into the socket to prevent bending the connectors on the socket and damaging the CPU!

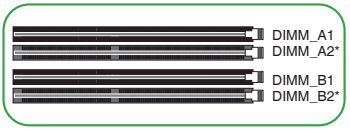
Installing the CPU



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

1.4 System memory

This motherboard comes with four Double Data Rate 4 (DDR4) Dual Inline Memory Module (DIMM) sockets. The figure illustrates the location of the DDR4 DIMM sockets:

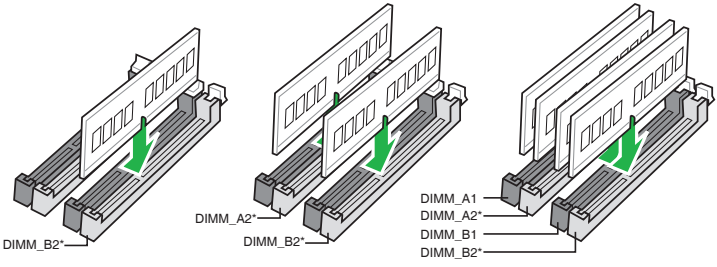


Channel	Sockets
Channel A	DIMM_A1 & DIMM_A2*
Channel B	DIMM_B1 & DIMM_B2*

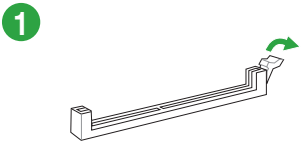
- You may install varying memory sizes in Channel A and Channel B. The system maps the total size of the lower-sized channel for the dual-channel configuration. Any excess memory from the higher-sized channel is then mapped for single-channel operation.
- Always install DIMMs with the same CAS latency. For optimal compatibility, we recommend that you install memory modules of the same version or date code (D/C) from the same vendor. Check with the retailer to get the correct memory modules.
- A DDR4 memory module is notched differently from a DDR, DDR2, or DDR3 module. DO NOT install a DDR, DDR2, or DDR3 memory module to the DDR4 slot.

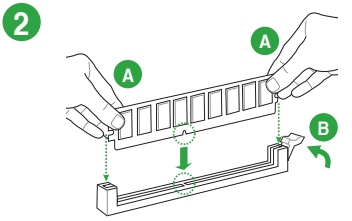
- The default memory operation frequency is dependent on its Serial Presence Detect (SPD), which is the standard way of accessing information from a memory module. Under the default state, some memory modules for overclocking may operate at a lower frequency than the vendor-marked value.
- For system stability, use a more efficient memory cooling system to support a full memory load.
- Refer to www.asus.com for the latest Memory QVL (Qualified Vendors Lists).

Recommended memory configurations

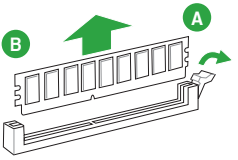


Installing a DIMM





To remove a DIMM



BIOS and RAID Support

2

2.1 Knowing BIOS

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

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

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

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

- When downloading or updating the BIOS file, rename it as **TB450MG2.CAP** for this motherboard.
- BIOS settings and options may vary due to different BIOS release versions. Please refer to the latest BIOS version for settings and options.

2.2 BIOS Setup program

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

Entering BIOS at startup

To enter BIOS Setup at startup, press <Delete> or <F2> during the Power-On Self Test (POST). If you do not press <Delete> or <F2>, POST continues with its routines.

Entering BIOS Setup after POST

To enter BIOS Setup after POST:

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

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

- Ensure that a USB mouse is connected to your motherboard if you want to use the mouse to control the BIOS setup program.
- If the system becomes unstable after changing any BIOS setting, load the default settings to ensure system compatibility and stability. Select the **Load Optimized Defaults** item under the **Exit** menu or press hotkey **<F5>**.
- If the system fails to boot after changing any BIOS setting, try to clear the CMOS and reset the motherboard to the default value.
- The BIOS Setup program does not support Bluetooth devices.

BIOS menu screen

The BIOS Setup program can be used under two modes: **EZ Mode** and **Advanced Mode**. You can change modes from **Setup Mode** in **Boot menu** or by pressing the <F7> hotkey.

2.3 ASUS EZ Flash 3

The ASUS EZ Flash 3 feature allows you to update the BIOS without using an OS-based utility.

Ensure to load the BIOS default settings to ensure system compatibility and stability. Select the **Load Optimized Defaults** item under the **Exit** menu or press hotkey **<F5>**.

To update the BIOS by USB:

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

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

2.4 ASUS CrashFree BIOS 3

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

If you want to use the latest BIOS file, download the file at https://www.asus.com/support, and save it to a USB flash drive.

Recovering the BIOS

To recover the BIOS:

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

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

2.5 RAID configurations

The motherboard comes with the RaidXpert2 Configuration Utility that supports RAID 0, RAID 1 and RAID 10 configuration.

For more information on configuring your RAID sets, please refer to the **RAID Configuration Guide** which you can find at https://www.asus.com/support, or by scanning the QR code.

RAID definitions

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

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

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

Appendix

Notices

FCC Compliance Information

Responsible Party:	Asus Computer International
Address:	48720 Kato Rd., Fremont, CA 94538, USA
Phone / Fax No:	(510)739-3777 / (510)608-4555

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.

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

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

Compliance Statement of Innovation, Science and Economic Development Canada (ISED)

This device complies with Innovation, Science and Economic Development Canada licence exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

CAN ICES-3(B)/NMB-3(B)

Déclaration de conformité de Innovation, Sciences et Développement économique Canada (ISED)

Le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

CAN ICES-3(B)/NMB-3(B)

VCCI: Japan Compliance Statement

Class B ITE

この装置は、クラスＢ情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。

取扱説明書に従って正しい取り扱いをして下さい。

ＶＣＣＩ－Ｂ

KC: Korea Warning Statement

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

Google™ License Terms

Declaration of compliance for product environmental regulation

ASUS follows the green design concept to design and manufacture our products, and makes sure that each stage of the product life cycle of ASUS product is in line with global environmental regulations. In addition, ASUS disclose the relevant information based on regulation requirements.

Please refer to http://csr.asus.com/Compliance.htm for information disclosure based on regulation requirements ASUS is complied with:

EU REACH and Article 33

Complying with the REACH (Registration, Evaluation, Authorisation, and Restriction of Chemicals) regulatory framework, we published the chemical substances in our products at ASUS REACH website at http://csr.asus.com/english/REACH.htm.

EU RoHS

This product complies with the EU RoHS Directive. For more details, see http://csr.asus.com/english/article.aspx?id=35

India RoHS

This product complies with the “India E-Waste (Management) Rules, 2016” and prohibits use of lead, mercury, hexavalent chromium, polybrominated biphenyls (PBBs) and polybrominated diphenyl ethers (PBDEs) in concentrations exceeding 0.1% by weight in homogenous materials and 0.01% by weight in homogenous materials for cadmium, except for the exemptions listed in Schedule II of the Rule.

Vietnam RoHS

ASUS products sold in Vietnam, on or after September 23, 2011,meet the requirements of the Vietnam Circular 30/2011/TT-BCT.

Các sản phẩm ASUS bán tại Việt Nam, vào ngày 23 tháng 9 năm2011 trở về sau, đều phải đáp ứng các yêu cầu của Thông tư 30/2011/TT-BCT của Việt Nam.

Turkey RoHS

AEEE Yönetmeliğine Uygundur

ASUS Recycling/Takeback Services

ASUS recycling and takeback programs come from our commitment to the highest standards for protecting our environment. We believe in providing solutions for you to be able to responsibly recycle our products, batteries, other components as well as the packaging materials. Please go to http://csr.asus.com/english/Takeback.htm for detailed recycling information in different regions.

DO NOT throw the motherboard in municipal waste. This product has been designed to enable proper reuse of parts and recycling. This symbol of the crossed out wheeled bin indicates that the product (electrical and electronic equipment) should not be placed in municipal waste. Check local regulations for disposal of electronic products.

DO NOT throw the mercury-containing button cell battery in municipal waste. This symbol of the crossed out wheeled bin indicates that the battery should not be placed in municipal waste.

Regional notice for California

WARNING

Cancer and Reproductive Harm -
www.P65Warnings.ca.gov

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Română ASUSTeK Computer Inc. declară că acest dispozitiv se conformează cerinţelor esenţiale şi altor prevederi relevante ale directivelor conexe. Textul complet al declaraţiei de conformitate a Uniunii Europene se găseşte la: www.asus.com/support

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

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

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

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

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

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

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

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

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Technical Support

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