

**Pro WS C422-ACE**

**ASUS®**

**Motherboard**

E15412  
First Edition  
August 2019

**Copyright © 2019 ASUSTeK COMPUTER INC. All Rights Reserved.**

No part of this manual, including the products and software described in it, may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language in any form or by any means, except documentation kept by the purchaser for backup purposes, without the express written permission of ASUSTeK COMPUTER INC. ("ASUS").

Product warranty or service will not be extended if: (1) the product is repaired, modified or altered, unless such repair, modification of alteration is authorized in writing by ASUS; or (2) the serial number of the product is defaced or missing.

ASUS PROVIDES THIS MANUAL "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL ASUS, ITS DIRECTORS, OFFICERS, EMPLOYEES OR AGENTS BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES (INCLUDING DAMAGES FOR LOSS OF PROFITS, LOSS OF BUSINESS, LOSS OF USE OR DATA, INTERRUPTION OF BUSINESS AND THE LIKE), EVEN IF ASUS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES ARISING FROM ANY DEFECT OR ERROR IN THIS MANUAL OR PRODUCT.

SPECIFICATIONS AND INFORMATION CONTAINED IN THIS MANUAL ARE FURNISHED FOR INFORMATIONAL USE ONLY, AND ARE SUBJECT TO CHANGE AT ANY TIME WITHOUT NOTICE, AND SHOULD NOT BE CONSTRUED AS A COMMITMENT BY ASUS. ASUS ASSUMES NO RESPONSIBILITY OR LIABILITY FOR ANY ERRORS OR INACCURACIES THAT MAY APPEAR IN THIS MANUAL, INCLUDING THE PRODUCTS AND SOFTWARE DESCRIBED IN IT.

Products and corporate names appearing in this manual may or may not be registered trademarks or copyrights of their respective companies, and are used only for identification or explanation and to the owners' benefit, without intent to infringe.

**Offer to Provide Source Code of Certain Software**

This product contains copyrighted software that is licensed under the General Public License ("GPL"), under the Lesser General Public License Version ("LGPL") and/or other Free Open Source Software Licenses. Such software in this product is distributed without any warranty to the extent permitted by the applicable law. Copies of these licenses are included in this product.

Where the applicable license entitles you to the source code of such software and/or other additional data, you may obtain it for a period of three years after our last shipment of the product, either

(1) for free by downloading it from <https://www.asus.com/support/>

or

(2) for the cost of reproduction and shipment, which is dependent on the preferred carrier and the location where you want to have it shipped to, by sending a request to:

ASUSTeK Computer Inc.  
Legal Compliance Dept.  
15 Li Te Rd.,  
Beitou, Taipei 112  
Taiwan

In your request please provide the name, model number and version, as stated in the About Box of the product for which you wish to obtain the corresponding source code and your contact details so that we can coordinate the terms and cost of shipment with you.

The source code will be distributed WITHOUT ANY WARRANTY and licensed under the same license as the corresponding binary/object code.

This offer is valid to anyone in receipt of this information.

ASUSTeK is eager to duly provide complete source code as required under various Free Open Source Software licenses. If however you encounter any problems in obtaining the full corresponding source code we would be much obliged if you give us a notification to the email address [gpl@asus.com](mailto:gpl@asus.com), stating the product and describing the problem (please DO NOT send large attachments such as source code archives, etc. to this email address).

# Contents

Safety information.....	iv
About this guide.....	iv
Package contents.....	vi
ASUS Pro WS C422-ACE specifications summary.....	vi
<b>Chapter 1: Product Introduction</b>	
1.1 Before you proceed.....	1-1
1.2 Motherboard overview.....	1-1
1.3 Central Processing Unit (CPU).....	1-11
1.4 System memory.....	1-13
<b>Chapter 2: BIOS Information</b>	
2.1 Managing and updating your BIOS.....	2-1
2.2 BIOS setup program.....	2-4
2.3 Exit menu.....	2-9
<b>Appendix</b>	
Q-Code table.....	A-1
Notices.....	A-5

# Safety information

## Electrical safety

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

## Operation safety

- Before installing the motherboard and adding devices on it, carefully read all the manuals that came with the package.
- Before using the product, ensure all cables are correctly connected and the power cables are not damaged. If you detect any damage, contact your dealer immediately.
- To avoid short circuits, keep paper clips, screws, and staples away from connectors, slots, sockets and circuitry.
- Avoid dust, humidity, and temperature extremes. Do not place the product in any area where it may become wet.
- Place the product on a stable surface.
- If you encounter technical problems with the product, contact a qualified service technician or your retailer.

## About this guide

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

## How this guide is organized

This guide contains the following parts:

- **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 Information**  
This chapter discusses changing system settings through the BIOS Setup menus.

## Where to find more information

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

### 1. ASUS website

The ASUS website ([www.asus.com](http://www.asus.com)) provides updated information on ASUS hardware and software products.

### 2. Optional documentation

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

## Conventions used in this guide

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



**DANGER/WARNING:** Information to prevent injury to yourself when trying to complete a task.



**CAUTION:** Information to prevent damage to the components when trying to complete a task.



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



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

## Typography

**Bold text**

Indicates a menu or an item to select.

*Italics*

Used to emphasize a word or a phrase.

<Key>

Keys enclosed in the less-than and greater-than sign means that you must press the enclosed key.

Example: <Enter> means that you must press the Enter or Return key.

<Key1> + <Key2> + <Key3>

If you must press two or more keys simultaneously, the key names are linked with a plus sign (+).

## Package contents

Check your motherboard package for the following items.

<b>Motherboard</b>	1 x ASUS Pro WS C422-ACE Motherboard
<b>Cables</b>	4 x Serial ATA 6.0Gb/s cables
<b>Accessories</b>	1 x M.2 Screw Package 1 x M.2 vertical bracket 1 x ASUS 2-Way VGA Holder
<b>Application DVD</b>	1 x Support DVD
<b>Documentation</b>	1 x User manual



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

## ASUS Pro WS C422-ACE specifications summary

<b>CPU</b>	Intel® Socket 2066 for Intel® Xeon™ W-Series Processors* Supports 14nm CPU Supports Intel® Turbo Boost Max Technology 3.0** * Refer to <a href="http://www.asus.com">www.asus.com</a> for Intel® CPU support list. ** The support of these features depends on the CPU types.
<b>Chipset</b>	Intel® C422 Chipset
<b>Memory</b>	Intel® Xeon™ W-Series Processors (4-core above) - 8 x DIMM, Max. 512GB, DDR4 2933/2666/2400/2133 MHz RDIMM, LR-DIMM Memory* - Quad channel memory architecture * Memory capacity supported depends on both CPU installed and Memory. ** Refer to <a href="http://www.asus.com">www.asus.com</a> for the Memory QVL (Qualified Vendors List).
<b>Expansion slots</b>	48-Lane CPU(CLX-W, SKL-W) 2 x PCI Express 3.0/2.0 x16 slots (dual at x16/x16 mode) 1 x PCI Express 3.0/2.0 x16 slots (max. at x8 mode)* * PCIe16_3 shares bandwidth with U.2_2. Disable U.2_2 in BIOS settings to allow PCIe16_3 to run at x8 mode.
<b>Multi-GPU Support</b>	Supports NVIDIA® 2-Way & 3-Way/Quad-GPU SLI™ Technology Supports AMD® 2-Way & 3-Way/Quad-GPU CrossFireX™ Technology* * This support depends on the CPU types and VGA cards.

(continued on the next page)

## ASUS Pro WS C422-ACE specifications summary

Storage	<p><b>Intel® Xeon™ W-Series Processors support with RAID 0, 1, 5, 10 and Intel® Virtual RAID (VROC) Support</b></p> <p>1 x M.2_2 Socket 3 with M key, type 2242/2260/2280/22110 storage devices support (PCIe 3.0 x4 mode)</p> <p>1 x M.2_3 Socket 3 with M key, type 2242/2260/2280/22110 storage devices support (PCIe 3.0 x4 mode)</p> <p>1 x U.2_2 connector (supports U.2 NVMe device)*</p> <p><b>Intel® C422 Chipset with RAID 0, 1, 5, 10</b></p> <ul style="list-style-type: none"> <li>- 1 x M.2_1 Socket 3 with vertical M Key, type 2242/2260/2280/22110 (both SATA &amp; PCIe 3.0 x4 mode)</li> <li>- 6 x SATA 6.0 Gb/s ports**</li> <li>- 1 x U.2_1 connector (supports U.2 NVMe device)</li> </ul> <p>* U.2_2 shares bandwidth with PCIeX16_3. A user may make a change to BIOS setting which will allow PCIeX16_3 to run at x8.</p> <p>** The SATA6G_1 shares bandwidth with M.2_1. SATA_1 will be disabled if M.2_1 is populated by a SATA device.</p>
LAN	<p>Intel® I210-AT Gigabit LAN</p> <p>Intel® I219-LM Gigabit LAN</p> <p>ASUS LANGuard</p> <p>ASUS Turbo LAN Utility</p>
Audio	<p><b>Realtek® S1220A 8-channel high definition audio CODEC featuring Crystal Sound 3</b></p> <ul style="list-style-type: none"> <li>- Impedance sense for front and rear headphone outputs</li> <li>- High quality 120dB SNR stereo playback output and 113dB SNR recording input</li> <li>- Internal audio Amplifier to enhance the highest quality sound for headphone and speakers</li> <li>- Power pre-regulator reduces power input noise to ensure consistent performance</li> <li>- Unique de-pop circuit to reduce start-up popping noise to audio outputs</li> <li>- Separate layer for left and right track, ensuring both sound deliver equal quality</li> <li>- Audio shielding ensures precise analog/digital separation and greatly reduced multi-lateral interference</li> <li>- Premium Japan-made audio capacitors</li> <li>- Supports up to 32-Bit/192kHz playback*</li> <li>- Supports jack-detection, multi-streaming, front panel jack-retasking (MIC)</li> <li>- Optical S/PDIF out port at back I/O</li> </ul> <p>* Due to limitations in HDA bandwidth, 32-Bit/192kHz is not supported for 8-Channel audio. 32-Bit/192kHz is only available under Windows® 10.</p>
USB	<p><b>Intel® C422 Chipset</b></p> <ul style="list-style-type: none"> <li>- 8 x USB 3.2 Gen 1 ports (4 ports at back panel, 4 ports at mid-board)</li> <li>- 6 x USB 2.0 ports (2 ports at back panel, 4 ports at mid-board)</li> </ul> <p><b>ASMedia® USB 3.2 Gen 2 hub</b></p> <ul style="list-style-type: none"> <li>- 4 x USB 3.2 Gen 2 ports at back panel, 3 type A + 1 type C</li> </ul>

(continued on the next page)

# ASUS Pro WS C422-ACE specifications summary

<p><b>ASUS Exclusive Features</b></p>	<p><b>&lt;Performance&gt;</b>  <b>5-Way Optimization</b></p> <ul style="list-style-type: none"> <li>- Whole system optimization with a single click! Perfectly consolidates better CPU performance, power saving, digital power control, system cooling and app usages.</li> </ul> <p><b>DIGI+ Power Control</b></p> <ul style="list-style-type: none"> <li>- CPU Power: Digital 12 Power Stages</li> <li>- DRAM Power: 1+1 Phase</li> </ul> <p><b>EPU</b>  <b>Fan Xpert 4</b></p> <p><b>UEFI BIOS</b>  <b>CrashFree BIOS 3</b>  <b>EZ Flash 3</b>  <b>EZ Tuning Wizard</b></p> <p><b>&lt;Connectivity&gt;</b>  Intel® VROC Ready  ASMedia® USB 3.2 Gen 2 Controller supports Multiple-INS function  Turbo LAN  ASUS NODE: hardware control interface</p> <p><b>&lt;EZ DIY&gt;</b>  <b>OLED with ASUS LiveDash Utility</b></p> <p><b>Q-Design</b></p> <ul style="list-style-type: none"> <li>- ASUS Q-DIMM</li> <li>- ASUS Q-LED (CPU, DRAM, VGA, Boot Device LED)</li> <li>- ASUS Q-Code</li> <li>- ASUS Q-Slot</li> </ul>
<p><b>Special Features</b></p>	<p><b>ASUS SafeSlot</b> - Protect your graphics card Investment</p> <p><b>ASUS 5X Protection III</b></p> <ul style="list-style-type: none"> <li>- ASUS LANGuard: Protects against LAN surges, lightning strikes and static-electricity discharges!</li> <li>- ASUS Overvoltage Protection: World-class circuit-protecting power design</li> <li>- ASUS Stainless-Steel Back I/O: 3X corrosion-resistance for greater durability!</li> <li>- ASUS ESD Guards - Enhanced ESD protection</li> <li>- DIGI+ VRM: Digital 12 Power Stages</li> </ul> <p>AI Suite 3  Ai Charger  ASUS Control Center Express</p>
<p><b>Thermal Design</b></p>	<ul style="list-style-type: none"> <li>- ASUS Fan Xpert 4</li> <li>- Fin with heatpipe solution heatsink and 22110 M.2 heatsink design</li> </ul>

(continued on the next page)



## ASUS Pro WS C422-ACE specifications summary

<b>Back Panel I/O Ports</b>	<ul style="list-style-type: none"> <li>1 x Optical S/PDIF out</li> <li>2 x Intel® LAN (RJ45) port(black)</li> <li>4 x USB 3.2 Gen 2 ports (teal blue, 3 x Type-A, 1 x Type-C)</li> <li>4 x USB 3.2 Gen 1 ports (Type-A)</li> <li>2 x USB 2.0 ports</li> <li>8-channel Audio I/O ports</li> </ul>
<b>Internal I/O Connectors</b>	<ul style="list-style-type: none"> <li>2 x USB 3.2 Gen 1 connectors supporting additional 4 USB ports (19-pin)</li> <li>2 x USB 2.0 connectors supporting additional 4 USB ports</li> <li>1 x M.2_1 Socket 3 with vertical M Key, type 2242/2260/2280/22110 storage devices support (both SATA &amp; PCIE 3.0 x4 mode from PCH)</li> <li>1 x M.2_2 Socket 3 with M Key, type 2242/2260/2280/22110 storage devices support (PCIe 3.0 x4 mode from CPU)</li> <li>1 x M.2_3 Socket 3 with M Key, type 2242/2260/2280/22110 storage devices support (PCIe 3.0 x4 mode from CPU)</li> <li>6 x SATA 6.0Gb/s connectors</li> <li>1 x 4-pin AIO_PUMP fan connector</li> <li>1 x 4-pin CPU Fan connector</li> <li>1 x 4-pin CPU_OPT fan connector</li> <li>3 x 4-pin Chassis Fan connectors</li> <li>1 x 2-pin Thermal sensor header</li> <li>1 x TPM header</li> <li>1 x NODE connector supports FAN Extension Card II</li> <li>1 x 24-pin EATX Power connector</li> <li>2 x 8-pin EATX 12V Power connectors</li> <li>1 x 6-pin EATX 12V Power connector</li> <li>1 x Front panel audio connector (AAFP)</li> <li>1 x COM connector</li> <li>1 x VROC_HW_KEY</li> <li>1 x System Panel connector</li> <li>1 x Clear CMOS jumper</li> <li>1 x BIOS Flashback button</li> <li>1 x Reset button</li> <li>1 x Q_Code</li> </ul>
<b>BIOS</b>	<p>128 Mb Flash ROM, UEFI AMI BIOS, PnP, SM BIOS 3.2, ACPI 6.0, Multi-language BIOS, ASUS EZ Flash 3, CrashFree BIOS 3, F1 General Help, F2 Previous Values, F3 MyFavorite, F5 Optimized Default, F6 QFan Control, F7 EZ mode/Advanced Mode, F9 Search, F10 Save, F11 EZ Tuning Wizard, F12 Print Screen, and ASUS DRAM SPD (Serial Presence Detect) memory information</p>

(continued on the next page)

## ASUS Pro WS C422-ACE specifications summary

<b>Manageability</b>	WfM 2.0, DMI 3.0, WOL by PME, PXE
<b>Support DVD</b>	Drivers ASUS Utilities EZ Update Anti-virus software (OEM version)
<b>OS Support</b>	Windows® 10 64-bit
<b>Form factor</b>	ATX Form Factor, 12"x 9.6" (30.5cm x 24.4cm)



---

Specifications are subject to change without notice.

---

# Product Introduction

# 1

## 1.1 Before you proceed

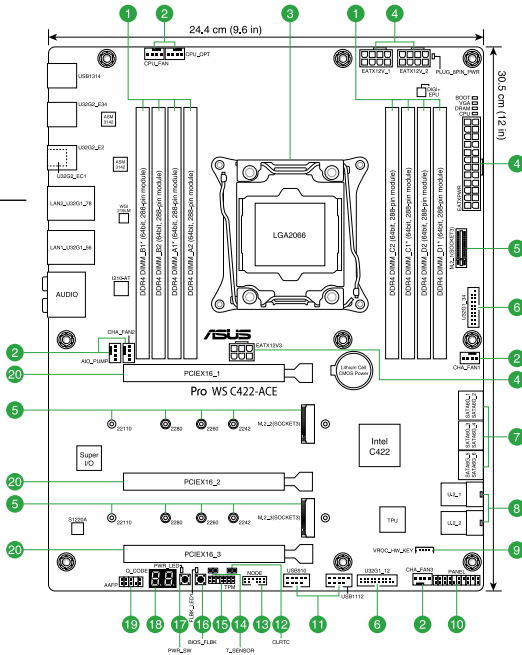
Take note of the following precautions before you install motherboard components or change any motherboard settings.



- 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

Place this side  
towards the rear  
of the chassis



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

Connectors/Jumpers/Slots		Page
1.	DDR4 DIMM slots	1-2
2.	CPU, CPU optional, chassis, and AIO pump fan connectors (4-pin CPU_FAN, 4-pin CPU_OPT, 4-pin CHA_FAN1~3, 4-pin AIO_PUMP FAN)	1-2
3.	Intel® LGA2066 CPU socket	1-3
4.	ATX power connectors (24-pin EATXPWR, 8-pin EATX12V_1-2, 6-pin EATX12V3)	1-3
5.	M.2 sockets (M.2_1-3(SOCKET3))	1-3
6.	USB 3.2 Gen 1 connector (20-1 pin U32G1_34; 20-1 pin U32G1_12)	1-4
7.	SATA 6Gb/s connector (7-pin SATA6G_1-6)	1-4
8.	Mini-SAS HD connector (U.2_1-2)	1-4
9.	VROC_HW_KEY connector (4-pin VROC_KEY)	1-4
10.	System panel connector (20-3 pin PANEL)	1-5
11.	USB 2.0 connector (10-1 pin USB1112; USB910)	1-5
12.	Clear RTC RAM (2-pin CLRRTC)	1-6
13.	Thermal Sensor connector (2-pin T_SENSOR)	1-6
14.	Node connector (12-1 pin NODE)	1-6
15.	TPM connector (14-1 pin TPM)	1-6
16.	USB BIOS Flashback button	1-7
17.	Power button	1-7
18.	Q-Code LED	1-7
19.	Front panel audio connector (10-1 pin AAFP)	1-8
20.	PCI Express 3.0/2.0 x16 slots	1-8

### 1 DDR4 DIMM slots

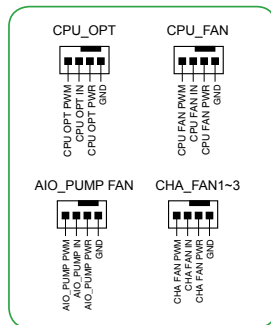
Install 2 GB, 4 GB, 8 GB, 16 GB, and 32 GB DDR4 DIMMs into these DIMM sockets.



For more details, refer to **1.4 System memory**.

### 2 CPU, CPU optional, chassis, and AIO pump fan connectors (4-pin CPU\_FAN, 4-pin CPU\_OPT, 4-pin CHA\_FAN1~3, 4-pin AIO\_PUMP FAN)

Connect the fan cables to the fan connectors on the motherboard, ensuring that the black wire of each cable matches the ground pin of the connector.



3

**Intel® LGA2066 CPU socket**

Install Intel® LGA2066 CPU into this surface mount LGA2066 socket, which is designed for Intel® Xeon™ W-Series Processors Family (4-core above) processors.

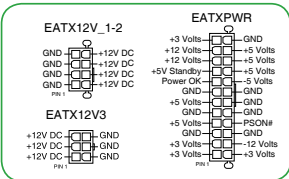


For more details, refer to **1.3 Central Processing Unit (CPU)**.

4

**ATX power connectors (24-pin EATXPWR, 8-pin EATX12V\_1-2, 6-pin EATX12V3)**

Correctly orient the ATX power supply plugs into these connectors and push down firmly until the connectors completely fit.



Ensure to connect the 8-pin power plug, or connect both the 8-pin and 6-pin power plugs.

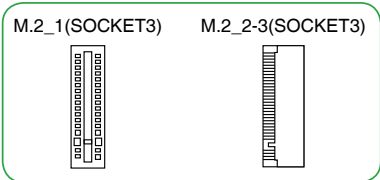


- The 8-pin Power Plug LED lights up to indicate that the 8-pin power plug is not connected.
- For a fully configured system, we recommend that you use a power supply unit (PSU) that complies with ATX 12 V Specification 2.0 (or later version) and provides a minimum power of 350 W. This PSU type has 24-pin and 8-pin power plugs.
- We recommend that you use a PSU with higher power output when configuring a system with more power-consuming devices or when you intend to install additional devices. The system may become unstable or may not boot up if the power is inadequate.

5

**M.2 sockets (M.2\_1-(SOCKET3))**

These sockets allow you to install M.2 (NGFF) SSD modules.



- The M.2\_1 socket supports vertical M Key and 2242/2260/2280/22110 storage devices (both SATA & PCIe 3.0 x4 mode from PCH).
- The M.2\_2 and M.2\_3 socket supports M Key and 2242/2260/2280/22110 storage devices (PCIe 3.0 x4 mode from CPU).

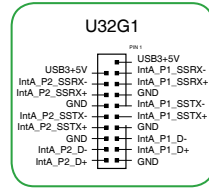


The M.2 SSD module is purchased separately.

6

**USB 3.2 Gen 1 connector (20-1 pin U32G1\_34; 20-1 pin U32G1\_12)**

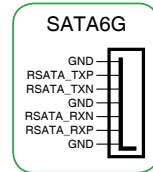
Connect a USB 3.2 Gen 1 module to any of these connectors for additional USB 3.2 Gen 1 front or rear panel ports. These connectors comply with USB 3.2 Gen 1 specifications and provides faster data transfer speeds of up to 5 Gbps, faster charging time for USB-chargable devices, optimized power efficiency, and backward compatibility with USB 2.0



7

**SATA 6Gb/s connector (7-pin SATA6G\_1-6)**

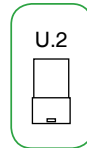
These connectors connect to Serial ATA 6.0 Gb/s hard disk drives via Serial ATA 6.0 Gb/s signal cables.



8

**Mini-SAS HD connector (U.2\_1-2)**

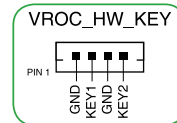
The Mini-SAS HD connector allows you to connect a Mini-SAS HD cable to support configurations such as U.2 devices or four SATA devices.



9

**VROC\_HW\_KEY connector (4-pin VROC\_KEY)**

This connector allows you to connect a KEY module to enable CPU RAID functions with Intel® CPU RSTe.



- The KEY module is purchased separately.
- Due to CPU behavior, CPU RAID functions with Intel® CPU RSTe only supports Intel® Core™ X-series Processors (6-core or above) and Intel® SSD modules.

10

### System panel connector (20-3 pin PANEL)

This connector supports several chassis-mounted functions.

- **System power LED (4-pin PWR\_LED)**

This 4-pin connector is for the system power LED. Connect the chassis power LED cable to this connector. The system power LED lights up when you turn on the system power, and blinks when the system is in sleep mode.

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

The 2-pin or 3-1 pin connector is for the system power LED.

- **Hard disk drive activity LED (2-pin HDD\_LED)**

This 2-pin connector is for the HDD Activity LED.

- **System warning speaker (4-pin SPEAKER)**

This 4-pin connector is for the chassis-mounted system warning speaker.

- **ATX power button/soft-off button (2-pin PWR\_SW)**

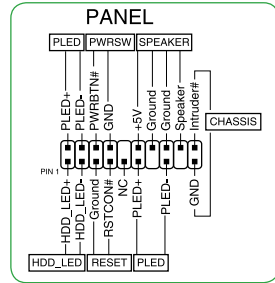
This connector is for the system power button.

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

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

- **Chassis intrusion connector (2-pin CHASSIS)**

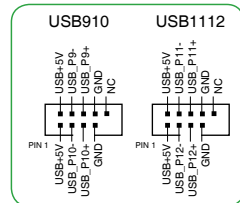
This connector is for a chassis-mounted intrusion detection sensor or switch.



11

### USB 2.0 connector (10-1 pin USB1112; USB910)

Connect a USB module cable to this connector, then install the module to a slot opening at the back of the system chassis. This USB connectors comply with USB 2.0 specifications and supports up to 480Mbps connection speed.



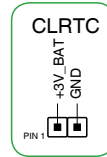
12

### Clear RTC RAM (2-pin CLRTC)

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.

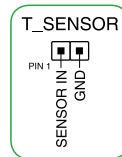


If the steps above do not help, remove the onboard battery and short the two pins again to clear the CMOS RTC RAM data. After clearing the CMOS, reinstall the battery.

13

### Thermal Sensor connector (2-pin T\_SENSOR)

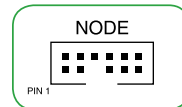
The Thermal Sensor connector allows you to connect a sensor to monitor the temperature of the devices and the critical components inside the motherboard. Connect the thermal sensor and place it on the device or the motherboard's component to detect its temperature.



14

### Node connector (12-1 pin NODE)

The Node connector allows you to connect Node compatible devices.

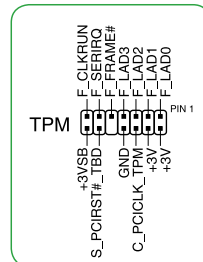


Visit [www.asus.com](http://www.asus.com) for more information about the devices and the latest compatibility list.

15

### TPM connector (14-1 pin TPM)

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





16

### USB BIOS Flashback button

USB BIOS Flashback allows you to easily update the BIOS without entering the existing BIOS or operating system. Simply insert a USB storage device to the USB port, press the USB BIOS Flashback button for three seconds, and the BIOS is updated automatically.

#### To use USB BIOS Flashback:

1. Insert a USB storage device to the USB Flashback port.



---

We recommend you to use a USB 2.0 storage device to save the latest BIOS version for better compatibility and stability.

---

2. Visit <https://www.asus.com/support/> and download the latest BIOS version for this motherboard.
3. Rename the file as **PWCA.CAP**, then copy it to your USB storage device.
4. Shut down your computer.
5. On your motherboard, press the BIOS Flashback button for three seconds until the Flashback LED blinks three times, indicating that the BIOS Flashback function is enabled.

17

### Power button

Press the Power button to power up the system, or put the system into sleep or soft-off mode (depending on the operating system settings).



---

The PWR\_LED near the button also lights up when the system is plugged to a power source indicating that you should shut down the system and unplug the power cable before removing or installing any motherboard component.

---

18

### Q-Code LED

The Q-Code LED design provides you with a 2-digit error code that displays the system status.

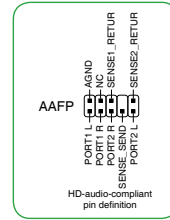


- 
- The Q-Code LED provides the most probable cause of an error code as a starting point for troubleshooting. The actual cause may vary from case to case.
  - Please refer to the Q-Code table in the **Appendix** section for more details.
-

19

**Front panel audio connector (10-1 pin AAFP)**

This connector 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 connector.



20

**PCI Express 3.0/2.0 x16 slots**

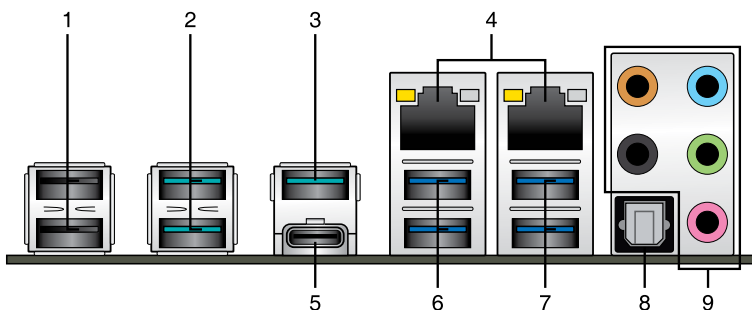
This motherboard supports three PCI Express 3.0/2.0 x16 graphic cards that comply with the PCI Express specifications. Actual PCI Express speeds varies per BIOS settings.

VGA configuration	PCI Express operating mode		
	PCIe 3.0 x16_1	PCIe 3.0 x16_2	PCIe 3.0 x16_3
Single VGA/PCIe card	x16	N/A	N/A
Dual VGA/PCIe cards	x16	x16	N/A
3-Way VGA/PCIe cards	x16	x16	x8



- In single VGA card mode, use the PCIe 3.0 x16\_1 slot (black) for a PCI Express x16 graphics card to get better performance.
- Connect a chassis fan to the motherboard connector labeled CHA\_FAN1/2/3 when using multiple graphics cards for better thermal environment.

## 1.2.2 Rear panel connectors



1. **USB 2.0 ports** These four 4-pin Universal Serial Bus (USB) ports are for USB 2.0/1.1 devices.
2. **USB 3.2 Gen 2 Type-A ports.** These 9-pin Universal Serial Bus 3.2 (USB 3.2) ports are for USB 3.2 Gen 2 devices.



- USB 3.2 Gen 1/Gen 2 devices can only be used as data storage only.
- We strongly recommend that you connect your devices to ports with matching data transfer rate. Please connect your USB 3.2 Gen 1 devices to USB 3.2 Gen 1 ports and your USB 3.2 Gen 2 devices to USB 3.2 Gen 2 ports for faster and better performance for your devices.

3. **USB 3.2 Gen 2 Type-A port.** This 9-pin Universal Serial Bus 3.2 (USB 3.2) port is for USB 3.2 Gen 2 devices.

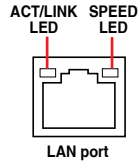


- USB 3.2 Gen 1/Gen 2 devices can only be used as data storage only.
- We strongly recommend that you connect your devices to ports with matching data transfer rate. Please connect your USB 3.2 Gen 1 devices to USB 3.2 Gen 1 ports and your USB 3.2 Gen 2 devices to USB 3.2 Gen 2 ports for faster and better performance for your devices.

4. **LAN (RJ-45) port.** These ports allow Gigabit connection to a Local Area Network (LAN) through a network hub.

**LAN 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 Wake up from S5 mode		



5. **USB 3.2 Gen 2 Type-C™ port.** This 24-pin Universal Serial Bus (USB) port is for USB (Type C) devices.
6. **USB 3.2 Gen 1 Type-A ports.** These 9-pin Universal Serial Bus (USB) ports are for USB 3.2 Gen 1 devices.



- USB 3.2 Gen 1 devices can only be used for data storage.
- We strongly recommend that you connect USB 3.2 Gen 1 devices to USB 3.2 Gen 1 ports for faster and better performance from your USB 3.2 Gen 1 devices.

7. **USB 3.2 Gen 1 Type-A ports.** These 9-pin Universal Serial Bus (USB) ports are for USB 3.2 Gen 1 devices.



- USB 3.2 Gen 1 devices can only be used for data storage.
- We strongly recommend that you connect USB 3.2 Gen 1 devices to USB 3.2 Gen 1 ports for faster and better performance from your USB 3.2 Gen 1 devices.

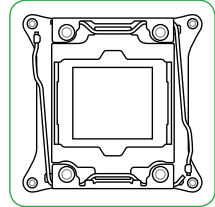
8. **Optical S/PDIF OUT port.** This port allows you to connect amplified speakers, headphones, or Sony/Phillips Digital Interconnect Format (S/PDIF) compliant devices.
9. **Audio I/O ports.** Refer to the audio configuration table below for the function of the audio ports in 2, 4, 5.1, or 7.1-channel 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	Line In	Line In	Line In	Side Speaker Out
Lime	Line Out	Front Speaker Out	Front Speaker Out	Front Speaker Out
Pink	Mic In	Mic In	Mic In	Mic In
Orange	–	–	Center/Sub woofer	Center/Sub woofer
Black	–	Rear Speaker Out	Rear Speaker Out	Rear Speaker Out

## 1.3 Central Processing Unit (CPU)

The motherboard comes with a surface mount LGA2066 socket designed for the Intel® Xeon™ W-Series Processors Family (4-core above) processors.



Unplug all power cables before installing the CPU.

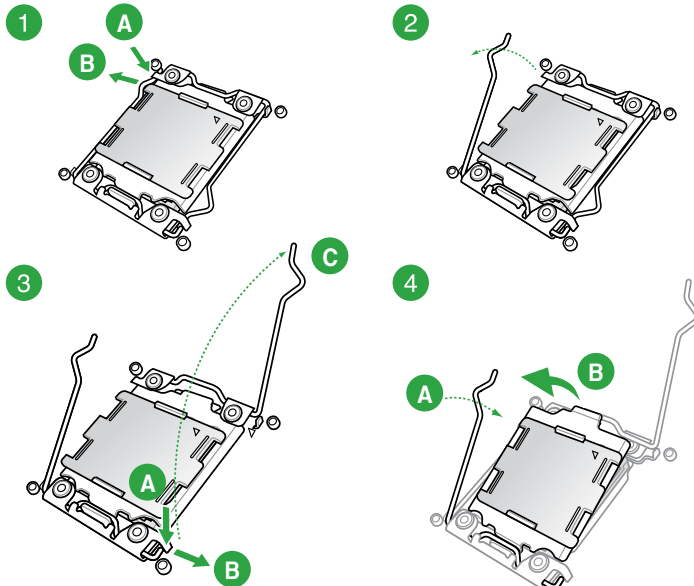


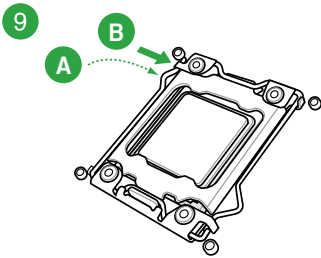
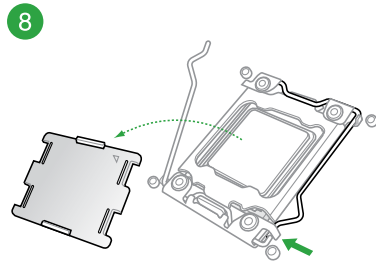
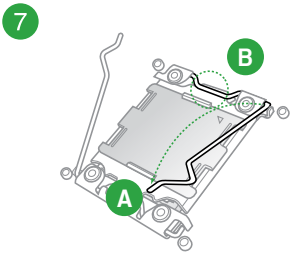
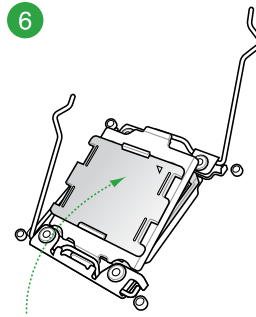
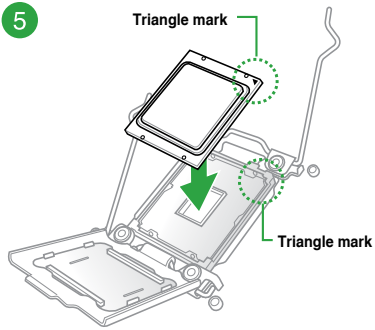
Ensure that you install the correct CPU designed for LGA2066 socket only.



- Ensure that all power cables are unplugged before installing the CPU.
- Upon purchase of the motherboard, ensure that the PnP cap is on the socket and the socket contacts are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket contacts/motherboard components. ASUS will shoulder the cost of repair only if the damage is shipment/transit-related.
- Keep the cap after installing the motherboard. ASUS will process Return Merchandise Authorization (RMA) requests only if the motherboard comes with the cap on the LGA2066 socket.
- The product warranty does not cover damage to the socket contacts resulting from incorrect CPU installation/removal, or misplacement/loss/incorrect removal of the PnP cap.

### Installing the CPU





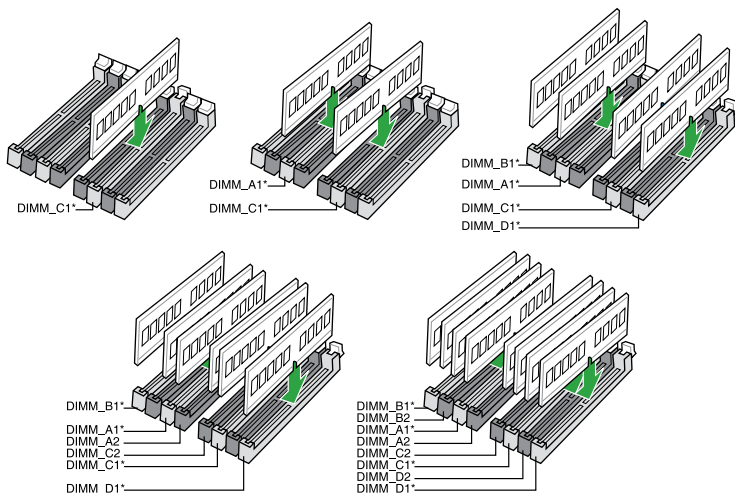
Apply the Thermal Interface Material to the CPU heatsink and CPU before you install the heatsink and fan if necessary.

## 1.4 System memory

### Overview

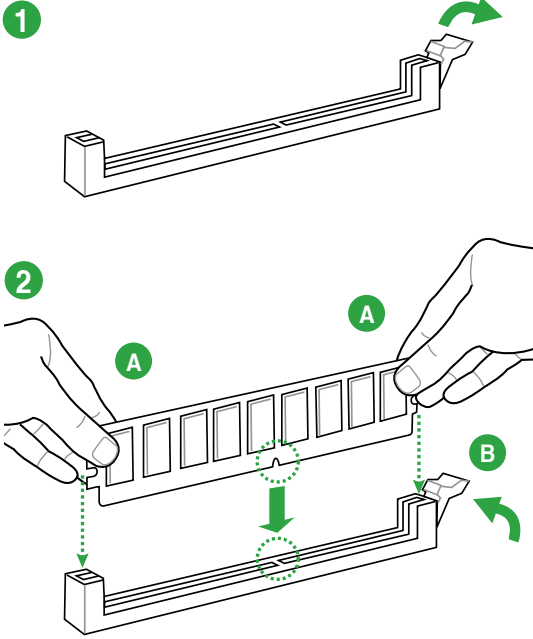
The motherboard comes with eight DDR4 (Double Data Rate 4) Dual Inline Memory Modules (DIMM) slots. The figure illustrates the location of the DDR4 DIMM sockets:

### Recommended memory configurations

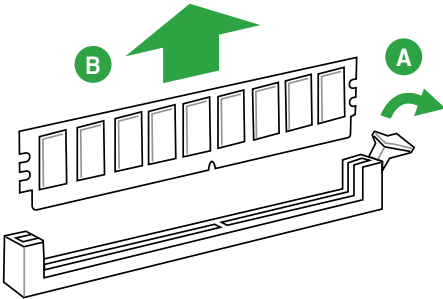


- The default memory operation frequency is dependent on its Serial Presence Detect (SPD), which is the standard way of accessing information from a memory module. Under the default state, some memory modules for overclocking may operate at a lower frequency than the vendor-marked value.
- For system stability, use a more efficient memory cooling system to support a full memory load (8 DIMMs) or overclocking condition.
- Always install the DIMMS with the same CAS Latency. For an optimum compatibility, we recommend that you install memory modules of the same version or data code (D/C) from the same vendor. Check with the vendor to get the correct memory modules.
- Refer to [www.asus.com](http://www.asus.com) for the latest Memory QVL (Qualified Vendors List)

# Installing a DIMM



# To remove a DIMM





# BIOS Information

# 2

## 2.1 Managing and updating your BIOS



Save a copy of the original motherboard BIOS file to a USB flash disk in case you need to restore the BIOS in the future. Copy the original motherboard BIOS using the ASUS Update utility.

### 2.1.1 EZ Update

EZ Update is a utility that allows you to automatically update your motherboard's softwares, drivers and the BIOS version easily. With this utility, you can also manually update the saved BIOS and select a boot logo when the system goes into POST.

To launch EZ Update, click **EZ Update** on the AI Suite 3 main menu bar.

The screenshot shows the ASUS EZ Update utility window. It features a dark blue background with white text. At the top right, it displays system information: 'Current BIOS: Model Name: Pro WS C422-ACE, Version: 3002, Release Date: 05/22/2019'. Below this, there are two main sections. The first section, 'Check updates from internet:', contains a blue 'Check Now!' button. A red line points from the text 'Click to automatically update your motherboard's driver, software and firmware' to this button. The second section, 'Manually update Boot logo or BIOS:', contains a text box and a button with an ellipsis (...). A red line points from the text 'Click to find and select the BIOS from file' to this button. At the bottom right, there are two buttons: 'Selected BIOS' and 'Update BIOS'. Red lines point from the text 'Click to select a boot logo' to the 'Selected BIOS' button and from 'Click to update the BIOS' to the 'Update BIOS' button.



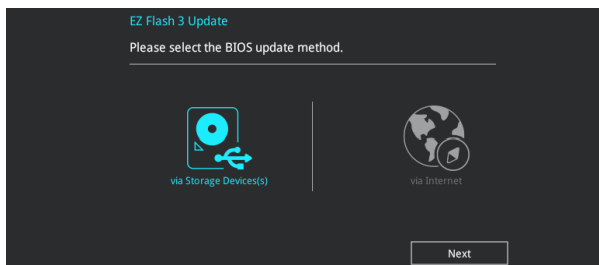
EZ Update requires an Internet connection either through a network or an ISP (Internet Service Provider).

## 2.1.2 ASUS EZ Flash 3

The ASUS EZ Flash 3 allows you to download and update to the latest BIOS through the Internet without having to use a bootable floppy disk or 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. See section **2.3 Exit Menu** for details.
- Check your local Internet connection before updating through the Internet.



### To update the BIOS using EZ Flash 3:

1. Enter the **Advanced Mode** of the BIOS setup program. Go to the **Tool** menu to select ASUS EZ Flash 3 and press <Enter> to enable it.
2. Follow the steps below to update the BIOS via USB or Internet.

#### Via USB

- a) Insert the USB flash disk that contains the latest BIOS file to the USB port, then select **by USB**.
- b) Press <Tab> to switch to the **Drive** field.
- c) Press the Up/Down arrow keys to find the USB flash disk that contains the latest BIOS, and then press <Enter>.
- d) Press <Tab> to switch to the **Folder** field.
- e) Press the Up/Down arrow keys to find the BIOS file, and then press <Enter> to perform the BIOS update process.

#### Via the Internet

- a) Select **by Internet**.
  - b) Press the Left/Right arrow keys to select an Internet connection method, and then press <Enter>.
  - c) Follow the onscreen instructions to complete the update.
3. Reboot the system when the update process is done.



- 
- ASUS EZ Flash 3 supports USB 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!
- 

### 2.1.3 ASUS CrashFree BIOS 3 utility

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



- 
- Before using this utility, rename the BIOS file in the removable device into **PWCA.CAP**.
  - The BIOS file in the support DVD may not be the latest version. Download the latest BIOS file from the ASUS website at [www.asus.com](http://www.asus.com).
- 

### Recovering the BIOS

#### To recover the BIOS:

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



---

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

---

## 2.2 BIOS setup program

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

### Entering BIOS Setup 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>+<Del> 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.



---

Using the power button, reset button, or the <Ctrl>+<Alt>+<Del> keys to force reset from a running operating system can cause damage to your data or system. We recommend you always shut down the system properly from the operating system.

---



- The BIOS setup screens shown in this section are for reference purposes only, and may not exactly match what you see on your screen.
  - Visit the ASUS website at [www.asus.com](http://www.asus.com) to download the latest BIOS file for this motherboard.
  - Ensure that a USB mouse is connected to your motherboard if you want to use the mouse to control the BIOS setup program.
  - If the system becomes unstable after changing any BIOS setting, load the default settings to ensure system compatibility and stability. Select the **Load Optimized Defaults** item under the Exit menu or press hotkey F5. See section 2.3 **Exit Menu** for details.
  - If the system fails to boot after changing any BIOS setting, try to clear the CMOS and reset the motherboard to the default value. See section 1.2 **Motherboard overview** for information on how to erase the RTC RAM.
- 

### BIOS menu screen

The BIOS setup program can be used under two modes: **EZ Mode** and **Advanced Mode**. Press <F7> to change between the two modes.

## 2.2.1 EZ Mode

By default, the EZ Mode screen appears when you enter the BIOS setup program. The EZ Mode provides you an overview of the basic system information, and allows you to select the display language, system performance mode, fan profile and boot device priority. To access the Advanced Mode, click **Advanced Mode(F7)** or press <F7>.



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

The screenshot shows the ASUS UEFI BIOS Utility - EZ Mode interface. The interface is divided into several sections:

- Information:** Displays system status including date (01/20/2009 Tuesday), time (17:42), language (English), and system details like Pro WS C422-ACE BIOS Ver. 0215.
- CPU Temperature:** Shows CPU Core Voltage (0.888 V) and Motherboard Temperature (27°C).
- DRAM Status:** Lists memory modules (DIMM\_A1 to DIMM\_D2) and their status (N/A).
- Storage Information:** Shows Intel Rapid Storage Technology enterprise (On/Off).
- FAN Profile:** Displays fan speeds for CPU FAN (4285 RPM) and other fans (CHA FAN1-3, CPU OPT FAN, EXT FAN1-2).
- EZ System Tuning:** Includes a gauge for system performance and a 'Normal' mode selection.
- Boot Priority:** Allows selecting boot devices and includes a 'Switch all' button.
- Bottom Bar:** Contains navigation options: Default(F5), Save & Exit(F10), Advanced Mode(F7) [-], and Search on FAQ.

Annotations on the screenshot include:

- Displays a quick overview of the system status:** Points to the Information section.
- Creates storage RAID and configures system overlocking:** Points to the Storage Information section.
- Selects the display language of the BIOS setup program:** Points to the Language icon.
- Search(F9):** Points to the Search icon.
- Displays the system properties of the selected mode. Click < or > to switch EZ System Tuning modes:** Points to the EZ System Tuning gauge.
- Displays the CPU Fan's speed. Click the button to manually tune the fans:** Points to the CPU FAN speed indicator.
- Saves the changes and resets the system:** Points to the Save & Exit(F10) button.
- Click to go to Advanced mode:** Points to the Advanced Mode(F7) [-] button.
- Search on the FAQ:** Points to the Search on FAQ button.
- Click to display boot devices:** Points to the Boot Priority section.
- Selects the boot device priority:** Points to the Boot Priority section.
- Loads optimized default settings:** Points to the X.M.P. dropdown menu.



The boot device options vary depending on the devices you installed to the system.

## 2.2.2 Advanced Mode

The Advanced Mode provides advanced options for experienced end-users to configure the BIOS settings. The figure below shows an example of the **Advanced Mode**. Refer to the following sections for the detailed configurations.



To access the EZ Mode, click **EzMode(F7)** or press <F7>.

The screenshot shows the ASUS UEFI BIOS Utility in Advanced Mode. The interface includes a menu bar at the top with options like Language, MyFavorite(F3), Qfan Control(F6), EZ Tuning Wizard(F11), and Search(F9). A scroll bar is visible on the right. The main area displays configuration fields for Hyper-Threading Technology, Intel VT-x Technology, Intel SMX Technology, 64-bit, EIST Technology, CPU C3 state, CPU C6 state, CPU C7 state, L1 Cache RAM, L2 Cache RAM, and L3 Cache RAM. A dropdown menu for Hyper-Threading (ALL) is open, showing options: Enabled, Disabled, Enabled, Enabled, and Enabled. The Hardware Prefetcher is also set to Enabled. A hardware monitor on the right shows CPU and Memory status. The bottom of the screen displays menu items, general help, last modified settings, and a search on the FAQ. A note at the bottom states: 'Enables Hyper Threading (Software Method to Enable/Disable Logical Processor threads.)'.

## Menu bar

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

<b>My Favorites</b>	For saving the frequently-used system settings and configuration
<b>Main</b>	For changing the basic system configuration
<b>Ai Tweaker</b>	For changing the overclocking settings
<b>Advanced</b>	For changing the advanced system settings
<b>Monitor</b>	For displaying the system temperature, power status, and changing the fan settings
<b>Boot</b>	For changing the system boot configuration
<b>Tool</b>	For configuring options for special functions
<b>Exit</b>	For selecting the exit options and loading default settings

## Menu items

The highlighted item on the menu bar displays the specific items for that menu. For example, selecting **Main** shows the Main menu items.

The other items (My Favorites, Ai Tweaker, Advanced, Monitor, Boot, Tool, and Exit) on the menu bar have their respective menu items.

## Submenu items

A greater than sign (>) before each item on any menu screen means that the item has a submenu. To display the submenu, select the item and press <Enter>.

## Language

This button above the menu bar contains the languages that you can select for your BIOS. Click this button to select the language that you want to display in your BIOS screen.

## My Favorites (F3)

This button above the menu bar shows all BIOS items in a Tree Map setup. Select frequently-used BIOS settings and save it to MyFavorites menu.

## Q-Fan Control (F6)

This button above the menu bar displays the current settings of your fans. Use this button to manually tweak the fans to your desired settings.

## Search (F9)

This button allows you to search for BIOS items by entering its name, enter the item name to find the related item listing.

## Search on FAQ

Move your mouse over this button to show a QR code, scan this QR code on your mobile device to connect to the BIOS FAQ web page of the ASUS support website. You can also scan the following QR code:



## Scroll bar

A scroll bar appears on the right side of a menu screen when there are items that do not fit on the screen. Press the Up/Down arrow keys or <Page Up> / <Page Down> keys to display the other items on the screen.

## General help

At the bottom of the menu screen is a brief description of the selected item. Use <F12> key to capture the BIOS screen and save it to the removable storage device.

## Configuration fields

These fields show the values for the menu items. If an item is user-configurable, you can change the value of the field opposite the item. You cannot select an item that is not user-configurable.

A configurable field is highlighted when selected. To change the value of a field, select it and press <Enter> to display a list of options.

## Hot keys

This button contains the navigation keys for the BIOS setup program. Use the navigation keys to select items in the menu and change the settings.

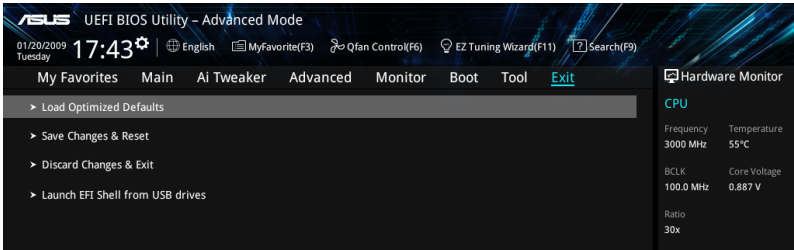
## Last Modified button

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



## 2.3 Exit menu

The Exit menu items allow you to load the optimal default values for the BIOS items, and save or discard your changes to the BIOS items.



### Load Optimized Defaults

This option allows you to load the default values for each of the parameters on the Setup menus. When you select this option or if you press <F5>, a confirmation window appears. Select OK to load the default values.

### Save Changes & Reset

Once you are finished making your selections, choose this option from the Exit menu to ensure the values you selected are saved. When you select this option or if you press <F10>, a confirmation window appears. Select OK to save changes and exit.

### Discard Changes and Exit

This option allows you to exit the Setup program without saving your changes. When you select this option or if you press <Esc>, a confirmation window appears. Select OK to discard changes and exit.

### Launch EFI Shell from USB drives

This option allows you to attempt to launch the EFI Shell application (shellx64.efi) from one of the available USB devices.



# Appendix

## Q-Code table

Code	Description
00	Not used
01	Power on. Reset type detection (soft/hard).
02	AP initialization before microcode loading
03	System Agent initialization before microcode loading
04	PCH initialization before microcode loading
06	Microcode loading
07	AP initialization after microcode loading
08	System Agent initialization after microcode loading
09	PCH initialization after microcode loading
0B	Cache initialization
0C – 0D	Reserved for future AMI SEC error codes
0E	Microcode not found
0F	Microcode not loaded
10	PEI Core is started
11 – 14	Pre-memory CPU initialization is started
15 – 18	Pre-memory System Agent initialization is started
19 – 1C	Pre-memory PCH initialization is started
2B – 2F	Memory initialization
30	Reserved for ASL (see ASL Status Codes section below)
31	Memory Installed
32 – 36	CPU post-memory initialization
37 – 3A	Post-Memory System Agent initialization is started
3B – 3E	Post-Memory PCH initialization is started
4F	DXE IPL is started
50 – 53	Memory initialization error. Invalid memory type or incompatible memory speed
54	Unspecified memory initialization error
55	Memory not installed
56	Invalid CPU type or Speed
57	CPU mismatch
58	CPU self test failed or possible CPU cache error
59	CPU micro-code is not found or micro-code update is failed
5A	Internal CPU error
5B	Reset PPI is not available
5C – 5F	Reserved for future AMI error codes

*(continued on the next page)*

## Q-Code table

Code	Description
E0	S3 Resume is started (S3 Resume PPI is called by the DXE IPL)
E1	S3 Boot Script execution
E2	Video repost
E3	OS S3 wake vector call
E4 – E7	Reserved for future AMI progress codes
E8	S3 Resume Failed
E9	S3 Resume PPI not Found
EA	S3 Resume Boot Script Error
EB	S3 OS Wake Error
EC – EF	Reserved for future AMI error codes
F0	Recovery condition triggered by firmware (Auto recovery)
F1	Recovery condition triggered by user (Forced recovery)
F2	Recovery process started
F3	Recovery firmware image is found
F4	Recovery firmware image is loaded
F5 – F7	Reserved for future AMI progress codes
F8	Recovery PPI is not available
F9	Recovery capsule is not found
FA	Invalid recovery capsule
FB – FF	Reserved for future AMI error codes
60	DXE Core is started
61	NVRAM initialization
62	Installation of the PCH Runtime Services
63 – 67	CPU DXE initialization is started
68	PCI host bridge initialization
69	System Agent DXE initialization is started
6A	System Agent DXE SMM initialization is started
6B – 6F	System Agent DXE initialization (System Agent module specific)
70	PCH DXE initialization is started
71	PCH DXE SMM initialization is started
72	PCH devices initialization
73 – 77	PCH DXE Initialization (PCH module specific)
78	ACPI module initialization
79	CSM initialization
7A – 7F	Reserved for future AMI DXE codes

*(continued on the next page)*

## Q-Code table

Code	Description
90	Boot Device Selection (BDS) phase is started
91	Driver connecting is started
92	PCI Bus initialization is started
93	PCI Bus Hot Plug Controller Initialization
94	PCI Bus Enumeration
95	PCI Bus Request Resources
96	PCI Bus Assign Resources
97	Console Output devices connect
98	Console input devices connect
99	Super IO Initialization
9A	USB initialization is started
9B	USB Reset
9C	USB Detect
9D	USB Enable
9E – 9F	Reserved for future AMI codes
A0	IDE initialization is started
A1	IDE Reset
A2	IDE Detect
A3	IDE Enable
A4	SCSI initialization is started
A5	SCSI Reset
A6	SCSI Detect
A7	SCSI Enable
A8	Setup Verifying Password
A9	Start of Setup
AA	Reserved for ASL (see ASL Status Codes section below)
AB	Setup Input Wait
AC	Reserved for ASL (see ASL Status Codes section below)
AD	Ready To Boot event
AE	Legacy Boot event
AF	Exit Boot Services event
B0	Runtime Set Virtual Address MAP Begin
B1	Runtime Set Virtual Address MAP End
B2	Legacy Option ROM Initialization
B3	System Reset

*(continued on the next page)*

## Q-Code table

Code	Description
B4	USB hot plug
B5	PCI bus hot plug
B6	Clean-up of NVRAM
B7	Configuration Reset (reset of NVRAM settings)
B8– BF	Reserved for future AMI codes
D0	CPU initialization error
D1	System Agent initialization error
D2	PCH initialization error
D3	Some of the Architectural Protocols are not available
D4	PCI resource allocation error. Out of Resources
D5	No Space for Legacy Option ROM
D6	No Console Output Devices are found
D7	No Console Input Devices are found
D8	Invalid password
D9	Error loading Boot Option (LoadImage returned error)
DA	Boot Option is failed (StartImage returned error)
DB	Flash update is failed
DC	Reset protocol is not available

## 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。

V C C I - B

## KC: Korea Warning Statement

B급 기기 (가정용 방송통신기자재)

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



## REACH

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



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



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

## ASUS Recycling/Takeback Services

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

## Regional notice for California



### WARNING

Cancer and Reproductive Harm -  
[www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

## Google™ License Terms

Copyright© 2019 Google Inc. All Rights Reserved.

Licensed under the Apache License, Version 2.0 (the “License”); you may not use this file except in compliance with the License. You may obtain a copy of the License at:

<http://www.apache.org/licenses/LICENSE-2.0>

Unless required by applicable law or agreed to in writing, software distributed under the License is distributed on an “AS IS” BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.

See the License for the specific language governing permissions and limitations under the License.

**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](http://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](http://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](http://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](http://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](http://www.asus.com/support)

**Български** С настоящото ASUSTeK Computer Inc. декларира, че това устройство е в съответствие със съществени изисквания и другите приложими постановления на свързаните директиви. Пълният текст на декларацията за съответствие на ЕС е достъпен на адрес: [www.asus.com/support](http://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](http://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](http://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](http://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](http://www.asus.com/support)

**Eesti** Käesolevaga kinnitab ASUSTeK Computer Inc, et see seade vastab asjakohaste direktiivide olulistele nõuetele ja teistele asjassepuutuvatele sätetele. El vastavusdeklaratsiooni täielik tekst on saadaval järgmisel aadressil: [www.asus.com/support](http://www.asus.com/support)

**Suomi** ASUSTeK Computer Inc. ilmoittaa täten, että tämä laite on asiaankuuluvien direktiivien olennaisien vaatimusten ja muiden tätä koskevien säädösten mukainen. EU-yhdenmukaisuusilmoituksen koko teksti on luettavissa osoitteessa: [www.asus.com/support](http://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 συμμόρφωσης είναι διαθέσιμο στη διεύθυνση: [www.asus.com/support](http://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 megfélelőségi nyilatkozat teljes szövege innen letölthető: [www.asus.com/support](http://www.asus.com/support)

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

**Lietuviai** „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](http://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](http://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](http://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](http://www.asus.com/support)

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

**Türkçe** ASUSTeK Computer Inc., bu aygıtın temel gereksinimlerle ve ilişkili Yönergelerin diğer ilgili koşullarına uyumlu olduğunu beyan eder. AB uygunluk bildirimini tam metni şu adreste bulunabilir: [www.asus.com/support](http://www.asus.com/support)

**Bosanski** ASUSTeK Computer Inc. ovim izjavljuje da je ovaj uređaj sukladan sa bitnim zahtjevima i ostalim odgovarajućim odredbama vezanih direktiva. Cijeli tekst EU izjave o uskladenosti dostupan je na: [www.asus.com/support](http://www.asus.com/support)

## ASUS contact information

### ASUSTeK COMPUTER INC.

Address 4F, No. 150, Li-Te Road, Peitou, Taipei 112, Taiwan  
Telephone +886-2-2894-3447  
Fax +886-2-2890-7798  
Web site [www.asus.com](http://www.asus.com)

#### **Technical Support**

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

### ASUS COMPUTER INTERNATIONAL (America)

Address 48720 Kato Rd., Fremont, CA 94538, USA  
Telephone +1-510-739-3777  
Fax +1-510-608-4555  
Web site <http://www.asus.com/us/>

#### **Technical Support**

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

### ASUS COMPUTER GmbH (Germany and Austria)

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

#### **Technical Support**

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

