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Chapter 1 Product Introduction

Thank you for choosing our wireless adapter!

The wireless adapter supports IEEE wireless standards, and is able to quickly process file transfer, video, multi-media and other applications that require higher bandwidth.

This wireless adapter also integrates wireless configuration program, which makes it easy and quick to set up the wireless client. Besides, Soft AP is supported for fast wireless network establishment, and WPS encryption supported for you to quickly encrypt and secure your wireless network.

All in all, the wireless adapter is easy-to-use, and of robust signal, long transmitting distance.

1.1 Package Contents

- One Wireless network adapter
- One Software CD (includes user guide and driver)

The above list is for your reference only; the actual contents may differ according to the product you purchase.

1.2 Product Features

- Supports soft AP feature
- Detects wireless network and adjusts transmitting rate automatically
- Provides two working modes: Infrastructure and Ad-Hoc
- Supports WEP data encryption and WPA-PSK/WPA2-PSK encryption methods
- Supports WPS (Wi-Fi Protected Setup) encryption to secure your wireless network
- Complies with Windows 7/Windows 8/XP/ 2000/Vista, Linux, MAC OS, etc.

1.3 Product Usage

This Wireless Adapter offers a fast, reliable and extendable solution for wireless access.

It is mostly used in the following circumstances:

1. Enables staff members who require higher mobility, to have access to the wireless network anywhere inside their company.
2. Enables wireless communication for companies or places which are not suitable for wired LAN installation because of budget or building environment restrictions, such as historical buildings, rentals, or places for short-term usage.
3. Suitable for Enterprises or individuals requiring to regularly alter the networking topology
4. Helps enterprises or individuals who would like to use wireless to establish wireless network quickly and frees them from the trouble of cable distribution.

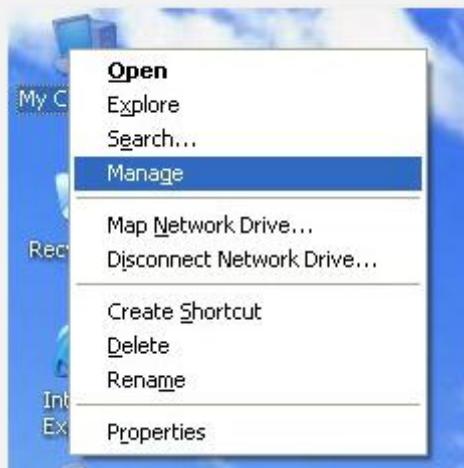
1.4 Before Installation

1. Please read through the whole user guide before you install and use this product.

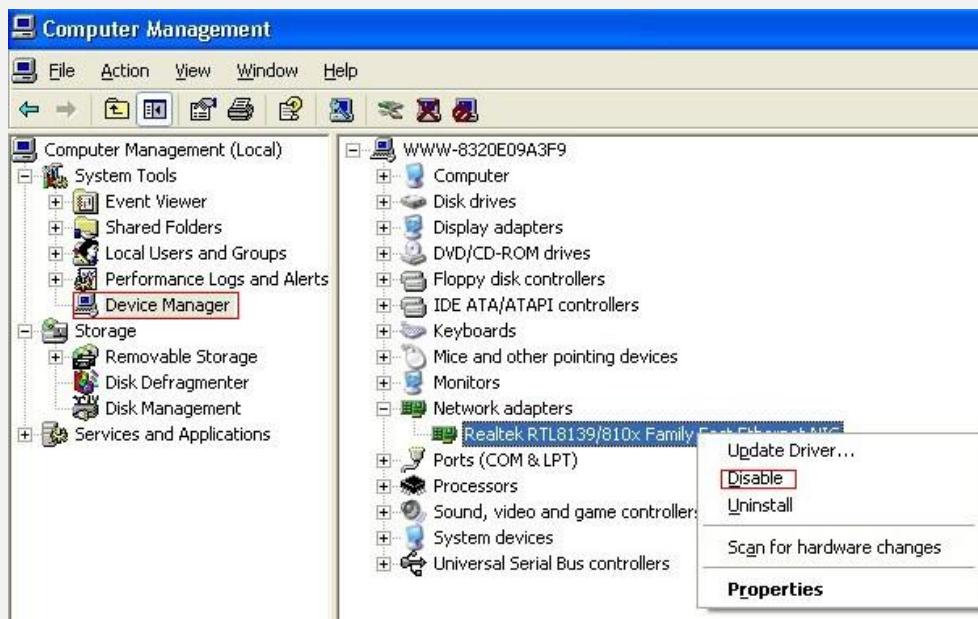
2. Please close or uninstall the configuration programs of other manufacturers' before you install the configuration programs of the network adapters to avoid possible UI (user interface) conflict.
3. To avoid possible network conflicts between this the network adapter and those of other manufactures', we recommend that you first disable the network adapters of other manufacturers before installing the driver.

1.5 Disable other manufacturers' wireless network adapters

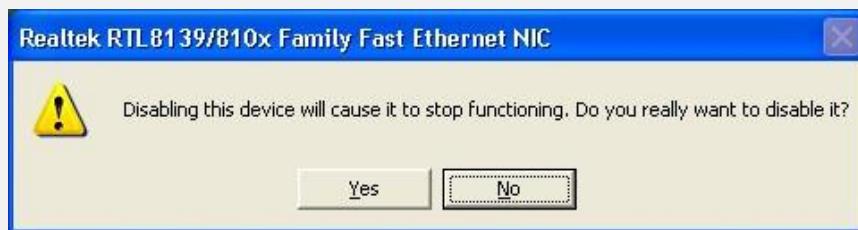
1. Right click "My Computer" and select "Manage"



2. On the Computer Management screen ,select "Device Manager" — "Network adapters", and right click the network adapter you want to disable and click "Disable"



3. Click the "Yes" button on the dialogue box to disable the network adapter.



1.6 Product Maintenance

1. Please keep the product away from water and humid environment to guarantee its normal performance
2. Protect it against hazardous substances (such as acids, alkalis etc).
3. Please don't directly expose the adapter to the sunlight or excessive heat.
4. Please contact our tech support if any problems occur.

Chapter 2 Installation Guide

This chapter will guide you through the process of installing the network adapter software package, with the included software CD. The package integrates driver and configuration software. Thus, when you are installing the driver, the configuration software will be installed automatically as well.

The software installation steps and operating guide in this user guide are explained under Windows XP, Installation steps for other operating systems are similar.

Before you proceed with the installation, please notice the following descriptions.

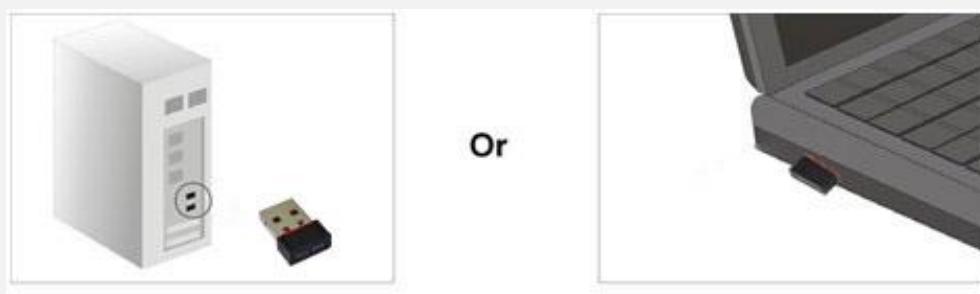
Note 1: The following installation was operated under Windows XP.

(Procedures are similar for Windows 98SE/Me/2000.)

Note 2: If you have installed the WLAN USB driver & utility before, please uninstall the old version first.

2.1 Install the USB network adapter

- 2.1.1 Please insert the Wireless USB Adapter into the USB port of your computer.



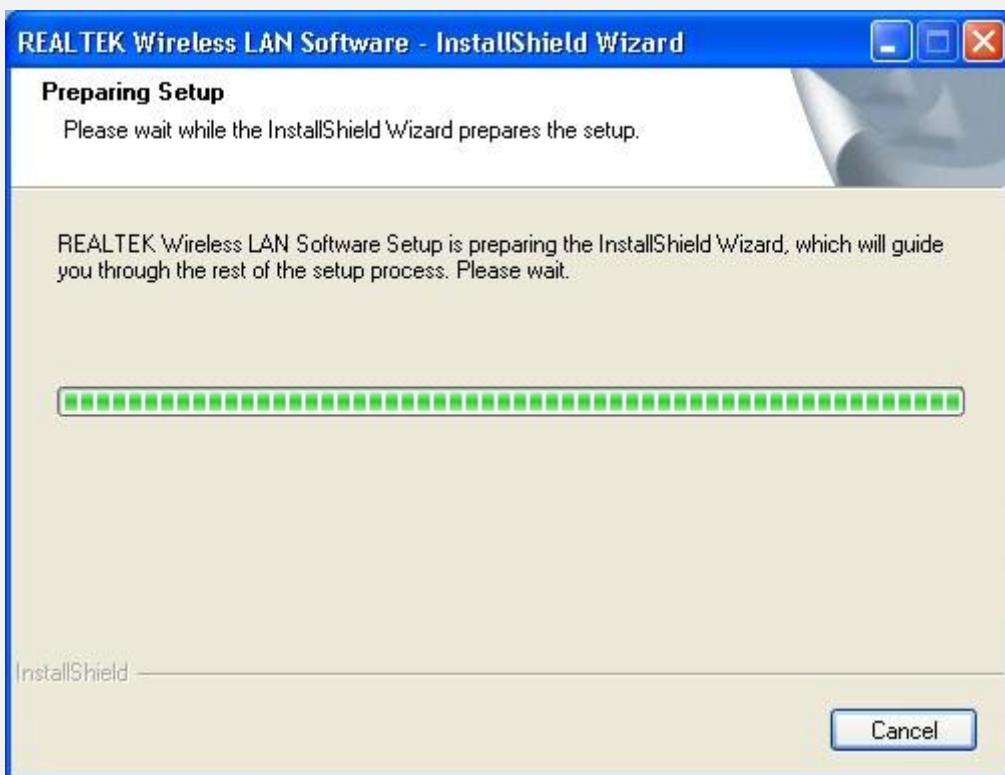
- 2.1.2 Ignore the following dialog. Please click "Cancel".



2.1.3 Put the software program CD, then auto installation window pops up on following. Just click **Windows**, the driver should run automatically. (Double click “**Setup.exe**” in the software CD and manually install when it doesn’t auto-run).



2.1.4 The following window will show up.



2.1.5 Click "Next" to process the installation.



2.1.6 It shows that it is installing.

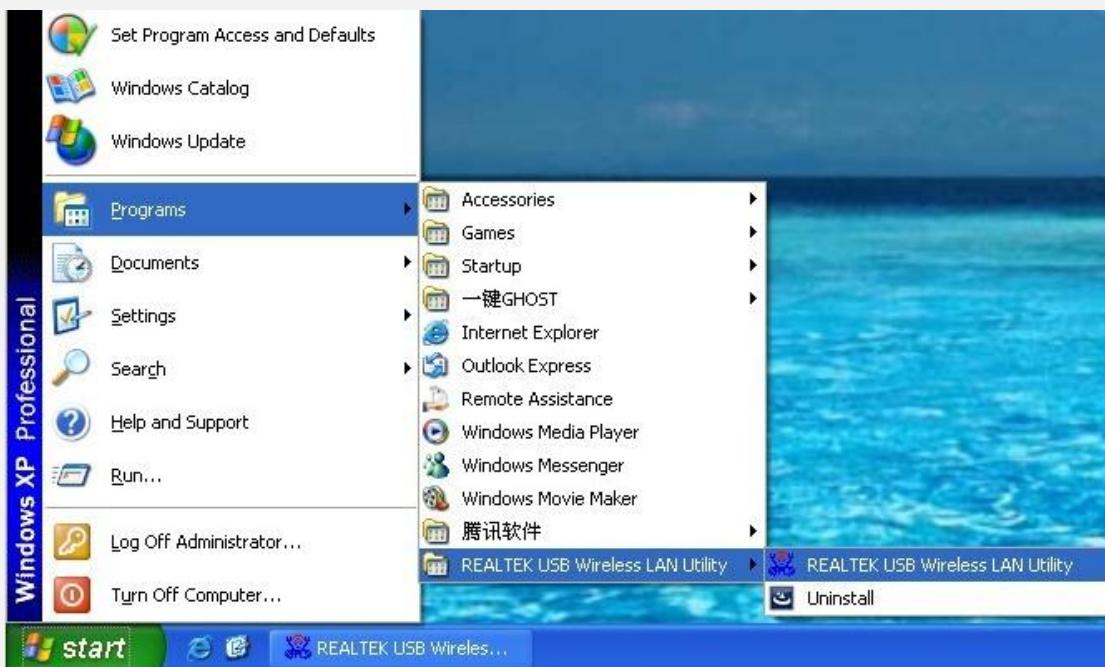


2.1.7 Click "finish" to complete the installation.



Chapter 3 Wireless LAN Utility

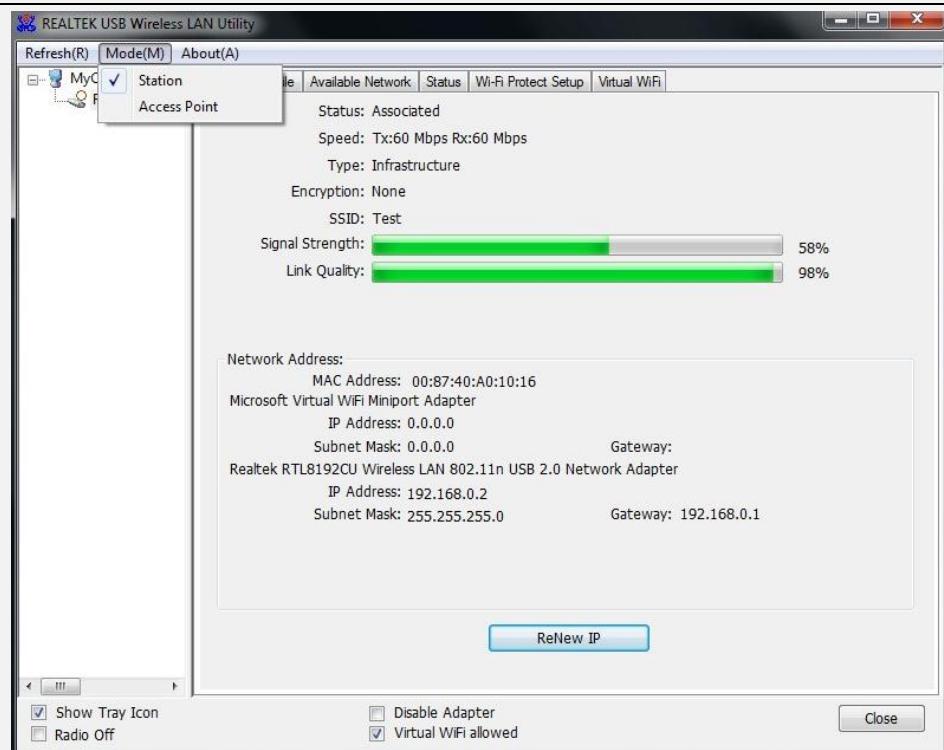
Select “Start”—“Programs” —“REALTEK USB Wireless LAN Utility”— “REALTEK USB Wireless LAN Utility”,



or click the “REALTEK USB Wireless LAN Utility” shortcut on your PC’s desktop to start the UI.

3.1 Station Mode

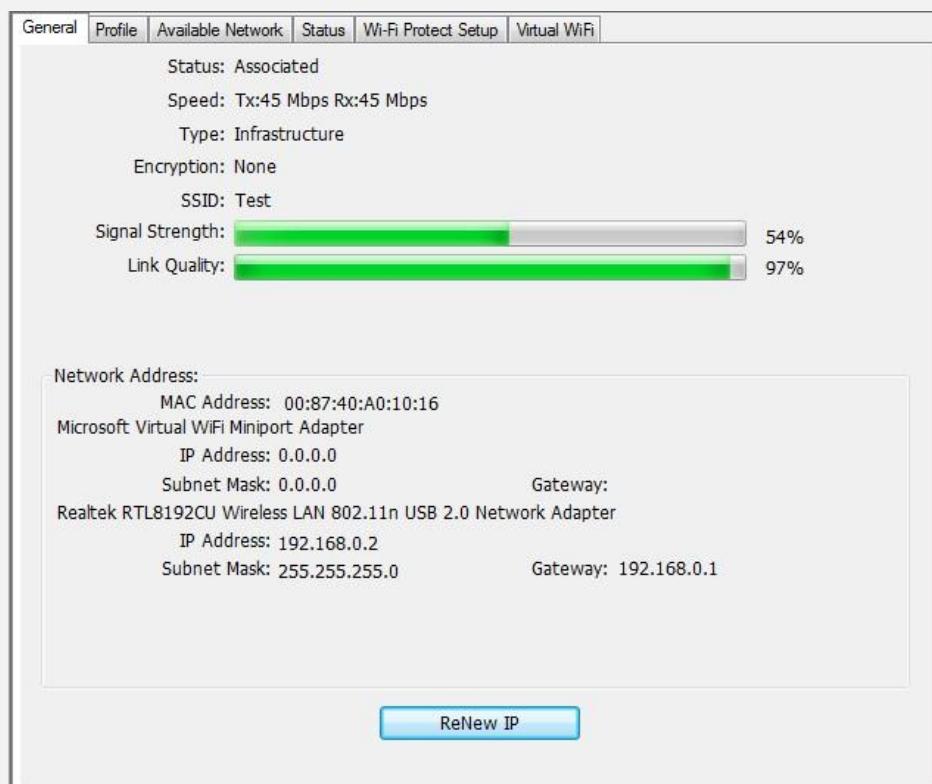
The following explanations focus on the properties area.



Infrastructure and Ad-Hoc

With both Infrastructure and Ad-Hoc types, the properties should look like the picture above. Six property pages present different information of current wireless network status. Please read the following explanations before you reviewing these pages, it could help you to well understand the wireless environment around the system. It is easy to use to switch property pages just by clicking left button of mouse on the title of each page. The following six sections describe detailed information of each page.

A: General Page



1. Status

The status of station connection to AP.

2. Speed

Current transition speed in Mbps (Mega-Bits-Per-Second).

3. Type

Current wireless LAN configuration type.

4. Encryption

Current encryption mode used.

5. SSID

Name of wireless network.

6. Signal Strength

The average signal quality of packets received from wireless network.

We recommend connecting AP with over 70% signal strength.

7. Throughput Diagram

Current throughput, including transmission (Tx) and total traffic (Total).

8. Network Address

Mac Address: six two-digit number of this Wireless LAN USB adapter

IP Address: assigned network address by DHCP server or self-definition in four three-digit number format.

- Subnet Mask: the only valid value is 255.255.0.0
- Gateway: It comes from connected AP. Your system can not connect internet with this field empty.

B. Profile Page

This page provides profiles management such as add, remove, edit and duplicate just by pressing the respected button.

Available Profile(s)

The list box shows all the created profiles.

General	Profile	Available Network	Status	Wi-Fi Protect Setup	Virtual WiFi
Available Profile(s)					
		Profile Name	SSID		
		Test	Test		
<input type="button" value="Add"/> <input type="button" value="Remove"/> <input type="button" value="Edit"/> <input type="button" value="Duplicate"/> <input type="button" value="Set Default"/>					

1. Add

Add a new profile for AP or IBSS (Ad-Hoc mode).

2. Remove

Remove the selected profile.

3. Edit

Edit contents of selected profile.

4. Duplicate

Make copy of selected profile.

5. Set Default

Set the selected profile as default selection.

6. Available Network Page

This page presents all BSS, including AP and IBSS, around this system. You can pick any one of these network connections.

C. Available Network(s)

Show network connection around this system

SSID	Channel	Encryption	Network Authentication	Signal	Type	BS
sjxy3	2	TKIP	WPA Pre-Shared Key/...	100%	Infrastructure	02
507	6	AES	WPA Pre-Shared Key/...	44%	Infrastructure	EC
ChinaNet-14	6	None	Unknown	26%	Infrastructure	6A
ChinaNet-fadr	6	TKIP	WPA Pre-Shared Key	48%	Infrastructure	00
MERCURY_704936	6	AES	WPA Pre-Shared Key/...	44%	Infrastructure	8C
SZtianhao	6	AES	WPA2 Pre-Shared Key	74%	Infrastructure	00
Test	6	None	Unknown	58%	Infrastructure	00
dd-wrt	6	None	Unknown	42%	Infrastructure	00
liming	6	AES	WPA Pre-Shared Key/...	42%	Infrastructure	EC
meeting	6	AES	WPA Pre-Shared Key/...	44%	Infrastructure	D8
xiao chen	6	AES	WPA Pre-Shared Key/...	48%	Infrastructure	5C
xiaolin	6	AES	WPA Pre-Shared Key/...	46%	Infrastructure	B0
ChinaNet-Se4Z	11	AES	WPA Pre-Shared Key/...	44%	Infrastructure	04
ChinaNet-bAKN	11	AES	WPA Pre-Shared Key/...	48%	Infrastructure	4C
TianHao_412FA2	11	None	Unknown	100%	Infrastructure	00
Izy520	11	AES	WPA Pre-Shared Key/...	46%	Infrastructure	6C
ÖÐ¹úØÆ¶£·ÅÜ...	11	WEP	Unknown	26%	IBSS	0E

1. Refresh

Rescan network connection around this system.

2. Add to Profile

Create profile for selected network connection and add it to profile list.

D. Status Page

General	Profile	Available Network	Status	Wi-Fi Protect Setup	Virtual WiFi
Manufacturer	REALTEK				
NDIS Driver Version	1021.3.912.2012				
Short Radio Header	Yes				
Encryption	Disabled				
Authenticate	Open System				
Channel Set	ETSI				
MAC Address	00:87:40:A0:10:16				
Data Rate (AUTO)	Tx:0 Mbps Rx:0 Mbps				
Channel (Frequency)	1 (2412 MHz)				
Status	Not Associated				
SSID					
Network Type					
Power Save Mode	None				
Associated AP MAC	00:00:00:00:00:00				
Up Time (hh:mm:ss)	0:15:45				

NDIS Driver Version: Driver version

Short Radio Header: No

Encryption: Current encryption mode.

Authenticate: Authentication state

Channel Set: Selected channel plan currently.

MAC Address: MAC address of this adapter.

Data Rate: Wireless LAN transition speed

Channel (Frequency): Current channel number

Status: Wireless network status

SSID: name of connecting AP

Network Type: Indicate current network configuration type

Power Save Mode: Current setting power save mode

Associated AP MAC: MAC address of connecting AP

Associated AP IP: IP address of connecting AP

Up Time: Total connection time

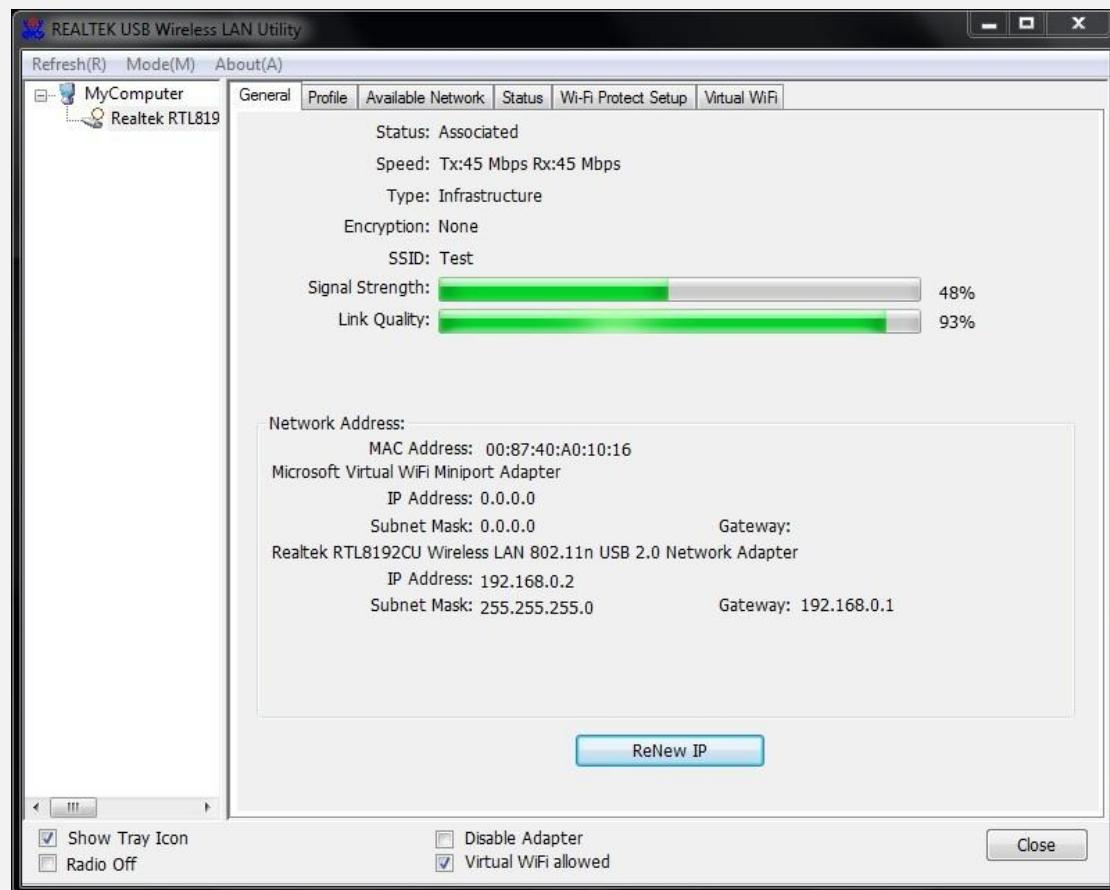
E. Wi-Fi Protect Setup Page

General	Profile	Available Network	Status	Wi-Fi Protect Setup	Virtual WiFi
<p>Wi-Fi Protected Setup (WPS) An easy and secure setup solution for Wi-Fi network</p> <p>Role Selection <input checked="" type="radio"/> As WPS Device</p> <p>Pin Input Config (PIN) After pushing the PIN button. Please enter the PIN code</p> <p>PIN Code : 90959394</p> <p><input type="button" value="Pin Input Config (PIN)"/></p> <p>Push Button After pushing the PBC button. Please push the physical button on your AP or visual button on the WPS config page.</p> <p><input type="button" value="Push Button Config (PBC)"/></p>					

F. Virtual WiFi Page

General	Profile	Available Network	Status	Wi-Fi Protect Setup	Virtual WiFi									
<p><input type="checkbox"/> Start Virtual WiFi Soft AP</p> <p>Virtual WiFi SoftAP Status</p> <table border="1"> <tr> <td>Status: Stopped</td> </tr> <tr> <td>SSID:</td> </tr> <tr> <td>BSSID:</td> </tr> </table> <p>Association Table</p> <table border="1"> <thead> <tr> <th>AID</th> <th>MAC Address</th> <th>Life Time</th> </tr> </thead> <tbody> <tr> <td colspan="3"></td> </tr> </tbody> </table> <p><input type="button" value="Config"/></p> <p>Soft AP Use the following IP address: IP Address: 192 . 168 . 159 . 1 <input type="button" value="Apply"/></p>						Status: Stopped	SSID:	BSSID:	AID	MAC Address	Life Time			
Status: Stopped														
SSID:														
BSSID:														
AID	MAC Address	Life Time												

3.2 Introduction of Main Window



A. Main Menu

The main menu includes five submenus.

1. Refresh(**R**)

When clicking the refresh menu, you can update and re-enumerate the contents of adapter list area.

2. Mode(**M**)

Wireless configuration is quickly switched to be either [Station] or [Access Point].

3. About(**A**)

Click the “About” to show the about dialog. The application version and license information are shown in the about dialog.



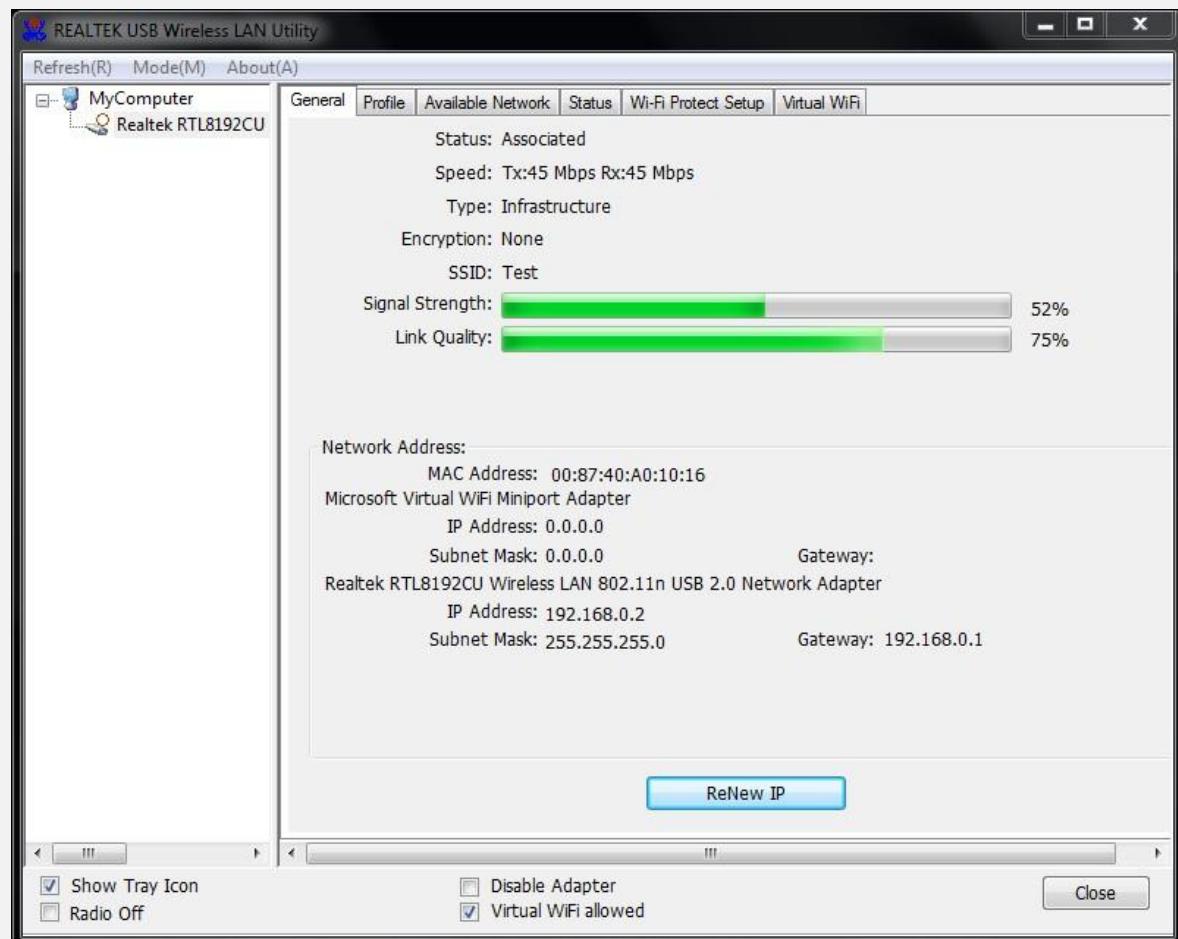
B. Adapter List Area

All connected adapters on this system with multiple adapter installations are displayed in this area. It is easy for users to change the selected adapter by one click. The contents of properties area are dependent on wireless configuration that the selected adapter is set up. If only single adapter is installed on the system, only one adapter is always selected.

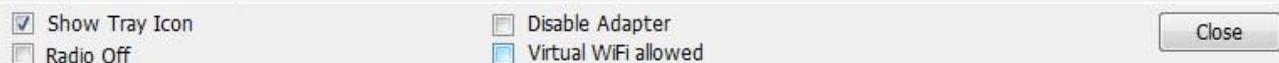


C. Properties Area

The contents of this area are dependent on current wireless configuration. The current configuration is determined on previous explanation of submenu “Mode”. The more detailed contents are described in the following wireless configuration sections for both Station and AP mode.



D. Global Control Bar



Each control item on this bar affects the adapter or management GUI directly.

Show Tray Icon

Checking "Show Tray Icon" and clicking "Close" button, the management GUI will be minimized and stay on the tray icon located at the right bottom corner of Windows. If not, management GUI will shut down while clicking "Close" button with unchecked condition.

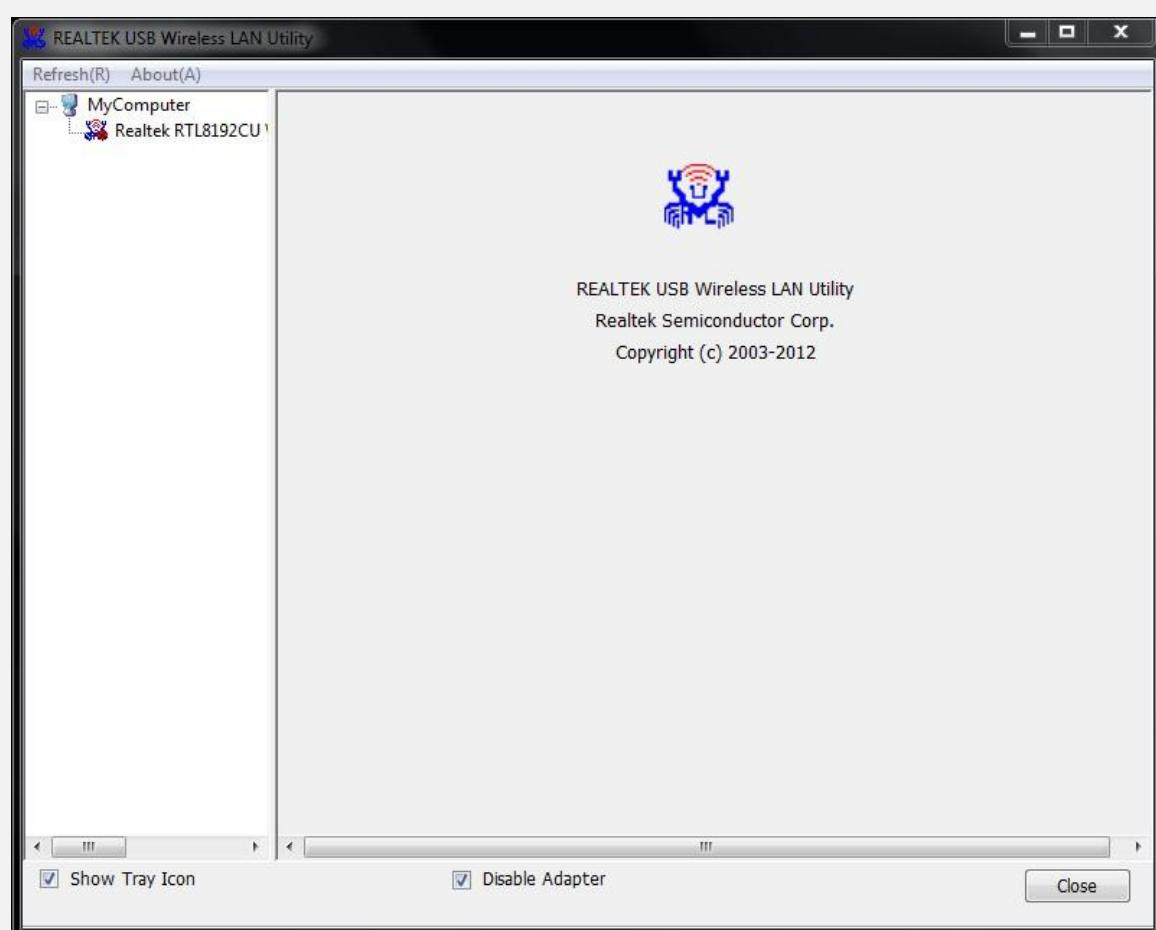


Radio Off

Turn off the radio to save power. While the radio is off, the links with other wireless network nodes are disconnected. User should be aware that while the wireless configuration is in AP mode. The radio off will cause the sub network belonging to the AP to be disconnected with internet/intranet.

Disable Adapter

Stop wireless USB device.



Virtual WiFi allowed

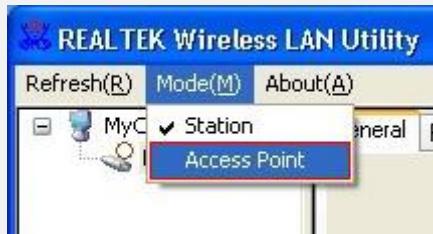
Switch utility to virtual WiFi setting tool.

Close

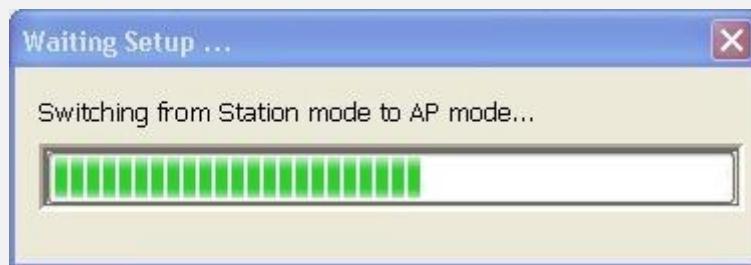
Whether to check or uncheck "Show Tray Icon" is to shut down or hide the management GUI.

3.3. AP Mode

Click main menu **Mode(M)** and choose “**Access Point**” to switch AP mode.



You will see the following window.



A. General Page

This page provides general information of this AP, including name, MAC address and list of joined stations.

General	Advanced	Statistics						
<p>SSID: admin-PC_AP BSSID: 00:87:40:A0:10:16</p> <p>Association Table</p> <table border="1"> <thead> <tr> <th>AID</th> <th>MAC Address</th> <th>Life Time</th> </tr> </thead> <tbody> <tr> <td colspan="3"> </td> </tr> </tbody> </table>			AID	MAC Address	Life Time			
AID	MAC Address	Life Time						
<input type="button" value="Config"/>								
<p>Soft AP Use the following IP address:</p> <table border="1"> <tr> <td>IP Address:</td> <td>192 . 168 . 159 . 1</td> <td><input type="button" value="Apply"/></td> </tr> </table>			IP Address:	192 . 168 . 159 . 1	<input type="button" value="Apply"/>			
IP Address:	192 . 168 . 159 . 1	<input type="button" value="Apply"/>						
<p><input type="checkbox"/> Setting Internet Connection Sharing (ICS)</p>								

1. SSID

The name of this AP.

2. BSSID

Six two-digit numbers of the MAC address of this AP.

3. Association Table

It is the list of joined stations to this AP.

4. AID (Association ID)

The AID field is a value assigned by an AP during association that represents 16-bit ID of a station. It is a unique value assigned by AP.

5. MAC Address

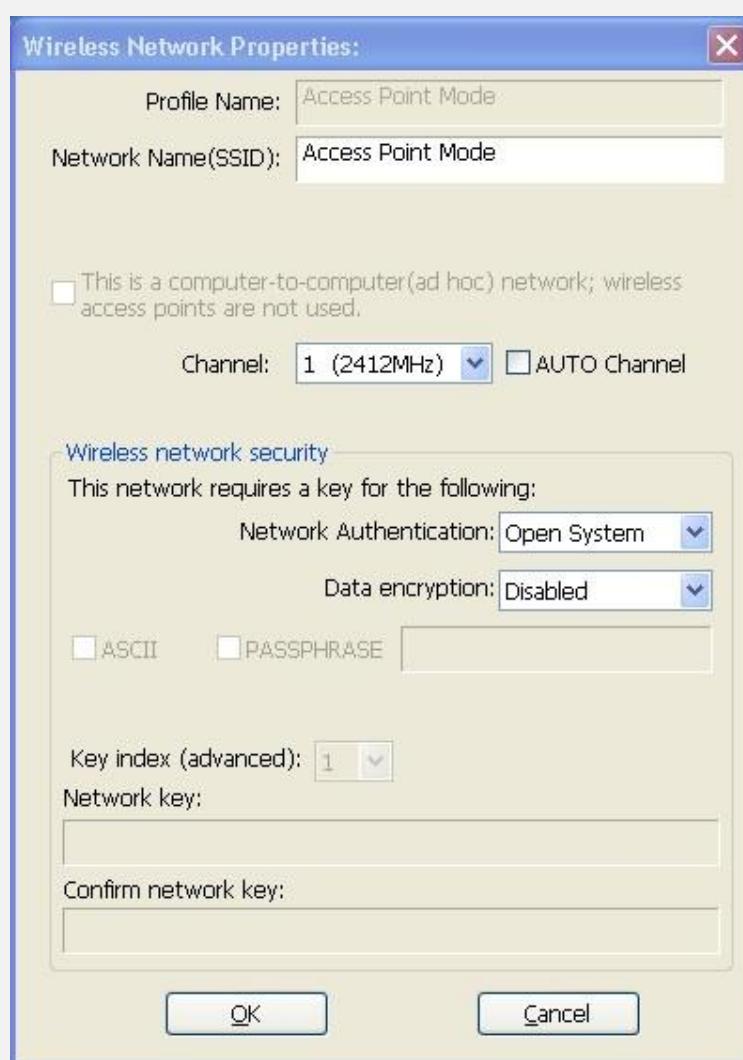
It is the six two-digit numbers that assemble the MAC address of respected joined station.

6. Life Time

It is the timer that counts down from 10 minutes whenever the AP connects the station successfully. If an STA associated to SW AP does not have any interaction with the AP in 10 minutes, it will be disassociated from the Infra-structure BSS.

7. Config

A dialog of this AP is shown for configuration modification



7.1. Network Name (SSID)

Name of the AP is searchable by other wireless Modes. The length of SSID should be shorter than 32 characters.

7.2. Channel

Select the wireless channel within current channel plan.

7.3. Network Authentication & Data Encryption

There are three types of authentication:

■ Open System

It is combined with data encryption type to be WEP or to be disabled.

Encryption ~ disabled: you decide to open this AP to every one without network authentication.

Encryption ~ WEP: you decide to setup the basic data encryption with a defined network key.

■ Shared Key + WEP

You decide to apply both authentication and data encryption to prevent unauthorized login.

■ WPA-PSK + TKIP & WPA2-PSK + TKIP

The most advanced authentication and data encryption that provide the best security protection.

7.4. ASCII/ PASSPHRASE

The most advanced authentication and data encryption that provide the best security protection.

- ASCII: You should provide either 5 or 13 ASCII characters on Network key edit box.
- PASSPHRASE: You could input words on Network Key edit box.
 - 64 bits: The generated pass key is 64-bit to be complied with data packets.
 - 128 bits: The generated pass key is 128-bit to be complied with data packets.
- Hexadecimal: While both ASCII and PASSPHRASE are not checked, you should input hexadecimal number in the network key box. For example, 10 digits hex number for 64-bit WEP or 26 digits hex number for 128-bit WEP.

7.5. Key index (1 ~4)

At most four key index to represent the opposite network key.

B. Advanced Page

Users could setup the advanced characteristics of network packet for transmission on this page.

General

Beacon Interval: 100

DTIM Period: 3

Preamble Mode: Long

Set Defaults **Apply**

1. Beacon Interval

This field indicates the interval between each beacon that this AP sends out in unit of TU (1024 micro-seconds).

2. DTIM Period

The DTIM Period field is the number of Beacon intervals between successive DTIMs.

3. Preamble Mode

- Long: higher quality but with lower performance than preamble short mode.
- Short: Normal quality but with higher performance than preamble long mode.
- Auto: select the proper preamble mode by current signal frame information.

C. Statistics Page

The Tx/Rx status of current wireless connection is shown. A statistics analysis of packet transition is listed.

General Advanced Statistics

Counter Name	Value
Tx OK	16
Tx Error	0
Rx OK	28
Rx Packet Count	28
Rx Retry	17
Rx ICV Error	0

Reset

B450M DS3H

User's Manual

Rev. 1101



For more product details, please visit GIGABYTE's website.



To reduce the impacts on global warming, the packaging materials of this product are recyclable and reusable. GIGABYTE works with you to protect the environment.

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- In order to assist in the use of this product, carefully read the User's Manual.
- For product-related information, check on our website at: <https://www.gigabyte.com>

Identifying Your Motherboard Revision

The revision number on your motherboard looks like this: "REV: X.X." For example, "REV: 1.0" means the revision of the motherboard is 1.0. Check your motherboard revision before updating motherboard BIOS, drivers, or when looking for technical information.

Example:

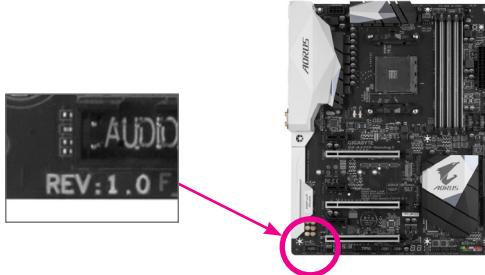
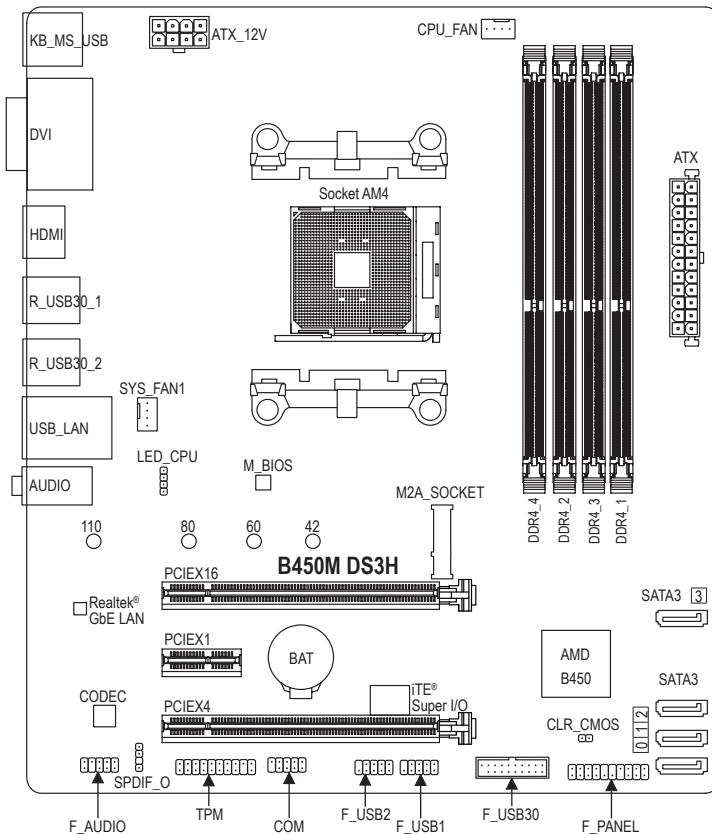


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B450M DS3H Motherboard Layout



Box Contents

- B450M DS3H Motherboard
- Motherboard driver disk
- User's Manual
- Two SATA cables
- I/O Shield

* The box contents above are for reference only and the actual items shall depend on the product package you obtain.
The box contents are subject to change without notice.

Chapter 1 Hardware Installation

1-1 Installation Precautions

The motherboard contains numerous delicate electronic circuits and components which can become damaged as a result of electrostatic discharge (ESD). Prior to installation, carefully read the user's manual and follow these procedures:

- Prior to installation, make sure the chassis is suitable for the motherboard.
- Prior to installation, do not remove or break motherboard S/N (Serial Number) sticker or warranty sticker provided by your dealer. These stickers are required for warranty validation.
- Always remove the AC power by unplugging the power cord from the power outlet before installing or removing the motherboard or other hardware components.
- When connecting hardware components to the internal connectors on the motherboard, make sure they are connected tightly and securely.
- When handling the motherboard, avoid touching any metal leads or connectors.
- It is best to wear an electrostatic discharge (ESD) wrist strap when handling electronic components such as a motherboard, CPU or memory. If you do not have an ESD wrist strap, keep your hands dry and first touch a metal object to eliminate static electricity.
- Prior to installing the motherboard, please have it on top of an antistatic pad or within an electrostatic shielding container.
- Before connecting or unplugging the power supply cable from the motherboard, make sure the power supply has been turned off.
- Before turning on the power, make sure the power supply voltage has been set according to the local voltage standard.
- Before using the product, please verify that all cables and power connectors of your hardware components are connected.
- To prevent damage to the motherboard, do not allow screws to come in contact with the motherboard circuit or its components.
- Make sure there are no leftover screws or metal components placed on the motherboard or within the computer casing.
- Do not place the computer system on an uneven surface.
- Do not place the computer system in a high-temperature or wet environment.
- Turning on the computer power during the installation process can lead to damage to system components as well as physical harm to the user.
- If you are uncertain about any installation steps or have a problem related to the use of the product, please consult a certified computer technician.
- If you use an adapter, extension power cable, or power strip, ensure to consult with its installation and/or grounding instructions.

1-2 Product Specifications

 CPU	<ul style="list-style-type: none"> ◆ AM4 Socket: <ul style="list-style-type: none"> - AMD Ryzen™ 2nd Generation processors - AMD Ryzen™ with Radeon™ Vega Graphics processors - AMD Ryzen™ 1st Generation processors <p>(Go to GIGABYTE's website for the latest CPU support list.)</p>
 Chipset	<ul style="list-style-type: none"> ◆ AMD B450
 Memory	<ul style="list-style-type: none"> ◆ 4 x DDR4 DIMM sockets supporting up to 128 GB (32 GB single DIMM capacity) of system memory ◆ Dual channel memory architecture ◆ Support for DDR4 2933/2667/2400/2133 MHz memory modules ◆ Support for ECC Un-buffered DIMM 1Rx8/2Rx8 memory modules (operate in non-ECC mode) ◆ Support for non-ECC Un-buffered DIMM 1Rx8/2Rx8/1Rx16 memory modules ◆ Support for Extreme Memory Profile (XMP) memory modules <p>(Go to GIGABYTE's website for the latest supported memory speeds and memory modules.)</p>
 Onboard Graphics	<ul style="list-style-type: none"> ◆ Integrated Graphics Processor: <ul style="list-style-type: none"> - 1 x DVI-D port, supporting a maximum resolution of 1920x1200@60 Hz <ul style="list-style-type: none"> * The DVI-D port does not support D-Sub connection by adapter. - 1 x HDMI port, supporting a maximum resolution of 4096x2160@60 Hz ^(Note) <ul style="list-style-type: none"> * Support for HDMI 2.0 version and HDCP 2.2. ^(Note) ◆ Maximum shared memory of 16 GB
 Audio	<ul style="list-style-type: none"> ◆ Realtek® Audio CODEC ◆ High Definition Audio ◆ 2/4/5.1/7.1-channel <ul style="list-style-type: none"> * To configure 7.1-channel audio, you have to use an HD front panel audio module and enable the multi-channel audio feature through the audio driver. ◆ Support for S/PDIF Out
 LAN	<ul style="list-style-type: none"> ◆ Realtek® GbE LAN chip (10/100/1000 Mbit)
 Expansion Slots	<ul style="list-style-type: none"> ◆ 1 x PCI Express x16 slot, running at x16 (PCIEX16) ^(Note) <ul style="list-style-type: none"> * For optimum performance, if only one PCI Express graphics card is to be installed, be sure to install it in the PCIEX16 slot. ◆ (The PCIEX16 slot conforms to PCI Express 3.0 standard.) ◆ 1 x PCI Express x16 slot, running at x4 (PCIEX4) ◆ 1 x PCI Express x1 slot <ul style="list-style-type: none"> (The PCIEX4 and PCI Express x1 slots conform to PCI Express 2.0 standard.)
 Multi-Graphics Technology	<ul style="list-style-type: none"> ◆ Support for AMD Quad-GPU CrossFire™ and 2-Way AMD CrossFire™ technologies
 Storage Interface	<ul style="list-style-type: none"> ◆ 1 x M.2 connector (Socket 3, M key, type 2242/2260/2280/22110 SATA and PCIe 3.0 x4/x2 SSD support) ◆ 4 x SATA 6Gb/s connectors ◆ Support for RAID 0, RAID 1, and RAID 10 <ul style="list-style-type: none"> * Refer to "1-7 Internal Connectors," for the installation notices for the M.2 and SATA connectors.

(Note) Actual support may vary by CPU.

 USB	<ul style="list-style-type: none"> ◆ Chipset: <ul style="list-style-type: none"> - 2 x USB 3.1 Gen 1 ports available through the internal USB header - 8 x USB 2.0/1.1 ports (4 ports on the back panel, 4 ports available through the internal USB headers) ◆ CPU: <ul style="list-style-type: none"> - 4 x USB 3.1 Gen 1 ports on the back panel
 Internal Connectors	<ul style="list-style-type: none"> ◆ 1 x 24-pin ATX main power connector ◆ 1 x 8-pin ATX 12V power connector ◆ 1 x CPU fan header ◆ 1 x system fan header ◆ 1 x M.2 Socket 3 connector ◆ 4 x SATA 6Gb/s connectors ◆ 1 x front panel header ◆ 1 x front panel audio header ◆ 1 x S/PDIF Out header ◆ 1 x CPU cooler LED strip/RGB LED strip header ◆ 1 x USB 3.1 Gen 1 header ◆ 2 x USB 2.0/1.1 headers ◆ 1 x Trusted Platform Module (TPM) header (2x10 pin, for the GC-TPM2.0 module only) ◆ 1 x serial port header ◆ 1 x Clear CMOS jumper
 Back Panel Connectors	<ul style="list-style-type: none"> ◆ 1 x PS/2 keyboard/mouse port ◆ 1 x DVI-D port ◆ 1 x HDMI port ◆ 4 x USB 3.1 Gen 1 ports ◆ 4 x USB 2.0/1.1 ports ◆ 1 x RJ-45 port ◆ 3 x audio jacks
 I/O Controller	<ul style="list-style-type: none"> ◆ iTE® I/O Controller Chip
 Hardware Monitor	<ul style="list-style-type: none"> ◆ Voltage detection ◆ Temperature detection ◆ Fan speed detection ◆ Overheating warning ◆ Fan fail warning ◆ Fan speed control <ul style="list-style-type: none"> * Whether the fan speed control function is supported will depend on the cooler you install.
 BIOS	<ul style="list-style-type: none"> ◆ 1 x 128 Mbit flash ◆ Use of licensed AMI UEFI BIOS ◆ PnP 1.0a, DMI 2.7, WfM 2.0, SM BIOS 2.7, ACPI 5.0

	Unique Features	<ul style="list-style-type: none"> ◆ Support for APP Center <ul style="list-style-type: none"> * Available applications in APP Center may vary by motherboard model. Supported functions of each application may also vary depending on motherboard specifications. - 3D OSD - @BIOS - AutoGreen - Cloud Station - EasyTune - Fast Boot - Game Boost - ON/OFF Charge - RGB Fusion - Smart Backup - Smart Keyboard - Smart TimeLock - Smart HUD - Smart Survey - System Information Viewer - USB Blocker - V-Tuner
	Bundled Software	<ul style="list-style-type: none"> ◆ Norton® Internet Security (OEM version) ◆ cFosSpeed
	Operating System	<ul style="list-style-type: none"> ◆ Support for Windows 10 64-bit
	Form Factor	<ul style="list-style-type: none"> ◆ Micro ATX Form Factor; 24.4cm x 21.5cm

* GIGABYTE reserves the right to make any changes to the product specifications and product-related information without prior notice.



Please visit GIGABYTE's website for support lists of CPU, memory modules, SSDs, and M.2 devices.



Please visit the **Support Utility List** page on GIGABYTE's website to download the latest version of apps.

1-3 Installing the CPU

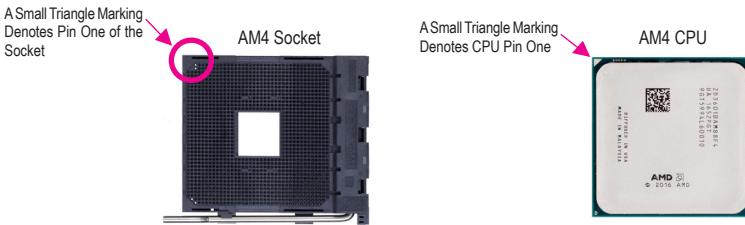


Read the following guidelines before you begin to install the CPU:

- Make sure that the motherboard supports the CPU.
(Go to GIGABYTE's website for the latest CPU support list.)
- Always turn off the computer and unplug the power cord from the power outlet before installing the CPU to prevent hardware damage.
- Locate the pin one of the CPU. The CPU cannot be inserted if oriented incorrectly.
- Apply an even and thin layer of thermal grease on the surface of the CPU.
- Do not turn on the computer if the CPU cooler is not installed, otherwise overheating and damage of the CPU may occur.
- Set the CPU host frequency in accordance with the CPU specifications. It is not recommended that the system bus frequency be set beyond hardware specifications since it does not meet the standard requirements for the peripherals. If you wish to set the frequency beyond the standard specifications, please do so according to your hardware specifications including the CPU, graphics card, memory, hard drive, etc.

Installing the CPU

Locate the pin one (denoted by a small triangle) of the CPU socket and the CPU.



1-4 Installing the Memory



Read the following guidelines before you begin to install the memory:

- Make sure that the motherboard supports the memory. It is recommended that memory of the same capacity, brand, speed, and chips be used.
(Go to GIGABYTE's website for the latest supported memory speeds and memory modules.)
- Always turn off the computer and unplug the power cord from the power outlet before installing the memory to prevent hardware damage.
- Memory modules have a foolproof design. A memory module can be installed in only one direction. If you are unable to insert the memory, switch the direction.

Dual Channel Memory Configuration

This motherboard provides four memory sockets and supports Dual Channel Technology. After the memory is installed, the BIOS will automatically detect the specifications and capacity of the memory. Enabling Dual Channel memory mode will double the original memory bandwidth.

The four memory sockets are divided into two channels and each channel has two memory sockets as following:

- Channel A: DDR4_2, DDR4_4
- Channel B: DDR4_1, DDR4_3



Please visit GIGABYTE's website for details on hardware installation.

► Dual Channel Memory Configurations Table

	DDR4_4	DDR4_2	DDR4_3	DDR4_1
2 Modules	--	DS/SS	--	DS/SS
	DS/SS	--	DS/SS	--
4 Modules	DS/SS	DS/SS	DS/SS	DS/SS

(SS=Single-Sided, DS=Double-Sided, "--=No Memory)

Due to CPU limitations, read the following guidelines before installing the memory in Dual Channel mode.

1. Dual Channel mode cannot be enabled if only one memory module is installed.
2. When enabling Dual Channel mode with two or four memory modules, it is recommended that memory of the same capacity, brand, speed, and chips be used. For optimum performance, when enabling Dual Channel mode with two memory modules, we recommend that you install them in the DDR4_1 and DDR4_2 sockets.

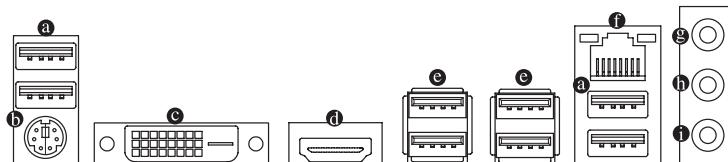
1-5 Installing an Expansion Card



Read the following guidelines before you begin to install an expansion card:

- Make sure the motherboard supports the expansion card. Carefully read the manual that came with your expansion card.
- Always turn off the computer and unplug the power cord from the power outlet before installing an expansion card to prevent hardware damage.

1-6 Back Panel Connectors



④ USB 2.0/1.1 Port

The USB port supports the USB 2.0/1.1 specification. Use this port for USB devices.

⑤ PS/2 Keyboard/Mouse Port

Use this port to connect a PS/2 mouse or keyboard.

⑥ DVI-D Port (Note 1)

The DVI-D port conforms to the DVI-D specification and supports a maximum resolution of 1920x1200@60 Hz (the actual resolutions supported depend on the monitor being used). Connect a monitor that supports DVI-D connection to this port.

⑦ HDMI Port

 The HDMI port supports HDCP 2.2 ^(Note 2) and Dolby TrueHD and DTS HD Master Audio formats. It also supports up to 192KHz/24bit 8-channel LPCM audio output. You can use this port to connect your HDMI-supported monitor. The maximum supported resolution is 4096x2160@60 Hz ^(Note 2), but the actual resolutions supported are dependent on the monitor being used.



After installing the HDMI device, make sure to set the default sound playback device to HDMI. (The item name may differ depending on your operating system.)

(Note 1) The DVI-D port does not support D-Sub connection by adapter.

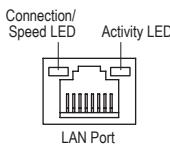
(Note 2) Actual support may vary by CPU.

④ USB 3.1 Gen 1 Port

The USB 3.1 Gen 1 port supports the USB 3.1 Gen 1 specification and is compatible to the USB 2.0 specification. Use this port for USB devices.

⑤ RJ-45 LAN Port

The Gigabit Ethernet LAN port provides Internet connection at up to 1 Gbps data rate. The following describes the states of the LAN port LEDs.



Connection/Speed LED:

State	Description
Orange	1 Gbps data rate
Green	100 Mbps data rate
Off	10 Mbps data rate

Activity LED:

State	Description
Blinking	Data transmission or receiving is occurring
Off	No data transmission or receiving is occurring

⑥ Line In/Rear Speaker Out (Blue)

The line in jack. Use this audio jack for line in devices such as an optical drive, walkman, etc.

⑦ Line Out/Front Speaker Out (Green)

The line out jack.

⑧ Mic In/Center/Subwoofer Speaker Out (Pink)

The Mic in jack.

Audio Jack Configurations:

Jack	Headphone/ 2-channel	4-channel	6-channel	8-channel
⑥ Line In/Rear Speaker Out		✓	✓	✓
⑦ Line Out/Front Speaker Out	✓	✓	✓	✓
⑧ Mic In/Center/Subwoofer Speaker Out			✓	✓
Front Panel Line Out/Side Speaker Out				✓



- When removing the cable connected to a back panel connector, first remove the cable from your device and then remove it from the motherboard.
- When removing the cable, pull it straight out from the connector. Do not rock it side to side to prevent an electrical short inside the cable connector.

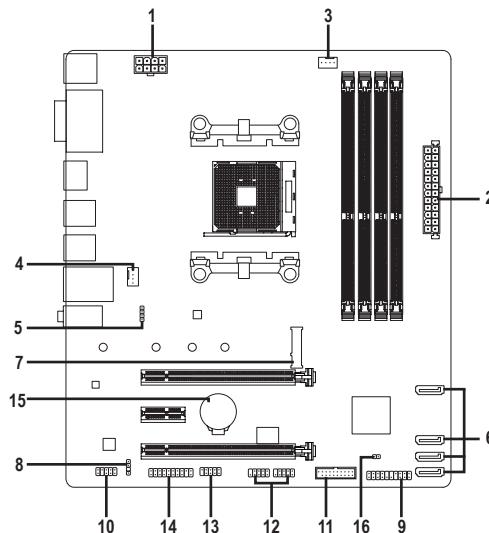


To configure 7.1-channel audio, you have to use an HD front panel audio module and enable the multi-channel audio feature through the audio driver.



Please visit GIGABYTE's website for details on configuring the audio software.

1-7 Internal Connectors



1)	ATX_12V	9)	F_PANEL
2)	ATX	10)	F_AUDIO
3)	CPU_FAN	11)	F_USB30
4)	SYS_FAN1	12)	F_USB1/F_USB2
5)	LED_CPU	13)	COM
6)	SATA3 0/1/2/3	14)	TPM
7)	M2A_SOCKET	15)	BAT
8)	SPDIF_O	16)	CLR_CMOS



Read the following guidelines before connecting external devices:

- First make sure your devices are compliant with the connectors you wish to connect.
- Before installing the devices, be sure to turn off the devices and your computer. Unplug the power cord from the power outlet to prevent damage to the devices.
- After installing the device and before turning on the computer, make sure the device cable has been securely attached to the connector on the motherboard.

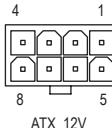
1/2) ATX_12V/ATX (2x4 12V Power Connector and 2x12 Main Power Connector)

With the use of the power connector, the power supply can supply enough stable power to all the components on the motherboard. Before connecting the power connector, first make sure the power supply is turned off and all devices are properly installed. The power connector possesses a foolproof design. Connect the power supply cable to the power connector in the correct orientation.

The 12V power connector mainly supplies power to the CPU. If the 12V power connector is not connected, the computer will not start.

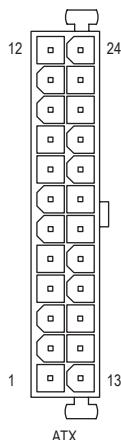


To meet expansion requirements, it is recommended that a power supply that can withstand high power consumption be used (500W or greater). If a power supply is used that does not provide the required power, the result can lead to an unstable or unbootable system.



ATX_12V:

Pin No.	Definition	Pin No.	Definition
1	GND (Only for 2x4-pin 12V)	5	+12V (Only for 2x4-pin 12V)
2	GND (Only for 2x4-pin 12V)	6	+12V (Only for 2x4-pin 12V)
3	GND	7	+12V
4	GND	8	+12V

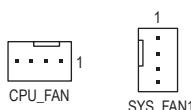


ATX:

Pin No.	Definition	Pin No.	Definition
1	3.3V	13	3.3V
2	3.3V	14	-12V
3	GND	15	GND
4	+5V	16	PS_ON (soft On/Off)
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	Power Good	20	NC
9	5VSB (stand by +5V)	21	+5V
10	+12V	22	+5V
11	+12V (Only for 2x12-pin ATX)	23	+5V (Only for 2x12-pin ATX)
12	3.3V (Only for 2x12-pin ATX)	24	GND (Only for 2x12-pin ATX)

3/4) CPU_FAN/SYS_FAN1 (Fan Headers)

All fan headers on this motherboard are 4-pin. Most fan headers possess a foolproof insertion design. When connecting a fan cable, be sure to connect it in the correct orientation (the black connector wire is the ground wire). The motherboard supports CPU fan speed control, which requires the use of a CPU fan with fan speed control design. For optimum heat dissipation, it is recommended that a system fan be installed inside the chassis.



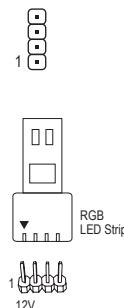
Pin No.	Definition
1	GND
2	Voltage Speed Control
3	Sense
4	PWM Speed Control



- Be sure to connect fan cables to the fan headers to prevent your CPU and system from overheating. Overheating may result in damage to the CPU or the system may hang.
- These fan headers are not configuration jumper blocks. Do not place a jumper cap on the headers.

5) LED_CPU (CPU Cooler LED Strip/RGB LED Strip Header)

The header can be used to connect a CPU cooler LED strip or a standard 5050 RGB LED strip (12V/G/R/B), with maximum power rating of 2A (12V) and maximum length of 2m.

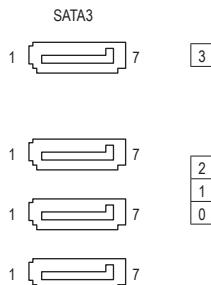


Pin No.	Definition
1	12V
2	G
3	R
4	B

Connect the CPU cooler LED strip/RGB LED strip to the header. The power pin (marked with a triangle on the plug) of the LED strip must be connected to Pin 1 (12V) of this header. Incorrect connection may lead to the damage of the LED strip.

6) SATA3 0/1/2/3 (SATA 6Gb/s Connectors)

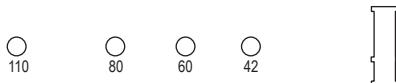
The SATA connectors conform to SATA 6Gb/s standard and are compatible with SATA 3Gb/s and SATA 1.5Gb/s standard. Each SATA connector supports a single SATA device. The SATA connectors support RAID 0, RAID 1, and RAID 10. Refer to Chapter 3, "Configuring a RAID Set," for instructions on configuring a RAID array.



Pin No.	Definition
1	GND
2	TXP
3	TXN
4	GND
5	RXN
6	RXP
7	GND

7) M2A_SOCKET (M.2 Socket 3 Connector)

The M.2 connectors support M.2 SATA SSDs or M.2 PCIe SSDs and support RAID configuration. Please note that an M.2 PCIe SSD cannot be used to create a RAID set either with a SATA hard drive. To create a RAID array with an M.2 PCIe SSD, you must set up the configuration in UEFI BIOS mode. Refer to Chapter 3, "Configuring a RAID Set," for instructions on configuring a RAID array.



Follow the steps below to correctly install an M.2 SSD in the M.2 connector.

Step 1:

Use a screw driver to unfasten the screw and nut from the motherboard. Locate the proper mounting hole for the M.2 SSD to be installed and then screw the nut first.

Slide the M.2 SSD into the connector at an angle.

Step 2:

Press the M.2 SSD down and then secure it with the screw.



Select the proper hole for the M.2 SSD to be installed and refasten the screw and nut.

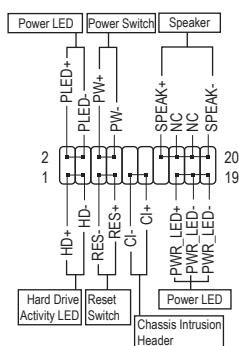
8) SPDIF_O (S/PDIF Out Header)

This header supports digital S/PDIF Out and connects a S/PDIF digital audio cable (provided by expansion cards) for digital audio output from your motherboard to certain expansion cards like graphics cards and sound cards. For example, some graphics cards may require you to use a S/PDIF digital audio cable for digital audio output from your motherboard to your graphics card if you wish to connect an HDMI display to the graphics card and have digital audio output from the HDMI display at the same time. For information about connecting the S/PDIF digital audio cable, carefully read the manual for your expansion card.

	Pin No.	Definition
1	1	5VDUAL
	2	No Pin
	3	SPDIFO
1	4	GND

9) F_PANEL (Front Panel Header)

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



- **PLED/PWR_LED (Power LED):**

System Status	LED
S0	On
S3/S4/S5	Off

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

- **PW (Power Switch):**

Connects to the power switch on the chassis front panel. You may configure the way to turn off your system using the power switch (refer to Chapter 2, "BIOS Setup," "Power Management," for more information).

- **SPEAK (Speaker):**

Connects to the speaker on the chassis front panel. The system reports system startup status by issuing a beep code. One single short beep will be heard if no problem is detected at system startup.

- **HD (Hard Drive Activity LED):**

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

- **RES (Reset Switch):**

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

- **CI (Chassis Intrusion Header):**

Connects to the chassis intrusion switch/sensor on the chassis that can detect if the chassis cover has been removed. This function requires a chassis with a chassis intrusion switch/sensor.

- **NC: No connection.**



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

10) F_AUDIO (Front Panel Audio Header)

The front panel audio header supports High Definition audio (HD). You may connect your chassis front panel audio module to this header. Make sure the wire assignments of the module connector match the pin assignments of the motherboard header. Incorrect connection between the module connector and the motherboard header will make the device unable to work or even damage it.



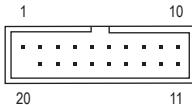
Pin No.	Definition	Pin No.	Definition
1	MIC2_L	6	Sense
2	GND	7	FAUDIO_JD
3	MIC2_R	8	No Pin
4	NC	9	LINE2_L
5	LINE2_R	10	Sense



Some chassis provide a front panel audio module that has separated connectors on each wire instead of a single plug. For information about connecting the front panel audio module that has different wire assignments, please contact the chassis manufacturer.

11) F_USB30 (USB 3.1 Gen 1 Header)

The header conforms to USB 3.1 Gen 1 and USB 2.0 specification and can provide two USB ports. For purchasing the optional 3.5" front panel that provides two USB 3.1 Gen 1 ports, please contact the local dealer.



Pin No.	Definition	Pin No.	Definition
1	VBUS	11	D2+
2	SSRX1-	12	D2-
3	SSRX1+	13	GND
4	GND	14	SSTX2+
5	SSTX1-	15	SSTX2-
6	SSTX1+	16	GND
7	GND	17	SSRX2+
8	D1-	18	SSRX2-
9	D1+	19	VBUS
10	NC	20	No Pin

12) F_USB1/F_USB2 (USB 2.0/1.1 Headers)

The headers conform to USB 2.0/1.1 specification. Each USB header can provide two USB ports via an optional USB bracket. For purchasing the optional USB bracket, please contact the local dealer.



Pin No.	Definition	Pin No.	Definition
1	Power (5V)	6	USB DY+
2	Power (5V)	7	GND
3	USB DX-	8	GND
4	USB DY-	9	No Pin
5	USB DX+	10	NC



- Do not plug the IEEE 1394 bracket (2x5-pin) cable into the USB 2.0/1.1 header.
- Prior to installing the USB bracket, be sure to turn off your computer and unplug the power cord from the power outlet to prevent damage to the USB bracket.

13) COM (Serial Port Header)

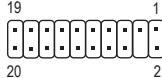
The COM header can provide one serial port via an optional COM port cable. For purchasing the optional COM port cable, please contact the local dealer.



Pin No.	Definition	Pin No.	Definition
1	NDCD-	6	NDSR-
2	NSIN	7	NRTS-
3	NSOUT	8	NCTS-
4	NDTR-	9	NRI-
5	GND	10	No Pin

14) TPM (Trusted Platform Module Header)

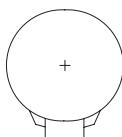
You may connect a TPM (Trusted Platform Module) to this header.



Pin No.	Definition	Pin No.	Definition
1	LCLK	11	LAD0
2	GND	12	GND
3	LFRAIME	13	NC
4	No Pin	14	NC
5	LRESET	15	SB3V
6	NC	16	SERIRQ
7	LAD3	17	GND
8	LAD2	18	NC
9	VCC3	19	NC
10	LAD1	20	NC

15) BAT (Battery)

The battery provides power to keep the values (such as BIOS configurations, date, and time information) in the CMOS when the computer is turned off. Replace the battery when the battery voltage drops to a low level, or the CMOS values may not be accurate or may be lost.



You may clear the CMOS values by removing the battery:

1. Turn off your computer and unplug the power cord.
2. Gently remove the battery from the battery holder and wait for one minute. (Or use a metal object like a screwdriver to touch the positive and negative terminals of the battery holder, making them short for 5 seconds.)
3. Replace the battery.
4. Plug in the power cord and restart your computer.



- Always turn off your computer and unplug the power cord before replacing the battery.
- Replace the battery with an equivalent one. Damage to your devices may occur if the battery is replaced with an incorrect model.
- Contact the place of purchase or local dealer if you are not able to replace the battery by yourself or uncertain about the battery model.
- When installing the battery, note the orientation of the positive side (+) and the negative side (-) of the battery (the positive side should face up).
- Used batteries must be handled in accordance with local environmental regulations.

16) CLR_CMOS (Clear CMOS Jumper)

Use this jumper to clear the BIOS configuration and reset the CMOS values to factory defaults. To clear the CMOS values, use a metal object like a screwdriver to touch the two pins for a few seconds.

 Open: Normal

 Short: Clear CMOS Values



- Always turn off your computer and unplug the power cord from the power outlet before clearing the CMOS values.
- After system restart, go to BIOS Setup to load factory defaults (select Load Optimized Defaults) or manually configure the BIOS settings (refer to Chapter 2, "BIOS Setup," for BIOS configurations).

Chapter 2 BIOS Setup

BIOS (Basic Input and Output System) records hardware parameters of the system in the CMOS on the motherboard. Its major functions include conducting the Power-On Self-Test (POST) during system startup, saving system parameters and loading operating system, etc. BIOS includes a BIOS Setup program that allows the user to modify basic system configuration settings or to activate certain system features.

When the power is turned off, the battery on the motherboard supplies the necessary power to the CMOS to keep the configuration values in the CMOS.

To access the BIOS Setup program, press the <Delete> key during the POST when the power is turned on.

To upgrade the BIOS, use either the GIGABYTE Q-Flash or @BIOS utility.

- Q-Flash allows the user to quickly and easily upgrade or back up BIOS without entering the operating system.
- @BIOS is a Windows-based utility that searches and downloads the latest version of BIOS from the Internet and updates the BIOS.



- Because BIOS flashing is potentially risky, if you do not encounter problems using the current version of BIOS, it is recommended that you not flash the BIOS. To flash the BIOS, do it with caution. Inadequate BIOS flashing may result in system malfunction.
- It is recommended that you not alter the default settings (unless you need to) to prevent system instability or other unexpected results. Inadequately altering the settings may result in system's failure to boot. If this occurs, try to clear the CMOS values and reset the board to default values. (Refer to the "Load Optimized Defaults" section in this chapter or introductions of the battery/clear CMOS jumper in Chapter 1 for how to clear the CMOS values.)

2-1 Startup Screen

The following startup Logo screen will appear when the computer boots.

(Sample BIOS Version: F1c)



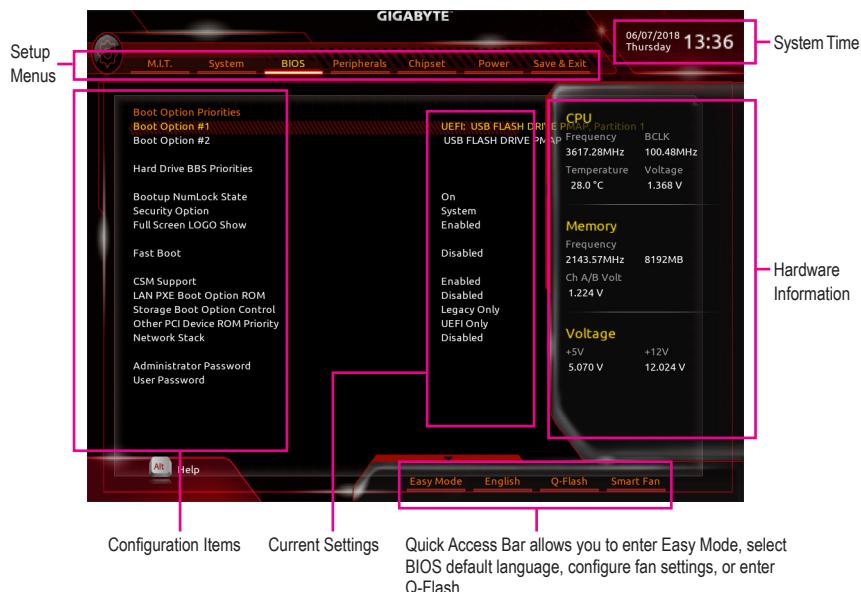
There are two different BIOS modes as follows and you can use the <F2> key to switch between the two modes. The Classic Setup mode provides detailed BIOS settings. You can press the arrow keys on your keyboard to move among the items and press <Enter> to accept or enter a sub-menu. Or you can use your mouse to select the item you want.

Easy Mode allows users to quickly view their current system information or to make adjustments for optimum performance. In Easy Mode, you can use your mouse to move through configuration items.



- When the system is not stable as usual, select the **Load Optimized Defaults** item to set your system to its defaults.
- The BIOS Setup menus described in this chapter are for reference only and may differ by BIOS version.

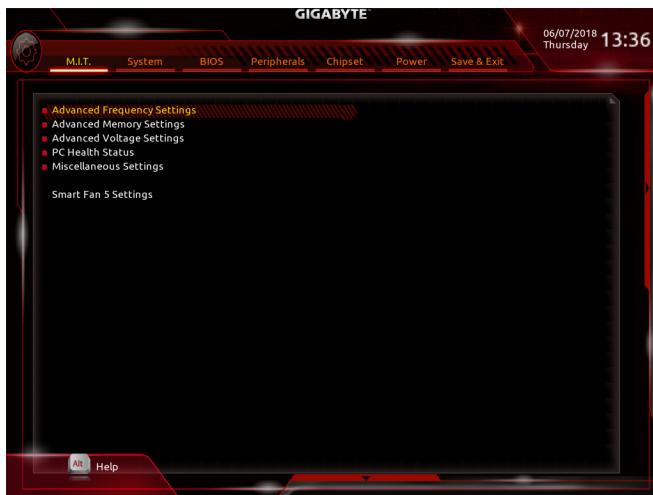
2-2 The Main Menu



Classic Setup Function Keys

<<->>->	Move the selection bar to select a setup menu
<↑><↓>	Move the selection bar to select an configuration item on a menu
<Enter>	Execute command or enter a menu
<+>/<Page Up>	Increase the numeric value or make changes
<->/<Page Down>	Decrease the numeric value or make changes
<F1>	Show descriptions of the function keys
<F2>	Switch to Easy Mode
<F5>	Restore the previous BIOS settings for the current submenus
<F7>	Load the Optimized BIOS default settings for the current submenus
<F8>	Access the Q-Flash utility
<F9>	Display system information
<F10>	Save all the changes and exit the BIOS Setup program
<F12>	Capture the current screen as an image and save it to your USB drive
<Esc>	Main Menu: Exit the BIOS Setup program Submenus: Exit current submenu

2-3 M.I.T.



Whether the system will work stably with the overclock/overvoltage settings you made is dependent on your overall system configurations. Incorrectly doing overclock/overvoltage may result in damage to CPU, chipset, or memory and reduce the useful life of these components. This page is for advanced users only and we recommend you not to alter the default settings to prevent system instability or other unexpected results. (Inadequately altering the settings may result in system's failure to boot. If this occurs, clear the CMOS values and reset the board to default values.)

► Advanced Frequency Settings

☞ Host Clock Value

Displays the current operating Host Clock frequency.

☞ GFX Clock Frequency (Note)

Allows you to alter the frequency for the GPU. After you alter the **GFX Clock Frequency** settings, make sure to adjust the **GFX Core Voltage** settings. (Default: Auto)

NOTE: The adjustable range is dependent on the CPU being installed. **Auto** lets the BIOS automatically configure this setting.

☞ GFX Core Voltage (Note)

Allows you to alter the voltage for the GPU. (Default: Auto)

NOTE: The adjustable range is dependent on the CPU being installed. **Auto** lets the BIOS automatically configure this setting.

☞ CPU Clock Ratio

Allows you to alter the clock ratio for the installed CPU. The adjustable range is dependent on the CPU being installed.

☞ CPU Frequency

Displays the current operating CPU frequency.

► Advanced CPU Core Settings

☞ CPU Clock Ratio, CPU Frequency

The settings above are synchronous to those under the same items on the **Advanced Frequency Settings** menu.

(Note) This item is present only when you install a CPU that supports this feature.

- ☞ **Core Performance Boost**
Allows you to determine whether to enable the Core Performance Boost (CPB) technology, a CPU performance-boost technology. (Default: Auto)
- ☞ **AMD Cool&Quiet function**
 - » Enabled Lets the AMD Cool'n'Quiet driver dynamically adjust the CPU clock and VID to reduce heat output from your computer and its power consumption. (Default)
 - » Disabled Disables this function.
- ☞ **SVM Mode**
Virtualization enhanced by Virtualization Technology will allow a platform to run multiple operating systems and applications in independent partitions. With virtualization, one computer system can function as multiple virtual systems. (Default: Disabled)
- ☞ **Global C-state Control**
Allows you to determine whether to let the CPU enter C states. When enabled, the CPU core frequency will be reduced during system halt state to decrease power consumption. (Default: Enabled)
- ☞ **Power Supply Idle Control**
Enables or disables Package C6 State.
 - » Typical Current Idle Disables this function.
 - » Low Current Idle Enables this function.
 - » Auto Lets the BIOS automatically configure this setting. (Default)
- ☞ **Opcache Control**^(Note 1)
Enables or disables Opcache. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)
- ☞ **Downcore Control**
Allows you to select the number of CPU cores to enable (the number of CPU cores may vary by CPU). **Auto** lets the BIOS automatically configure this setting. (Default: Auto)
- ☞ **SMT Mode**
Allows you to enable or disable the CPU Simultaneous Multi-Threading technology. This feature only works for operating systems that support multi-processor mode. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)
- ☞ **Extreme Memory Profile (X.M.P.)**^(Note 2)
Allows the BIOS to read the SPD data on XMP memory module(s) to enhance memory performance when enabled.
 - » Disabled Disables this function. (Default)
 - » Profile1 Uses Profile 1 settings.
 - » Profile2^(Note 2) Uses Profile 2 settings.
- ☞ **System Memory Multiplier**
Allows you to set the system memory multiplier. **Auto** sets memory multiplier according to memory SPD data. (Default: Auto)
- ☞ **Memory Frequency (MHz)**
The first memory frequency value is the normal operating frequency of the memory being used; the second is the memory frequency that is automatically adjusted according to the **System Memory Multiplier** settings.
- ▶ **Advanced Memory Settings**
- ☞ **Extreme Memory Profile (X.M.P.)**^(Note 2), **System Memory Multiplier**, **Memory Frequency(Mhz)**
The settings above are synchronous to those under the same items on the **Advanced Frequency Settings** menu.

(Note 1) This item is present only when you install a CPU that supports this feature.

(Note 2) This item is present only when you install a CPU and a memory module that support this feature.

- ☞ **Memory Timing Mode**
Manual allows the memory timing settings below to be configurable. Options are: Auto (default), Manual.
- ☞ **Profile DDR Voltage**
When using a non-XMP memory module or **Extreme Memory Profile (X.M.P.)** is set to **Disabled**, the value is displayed according to your memory specification. When **Extreme Memory Profile (X.M.P.)** is set to **Profile1** or **Profile2**, the value is displayed according to the SPD data on the XMP memory.
- ▶ **Standard Timing Control, Advanced Timing Control, CAD Bus Setup Timing, CAD Bus Drive Strength, Data Bus Configuration**
These sections provide memory timing settings. The respective timing setting screens are configurable only when **Memory Timing Mode** is set to **Manual**. Note: Your system may become unstable or fail to boot after you make changes on the memory timings. If this occurs, please reset the board to default values by loading optimized defaults or clearing the CMOS values.
- ▶ **Advanced Voltage Settings**
This sub-menu allows you to set CPU, chipset and memory voltages.
- ▶ **PC Health Status**
- ☞ **Reset Case Open Status**
 - » Disabled Keeps or clears the record of previous chassis intrusion status. (Default)
 - » Enabled Clears the record of previous chassis intrusion status and the **Case Open** field will show "No" at next boot.
- ☞ **Case Open**
Displays the detection status of the chassis intrusion detection device attached to the motherboard CI header. If the system chassis cover is removed, this field will show "Yes", otherwise it will show "No". To clear the chassis intrusion status record, set **Reset Case Open Status** to **Enabled**, save the settings to the CMOS, and then restart your system.
- ☞ **CPU Vcore/CPU VDDP/DRAM Channel A/B Voltage/+3.3V/+5V/+12V/VCORE SOC**
Displays the current system voltages.
- ▶ **Miscellaneous Settings**
- ☞ **PCIe Slot Configuration**
Allows you to set the operation mode of the PCI Express slots to Gen 1, Gen 2, or Gen 3. Actual operation mode is subject to the hardware specification of each slot. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)
- ☞ **3DMark01 Enhancement**
Allows you to determine whether to enhance some legacy benchmark performance. (Default: Disabled)

- ▶ **Smart Fan 5 Settings**
- **Monitor**
 - Allows you to select a target to monitor and to make further adjustment. (Default: CPU FAN)
- **Fan Speed Control**
 - Allows you to determine whether to enable the fan speed control function and adjust the fan speed.
 - » Normal Allows the fan to run at different speeds according to the temperature. You can adjust the fan speed with System Information Viewer based on your system requirements. (Default)
 - » Silent Allows the fan to run at slow speeds.
 - » Manual Allows you to control the fan speed in the curve graph.
 - » Full Speed Allows the fan to run at full speeds.
- **Fan Control Use Temperature Input**
 - Allows you to select the reference temperature for fan speed control.
- **Temperature Interval**
 - Allows you to select the temperature interval for fan speed change.
- **Fan Control Mode**
 - » Auto Lets the BIOS automatically detect the type of fan installed and sets the optimal control mode. (Default)
 - » Voltage Voltage mode is recommended for a 3-pin fan.
 - » PWM PWM mode is recommended for a 4-pin fan.
- **Fan Stop**
 - Enables or disables the fan stop function. You can set the temperature limit using the temperature curve. The fan stops operation when the temperature is lower than the limit. (Default: Disabled)
- **Temperature**
 - Displays the current temperature of the selected target area.
- **Fan Speed**
 - Displays current fan speeds.
- **Temperature Warning**
 - Sets the warning threshold for temperature. When temperature exceeds the threshold, BIOS will emit warning sound. Options are: Disabled (default), 60°C/140°F, 70°C/158°F, 80°C/176°F, 90°C/194°F.
- **Fan Fail Warning**
 - Allows the system to emit warning sound if the fan is not connected or fails. Check the fan condition or fan connection when this occurs. (Default: Disabled)

2-4 System



This section provides information on your motherboard model and BIOS version. You can also select the default language used by the BIOS and manually set the system time.

☞ **System Language**

Selects the default language used by the BIOS.

☞ **System Date**

Sets the system date. The date format is week (read-only), month, date, and year. Use <Enter> to switch between the Month, Date, and Year fields and use the <Page Up> or <Page Down> key to set the desired value.

☞ **System Time**

Sets the system time. The time format is hour, minute, and second. For example, 1 p.m. is 13:00:00. Use <Enter> to switch between the Hour, Minute, and Second fields and use the <Page Up> or <Page Down> key to set the desired value.

☞ **Access Level**

Displays the current access level depending on the type of password protection used. (If no password is set, the default will display as **Administrator**.) The Administrator level allows you to make changes to all BIOS settings; the User level only allows you to make changes to certain BIOS settings but not all.

2-5 BIOS



Boot Option Priorities

Specifies the overall boot order from the available devices. Removable storage devices that support GPT format will be prefixed with "UEFI:" string on the boot device list. To boot from an operating system that supports GPT partitioning, select the device prefixed with "UEFI:" string. Or if you want to install an operating system that supports GPT partitioning such as Windows 10 64-bit, select the optical drive that contains the Windows 10 64-bit installation disk and is prefixed with "UEFI:" string.

Hard Drive/CD/DVD ROM Drive/Floppy Drive/Network Device BBS Priorities

Specifies the boot order for a specific device type, such as hard drives, optical drives, floppy disk drives, and devices that support Boot from LAN function, etc. Press <Enter> on this item to enter the submenu that presents the devices of the same type that are connected. This item is present only if at least one device for this type is installed.

Bootup NumLock State

Enables or disables Numlock feature on the numeric keypad of the keyboard after the POST. (Default: On)

Security Option

Specifies whether a password is required every time the system boots, or only when you enter BIOS Setup. After configuring this item, set the password(s) under the **Administrator Password/User Password** item.

- » Setup A password is only required for entering the BIOS Setup program.
- » System A password is required for booting the system and for entering the BIOS Setup program. (Default)

Full Screen LOGO Show

Allows you to determine whether to display the GIGABYTE Logo at system startup. **Disabled** skips the GIGABYTE Logo when the system starts up. (Default: Enabled)

Fast Boot

Enables or disables Fast Boot to shorten the OS boot process. **Ultra Fast** provides the fastest bootup speed. (Default: Disabled)

- ☞ **SATA Support**
 - » All Sata Devices All SATA devices are functional in the operating system and during the POST.
 - » Last Boot HDD Only Except for the previous boot drive, all SATA devices are disabled before the OS boot process completes. (Default)

This item is configurable only when **Fast Boot** is set to **Enabled** or **Ultra Fast**.
- ☞ **VGA Support**

Allows you to select which type of operating system to boot.

 - » Auto Enables legacy option ROM only.
 - » EFI Driver Enables EFI option ROM. (Default)

This item is configurable only when **Fast Boot** is set to **Enabled** or **Ultra Fast**.
- ☞ **USB Support**
 - » Disabled All USB devices are disabled before the OS boot process completes.
 - » Full Initial All USB devices are functional in the operating system and during the POST. (Default)
 - » Partial Initial Part of the USB devices are disabled before the OS boot process completes.

This item is configurable only when **Fast Boot** is set to **Enabled**. This function is disabled when **Fast Boot** is set to **Ultra Fast**.
- ☞ **PS2 Devices Support**
 - » Disabled All PS/2 devices are disabled before the OS boot process completes.
 - » Enabled All PS/2 devices are functional in the operating system and during the POST. (Default)

This item is configurable only when **Fast Boot** is set to **Enabled**. This function is **disabled** when **Fast Boot** is set to **Ultra Fast**.
- ☞ **NetWork Stack Driver Support**
 - » Disabled Disables booting from the network. (Default)
 - » Enabled Enables booting from the network.

This item is configurable only when **Fast Boot** is set to **Enabled** or **Ultra Fast**.
- ☞ **CSM Support**

Enables or disables UEFI CSM (Compatibility Support Module) to support a legacy PC boot process.

 - » Enabled Enables UEFI CSM. (Default)
 - » Disabled Disables UEFI CSM and supports UEFI BIOS boot process only.
- ☞ **LAN PXE Boot Option ROM**

Allows you to select whether to enable the legacy option ROM for the LAN controller. (Default: Disabled)

This item is configurable only when **CSM Support** is set to **Enabled**.
- ☞ **Storage Boot Option Control**

Allows you to select whether to enable the UEFI or legacy option ROM for the storage device controller.

 - » Disabled Disables option ROM.
 - » UEFI Only Enables UEFI option ROM only.
 - » Legacy Only Enables legacy option ROM only. (Default)

This item is configurable only when **CSM Support** is set to **Enabled**.
- ☞ **Other PCI Device ROM Priority**

Allows you to select whether to enable the UEFI or Legacy option ROM for the PCI device controller other than the LAN, storage device, and graphics controllers.

 - » Disabled Disables option ROM.
 - » UEFI Only Enables UEFI option ROM only. (Default)
 - » Legacy Only Enables legacy option ROM only.

This item is configurable only when **CSM Support** is set to **Enabled**.

- ☞ **Network Stack**
Disables or enables booting from the network to install a GPT format OS, such as installing the OS from the Windows Deployment Services server. (Default: Disabled)
- ☞ **Ipv4 PXE Support**
Enables or disables IPv4 PXE Support. This item is configurable only when **Network Stack** is enabled.
- ☞ **Ipv4 HTTP Support**
Enables or disables HTTP boot support for IPv4. This item is configurable only when **Network Stack** is enabled.
- ☞ **Ipv6 PXE Support**
Enables or disables IPv6 PXE Support. This item is configurable only when **Network Stack** is enabled.
- ☞ **Ipv6 HTTP Support**
Enables or disables HTTP boot support for IPv6. This item is configurable only when **Network Stack** is enabled.
- ☞ **IPSEC Certificate**
Enables or disables Internet Protocol Security. This item is configurable only when **Network Stack** is enabled.
- ☞ **Administrator Password**
Allows you to configure an administrator password. Press <Enter> on this item, type the password, and then press <Enter>. You will be requested to confirm the password. Type the password again and press <Enter>. You must enter the administrator password (or user password) at system startup and when entering BIOS Setup. Differing from the user password, the administrator password allows you to make changes to all BIOS settings.
- ☞ **User Password**
Allows you to configure a user password. Press <Enter> on this item, type the password, and then press <Enter>. You will be requested to confirm the password. Type the password again and press <Enter>. You must enter the administrator password (or user password) at system startup and when entering BIOS Setup. However, the user password only allows you to make changes to certain BIOS settings but not all. To cancel the password, press <Enter> on the password item and when requested for the password, enter the correct one first. When prompted for a new password, press <Enter> without entering any password. Press <Enter> again when prompted to confirm.
NOTE: Before setting the User Password, be sure to set the Administrator Password first.

2-6 Peripherals



AMD CPU fTPM

Enables or disables the TPM 2.0 function integrated in the AMD CPU. (Default: Disabled)

Initial Display Output (Note)

Specifies the first initiation of the monitor display from the installed PCI Express graphics card or the onboard graphics.

- » IGD Video Sets the onboard graphics as the first display.
- » PCIe 1 Slot Sets the graphics card on the PCIE1X16 slot as the first display. (Default)

Legacy USB Support

Allows USB keyboard/mouse to be used in MS-DOS. (Default: Enabled)

XHCI Hand-off

Determines whether to enable XHCI Hand-off feature for an operating system without XHCI Hand-off support. (Default: Enabled)

EHCI Hand-off

Determines whether to enable EHCI Hand-off feature for an operating system without EHCI Hand-off support. (Default: Disabled)

Port 60/64 Emulation

Enables or disables emulation of I/O ports 64h and 60h. This should be enabled for full legacy support for USB keyboards/mice in MS-DOS or in operating system that does not natively support USB devices. (Default: Disabled)

USB Mass Storage Driver Support

Enables or disables support for USB storage devices. (Default: Enabled)

Mass Storage Devices

Displays a list of connected USB mass storage devices. This item appears only when a USB storage device is installed.

(Note) This item is present only when you install a CPU that supports this feature.

- ☞ **RGB Fusion (Onboard LED)**
Allows you to set the LED lighting mode for the motherboard.
 - » On Enables this function. (Default)
 - » Off Disables this function.
 - » Pulse Mode All LEDs simultaneously fade in and fade out.
- ☞ **RGB Fusion (LED strip)**
Allows you to set the display color of the external LED strip.
- ☞ **HD Audio Controller**
Enables or disables the onboard audio function. (Default: Enabled)
If you wish to install a 3rd party add-in audio card instead of using the onboard audio, set this item to **Disabled**.
- ☞ **Above 4G Decoding**
Enables or disables 64-bit capable devices to be decoded in above 4 GB address space (only if your system supports 64-bit PCI decoding). Set to Enabled if more than one advanced graphics card are installed and their drivers are not able to be launched when entering the operating system (because of the limited 4 GB memory address space). (Default: Disabled)
- ▶ **Trusted Computing**
Enables or disables Trusted Platform Module (TPM).
- ▶ **Super IO Configuration**
- ☞ **Serial Port 1**
Enables or disables the onboard serial port. (Default: Enabled)
- ▶ **AMD CBS**
This sub-menu provides AMD CBS-related configuration options.
- ▶ **Realtek PCIe GBE Family Controller**
This sub-menu provides information on LAN configuration and related configuration options.

2-7 Chipset



☞ IOMMU

Enables or disables AMD IOMMU support. (Default: Auto)

☞ Integrated Graphics (Note)

Enables or disables the onboard graphics function.

- » Auto The BIOS will automatically enable or disable the onboard graphics depending on the graphics card being installed. (Default)
- » Forces Enables the onboard graphics.
- » Disabled Disables the onboard graphics.

☞ UMA Mode (Note)

Specify the UMA mode.

- » Auto Lets the BIOS automatically configure this setting. (Default)
- » UMA Specified Sets the UMA Frame Buffer Size.
- » UMA Auto Sets the display resolution.

This item is configurable only when **Integrated Graphics** is set to **Forces**.

☞ UMA Frame Buffer Size (Note)

Frame buffer size is the total amount of system memory allocated solely for the onboard graphics controller. MS-DOS, for example, will use only this memory for display. Options are: Auto (default), 64M-16G.

This item is configurable only when **UMA Mode** is set to **UMA Specified**.

☞ Display Resolution (Note)

Allows you to set the display resolution. Options are: Auto (default), 1920x1080 and below, 2560x1600, 3840x2160.

This item is configurable only when **UMA Mode** is set to **UMA Auto**.

(Note) This item is present only when you install a CPU that supports this feature.

- ☞ **SATA Mode**
Enables or disables RAID for the integrated SATA controllers or configures the SATA controllers to AHCI mode.
 - » RAID Enables RAID for the SATA controller.
 - » AHCI Configures the SATA controllers to AHCI mode. Advanced Host Controller Interface (AHCI) is an interface specification that allows the storage driver to enable advanced Serial ATA features such as Native Command Queuing and hot plug. (Default)
- ☞ **NVMe RAID mode (M2A_SOCKET Connector)**
Allows you to determine whether to use your M.2 NVMe PCIe SSDs to configure RAID. (Default: Disabled)
- ☞ **Chipset SATA Port Enable (SATA3 0, 1, 2, 3 Connectors)**
Enables or disables the integrated SATA controllers. (Default: Enabled)
- ☞ **APU SATA Port 0 (M2A_SOCKET Connector)**
Displays the information of the connected M.2 SATA device.
- ☞ **Chipset SATA Port 0/1/2/3 (SATA3 0, 1, 2, 3 Connectors)**
Displays the information of the connected SATA device(s).

2-8 Power



AC BACK

Determines the state of the system after the return of power from an AC power loss.

- » Memory The system returns to its last known awake state upon the return of the AC power.
- » Always On The system is turned on upon the return of the AC power.
- » Always Off The system stays off upon the return of the AC power. (Default)

Power On By Keyboard

Allows the system to be turned on by a PS/2 keyboard wake-up event.

Note: To use this function, you need an ATX power supply providing at least 1A on the +5VSB lead.

- » Disabled Disables this function. (Default)
- » Password Set a password with 1~5 characters to turn on the system.
- » Keyboard 98 Press POWER button on the Windows 98 keyboard to turn on the system.
- » Any key Press any key to turn on the system.

Power On Password

Set the **password** when **Power On By Keyboard** is set to Password.

Press <Enter> on this item and set a password with up to 5 characters and then press <Enter> to accept. To turn on the system, enter the password and press <Enter>.

Note: To cancel the password, press <Enter> on this item. When prompted for the password, press <Enter> again without entering the password to clear the password settings.

Power On By Mouse

Allows the system to be turned on by a PS/2 mouse wake-up event.

Note: To use this function, you need an ATX power supply providing at least 1A on the +5VSB lead.

- » Disabled Disables this function. (Default)
- » Move Move the mouse to turn on the system.
- » Double Click Double click on left button on the mouse to turn on the system.

- ☞ **ErP**
Determines whether to let the system consume least power in S5 (shutdown) state. Note: When this item is set to **Enabled**, the following functions will become unavailable: Resume by Alarm, power on by mouse, and power on by keyboard.
- ☞ **Soft-Off by PWR-BTTN**
Configures the way to turn off the computer in MS-DOS mode using the power button.
 - » Instant-Off Press the power button and then the system will be turned off instantly. (Default)
 - » Delay 4 Sec. Press and hold the power button for 4 seconds to turn off the system. If the power button is pressed for less than 4 seconds, the system will enter suspend mode.
- ☞ **Power Loading**
Enables or disables dummy load. When the power supply is at low load, a self-protection will activate causing it to shutdown or fail. If this occurs, please set to **Enabled**. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)
- ☞ **Resume by Alarm**
Determines whether to power on the system at a desired time. (Default: Disabled)
If enabled, set the date and time as following:
 - » Wake up day: Turn on the system at a specific time on each day or on a specific day in a month.
 - » Wake up hour/minute/second: Set the time at which the system will be powered on automatically.Note: When using this function, avoid inadequate shutdown from the operating system or removal of the AC power, or the settings may not be effective.
- ☞ **Wake on LAN**
Enables or disables the wake on LAN function. (Default: Enabled)
- ☞ **High Precision Event Timer**
Enables or disables High Precision Event Timer (HPET) in the operating system. (Default: Enabled)
- ☞ **CEC 2019 Ready**
Allows you to select whether to allow the system to adjust power consumption when it is in shutdown, idle, or standby state in order to comply with the CEC (California Energy Commission) 2019 Standards. (Default: Disabled)

2-9 Save & Exit



☞ Save & Exit Setup

Press **<Enter>** on this item and select **Yes**. This saves the changes to the CMOS and exits the BIOS Setup program. Select **No** or press **<Esc>** to return to the BIOS Setup Main Menu.

☞ Exit Without Saving

Press **<Enter>** on this item and select **Yes**. This exits the BIOS Setup without saving the changes made in BIOS Setup to the CMOS. Select **No** or press **<Esc>** to return to the BIOS Setup Main Menu.

☞ Load Optimized Defaults

Press **<Enter>** on this item and select **Yes** to load the optimal BIOS default settings. The BIOS defaults settings help the system to operate in optimum state. Always load the Optimized defaults after updating the BIOS or after clearing the CMOS values.

☞ Boot Override

Allows you to select a device to boot immediately. Press **<Enter>** on the device you select and select **Yes** to confirm. Your system will restart automatically and boot from that device.

☞ Save Profiles

This function allows you to save the current BIOS settings to a profile. You can create up to 8 profiles and save as Setup Profile 1~ Setup Profile 8. Press **<Enter>** to complete. Or you can select **Select File in HDD/FDD/USB** to save the profile to your storage device.

☞ Load Profiles

If your system becomes unstable and you have loaded the BIOS default settings, you can use this function to load the BIOS settings from a profile created before, without the hassles of reconfiguring the BIOS settings. First select the profile you wish to load and then press **<Enter>** to complete. You can select **Select File in HDD/FDD/USB** to input the profile previously created from your storage device or load the profile automatically created by the BIOS, such as reverting the BIOS settings to the last settings that worked properly (last known good record).

Chapter 3 Appendix

3-1 Configuring a RAID Set

RAID Levels

	RAID 0	RAID 1	RAID 10
Minimum Number of Hard Drives	≥2	2	4
Array Capacity	Number of hard drives * Size of the smallest drive	Size of the smallest drive	(Number of hard drives/2) * Size of the smallest drive
Fault Tolerance	No	Yes	Yes

Before you begin, please prepare the following items:

- At least two SATA hard drives or SSDs (to ensure optimal performance, it is recommended that you use two hard drives with identical model and capacity). (Note)
- Windows setup disk.
- Motherboard driver disk.
- A USB thumb drive.

Configuring the Onboard SATA Controller

A. Installing SATA hard drive(s) in your computer

Install the hard drives/SSDs in the SATA/M.2 connectors on the motherboard. Then connect the power connectors from your power supply to the hard drives.

B. Configuring SATA controller mode in BIOS Setup

Make sure to configure the SATA controller mode correctly in system BIOS Setup.

Steps:

1. Turn on your computer and press <Delete> to enter BIOS Setup during the POST (Power-On Self-Test). Under **Chipset**, ensure **Chipset SATA Port Enable** is enabled. Set **SATA Mode** to **RAID**. Then save the settings and restart your computer. (If you want to use NVMe PCIe SSDs to configure RAID, make sure to set **NVMe RAID mode** to **Enabled**.)
2. If you want to configure UEFI RAID, follow the steps in "C-1." To enter the legacy RAID ROM, save the settings and exit BIOS Setup. Refer to "C-2" for more information.

 The BIOS Setup menus described in this section may differ from the exact settings for your motherboard. The actual BIOS Setup menu options you will see shall depend on the motherboard you have and the BIOS version.

C-1. UEFI RAID Configuration

Steps:

1. In BIOS Setup, go to **BIOS** and set **CSM Support** to **Disabled**. Save the changes and exit BIOS Setup.
2. After the system reboot, enter BIOS Setup again. Then enter the **Peripherals\RAIDXpert2 Configuration Utility** sub-menu.
3. On the **RAIDXpert2 Configuration Utility** screen, press <Enter> on **Array Management** to enter the **Create Array** screen. Then, select a **RAID level**. RAID levels supported include RAID 0(Stripe), RAID 1(Mirror), and RAID 10 (the selections available depend on the number of the hard drives being installed). Next, press <Enter> on **Select Physical Disks** to enter the **Select Physical Disks** screen.
4. On the **Select Physical Disks** screen, select the hard drives to be included in the RAID array and set them to **Enabled**. Next, use the down arrow key to move to **Apply Changes** and press <Enter>. Then return to the previous screen and set the **Array Size**, **Array Size Unit**, **Read Cache Policy** and **Write Cache Policy**.

(Note) An M.2 PCIe SSD cannot be used to set up a RAID set either with an M.2 SATA SSD or a SATA hard drive.

5. After setting the capacity, move to **Create Array** and press <Enter> to begin.
6. After completing, you'll be brought back to the **Array Management** screen. Under **Manage Array Properties** you can see the new RAID volume and information on RAID level, array name, array capacity, etc.

C-2. Configuring Legacy RAID ROM

Enter the legacy RAID BIOS setup utility to configure a RAID array. Skip this step and proceed with the installation of Windows operating system for a non-RAID configuration.

Steps:

1. After the POST memory test begins and before the operating system boot begins, look for a message which says "Press <Ctrl-F> to enter RAID Option ROM Utility". Press <Ctrl> + <R> to enter the RAID BIOS setup utility.
2. To create a new array, press <Enter> on the Create Array option.
3. The selection bar will move to the **Disks** section on the right of the screen. Select the hard drives to be included in the RAID array. Use the up or down arrow key to select a hard drive and press <Insert>. The selected hard drive will be shown in green. To use all of the hard drives, simply press <A> to select all. Then press <Enter> and the selection bar will move to the **User Input** section on the left bottom of the screen.
4. First, select a RAID mode and press <Enter>. The selections available depend on the number of the hard drives being installed. Then follow the on-screen instructions to specify the array size. You can select **All available space** to use the maximum size allowed or use the up or down arrow key to adjust the size and press <Enter>.
5. Select a caching mode. Options include Read/Write, Read Only, and None. Then press <Enter> to proceed.
6. Finally, a message which says "Confirm Creation of Array" will appear. Press <C> to confirm or <Esc> to return to the previous screen.
7. When completed, you will see the new array on the main screen. To exit the RAID BIOS utility, press <Esc> and then press <C> to confirm.

Installing the SATA RAID/AHCI Driver and Operating System

With the correct BIOS settings, you are ready to install the operating system.

Installing the Operating System

As some operating systems already include RAID/AHCI driver, you do not need to install separate RAID/AHCI driver during the Windows installation process. After the operating system is installed, we recommend that you install all required drivers from the motherboard driver disk using "Xpress Install" to ensure system performance and compatibility. If the operating system to be installed requires that you provide additional RAID/AHCI driver during the OS installation process, please refer to the steps below:

1. Copy the **Hw10** folder under the **\Boot** folder in the driver disk to your USB thumb drive.
2. Boot from the Windows setup disk and perform standard OS installation steps. When the screen requesting you to load the driver appears, select **Browse**.
3. Insert the USB thumb drive and then browse to the location of the driver. The location of the drivers is as follows:
\Hw10\RAID\x64
4. Select **AMD-RAID Bottom Device** first and click **Next** to load the driver. Then select **AMD-RAID Controller** and click **Next** to load the driver. Finally, continue the OS installation.



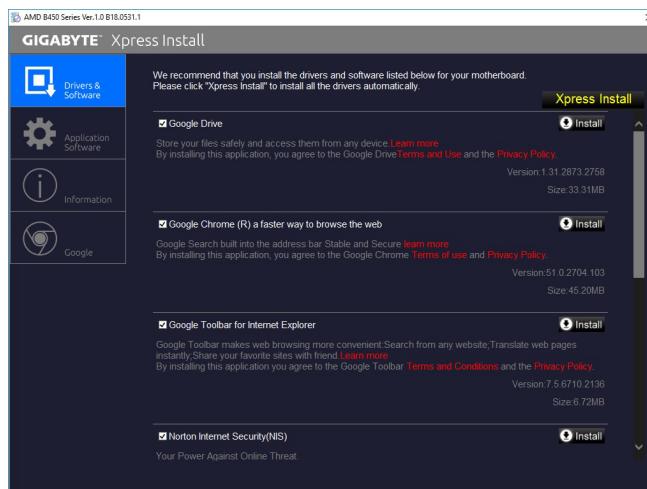
Please visit GIGABYTE's website for details on configuring a RAID array.

3-2 Drivers Installation



- Before installing the drivers, first install the operating system.
- After installing the operating system, insert the motherboard driver disk into your optical drive. Click on the message "Tap to choose what happens with this disc" on the top-right corner of the screen and select "Run Run.exe." (Or go to My Computer, double-click the optical drive and execute the Run.exe program.)

"Xpress Install" will automatically scan your system and then list all of the drivers that are recommended to install. You can click the **Xpress Install** button and "Xpress Install" will install all of the selected drivers. Or click the arrow icon to individually install the drivers you need.



Please visit GIGABYTE's website for more software information.



Please visit GIGABYTE's website for more troubleshooting information.

Regulatory Notices

United States of America, Federal Communications Commission Statement

Supplier's Declaration of Conformity 47 CFR § 2.1077 Compliance Information

Product Name: Motherboard
Trade Name: GIGABYTE
Model Number: B450M DS3H

Responsible Party – U.S. Contact Information: **G.B.T. Inc.**
Address: 17358 Railroad street, City Of Industry, CA91748
Tel.: 1-626-854-9338
Internet contact information: <https://www.gigabyte.com>

FCC Compliance Statement:

This device complies with Part 15 of the FCC Rules, Subpart B, Unintentional Radiators. 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 manufacturer's 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 to 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.

Canadian Department of Communications Statement

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications. This class B digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

European Union (EU) CE Declaration of Conformity

This device complies with the following directives: Electromagnetic Compatibility Directive 2014/30/EU, Low-voltage Directive 2014/35/EU, RoHS directive (recast) 2011/65/EU & the 2015/863 Statement. This product has been tested and found to comply with all essential requirements of the Directives.

European Union (EU) RoHS (recast) Directive 2011/65/EU & the European Commission Delegated Directive (EU) 2015/863 Statement
GIGABYTE products have not intended to add and safe from hazardous substances (Cd, Pb, Hg, Cr+6, PBDE, PBB, DEHP, BBP, DBP and DiBP). The parts and components have been carefully selected to meet RoHS requirement. Moreover, we at GIGABYTE are continuing our efforts to develop products that do not use internationally banned toxic chemicals.

European Union (EU) Community Waste Electrical & Electronic Equipment (WEEE) Directive Statement

GIGABYTE will fulfill the national laws as interpreted from the 2012/19/EU WEEE (Waste Electrical and Electronic Equipment) (recast) directive. The WEEE Directive specifies the treatment, collection, recycling and disposal of electric and electronic devices and their components. Under the Directive, used equipment must be marked, collected separately, and disposed of properly.

WEEE Symbol Statement



The symbol shown below is on the product or on its packaging, which indicates that this product must not be disposed of with other waste. Instead, the device should be taken to the waste collection centers for activation of the treatment, collection, recycling and disposal procedure.

For more information about where you can drop off your waste equipment for recycling, please contact your local government office, your household waste disposal service or where you purchased the product for details of environmentally safe recycling.

End of Life Directives-Recycling



The symbol shown below is on the product or on its packaging, which indicates that this product must not be disposed of with other waste. Instead, the device should be taken to the waste collection centers for activation of the treatment, collection, recycling and disposal procedure.

Déclaration de Conformité aux Directives de l'Union européenne (UE)

Cet appareil porte la marque CE est conforme aux directives de l'UE suivantes: directive Compatibilité Electromagnétique 2014/30/UE, directive Basse Tension 2014/35/UE et directive RoHS II 2011/65/UE. La conformité à ces directives est évaluée sur la base des normes européennes harmonisées applicables.

European Union (EU) CE-Konformitätserklärung

Diese Produkte mit CE-Kennzeichnung erfüllen folgenden EU-Richtlinien: EMV-Richtlinie 2014/30/EU, Niederspannungsrichtlinie 2014/30/EU und RoHS-Richtlinie 2011/65/EU erfüllt. Die Konformität mit diesen Richtlinien wird unter Verwendung der entsprechenden Standards zur Europäischen Normierung beurteilt.

CE declaração de conformidade

Este produto com a marcação CE estão em conformidade com das seguintes Directivas UE: Diretiva Baixa Tensão 2014/35/EU; Diretiva CEM 2014/30/EU; Diretiva RSP 2011/65/EU. A conformidade com estas directivas é verificada utilizando as normas europeias harmonizadas.

CE Declaración de conformidad

Este producto que llevan la marca CE cumplen con las siguientes Directivas de la Unión Europea: Directiva EMC (2014/30/EU), Directiva de bajo voltaje (2014/35/EU), Directiva RoHS (recast) (2011/65/EU). El cumplimiento de estas directivas se evalúa mediante las normas europeas armonizadas.

Dichiarazione di conformità CE

Questo prodotto è conforme alle seguenti direttive: Direttiva sulla compatibilità elettromagnetica 2014/30/UE, Direttiva sulla bassa tensione 2014/35/UE, Direttiva RoHS (rifusione) 2011/65/UE. Questo prodotto è stato testato e trovato conforme a tutti i requisiti essenziali delle Direttive.

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Tech. and Non-Tech. Support (Sales/Marketing) : <https://esupport.gigabyte.com>

WEB address (English): <https://www.gigabyte.com>

WEB address (Chinese): <https://www.gigabyte.com/tw>

- **GIGABYTE eSupport**

To submit a technical or non-technical (Sales/Marketing) question, please link to:
<https://esupport.gigabyte.com>

The screenshot shows the 'Welcome to eSupport' page. At the top, there is a navigation bar with the 'GIGABYTE' logo. Below the navigation bar, the main heading 'Welcome to eSupport' is displayed in a large blue font. A sub-instruction 'Submit your product/sponsorship/marketing questions or inquiries, and our representative will respond in a timely fashion.' is present. The page is divided into three main sections: 'NEWS' (with a note about personal page visibility), 'SIGN IN' (with fields for Account and Password, and social media sign-in options for Facebook, Google, Twitter, and Windows), and 'QUICK LINK' (with links for Downloads, FAQ, and Warranty).