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Si dichiara che questo prodotto è conforme  
alle normative vigenti e soddisfa i requisiti  
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Short Declaration of conformity  
We declare this product is complying with the  
laws in force and meeting all the essential  
requirements as specified by the directives  
2004/108/CE, 2006/95/CE and 1999/05/CE  
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# Chapter 1: Introduction

## 1.1 Before You Start

Thank you for choosing our product. Before you start installing the motherboard, please make sure you follow the instructions below:

- Prepare a dry and stable working environment with sufficient lighting.
- Always disconnect the computer from power outlet before operation.
- Before you take the motherboard out from anti-static bag, ground yourself properly by touching any safely grounded appliance, or use grounded wrist strap to remove the static charge.
- Avoid touching the components on motherboard or the rear side of the board unless necessary. Hold the board on the edge, do not try to bend or flex the board.
- Do not leave any unfastened small parts inside the case after installation. Loose parts will cause short circuits which may damage the equipment.
- Keep the computer from dangerous area, such as heat source, humid air and water.
- The operating temperatures of the computer should be 0 to 45 degrees Celsius.
- To avoid injury, be careful of:
  - Sharp pins on headers and connectors
  - Rough edges and sharp corners on the chassis
  - Damage to wires that could cause a short circuit

## 1.2 Package Checklist

- Serial ATA Cable x2
- Rear I/O Panel for ATX Case x1
- Quick Installation Guide x1
- Fully Setup Driver DVD x1

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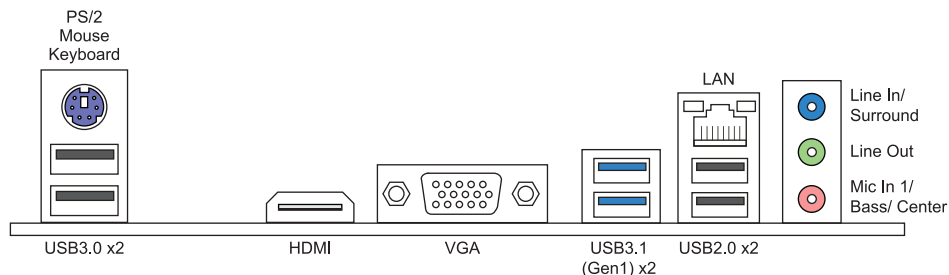
**Note**

- » *The package contents may be different due to the sales region or models in which it was sold. For more information about the standard package in your region, please contact your dealer or sales representative.*
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### 1.3 Specifications

Specifications	
CPU Support	Socket AM4 supports AMD® A-series APU, Ryzen APU / Ryzen CPU * Please refer to <a href="http://www.biostar.com.tw">www.biostar.com.tw</a> for CPU support list.
Chipset	AMD® A320
Memory	Supports Dual Channel DDR4 1866/2133/2400/2667/2933 2 x DDR4 DIMM Memory Slot, Max. Supports up to 32 GB Memory Each DIMM supports non-ECC 8/16 GB DDR4 module * DDR4 - 2933 only for Ryzen2 CPU. * Please refer to <a href="http://www.biostar.com.tw">www.biostar.com.tw</a> for Memory support list.
Storage	4x SATA III Connector (6Gb/s) : Supports AHCI & RAID 0, 1, 10
LAN	Realtek RTL 8111H 10/ 100/ 1000 Mb/s auto negotiation, Half / Full duplex capability
Audio Codec	ALC887 7.1 Channels, High Definition Audio
USB	4x USB 3.1 Gen1 (5Gb/s) port (2 on rear I/Os and 2 via internal headers) 8x USB 2.0 port (4 on rear I/Os and 4 via internal headers)
Expansion Slots	2x PCIe 2.0 x1 Slot 1x PCIe 3.0 x16 Slot (When using APU, the bandwidth is x8 speed)
Rear I/Os	1x PS/2 Keyboard / Mouse 1x VGA Port 1x HDMI Port 1x LAN port 2x USB 3.1 Gen1 (5Gb/s) Port 4x USB 2.0 Port 3x Audio Jack
Internal I/Os	4x SATA III 6.0Gb/s Connector 2x USB 2.0 Header (each header supports 2 USB 2.0 ports) 1x USB 3.1 Gen1 (5Gb/s) Header (each header supports 2 USB 3.1 Gen1 ports) 1x 4-Pin Power Connector 1x 24-Pin Power Connector 1x CPU Fan Connector 1x System Fan Connector 1x Front Panel Header 1x Front Audio Header 1x COM Serial Header 1x Clear CMOS Header
Form Factor	uATX Form Factor, 226 mm x 174 mm
OS Support	Windows 7(64bit) / 10(64bit) Biostar reserves the right to add or remove support for any OS with or without notice.

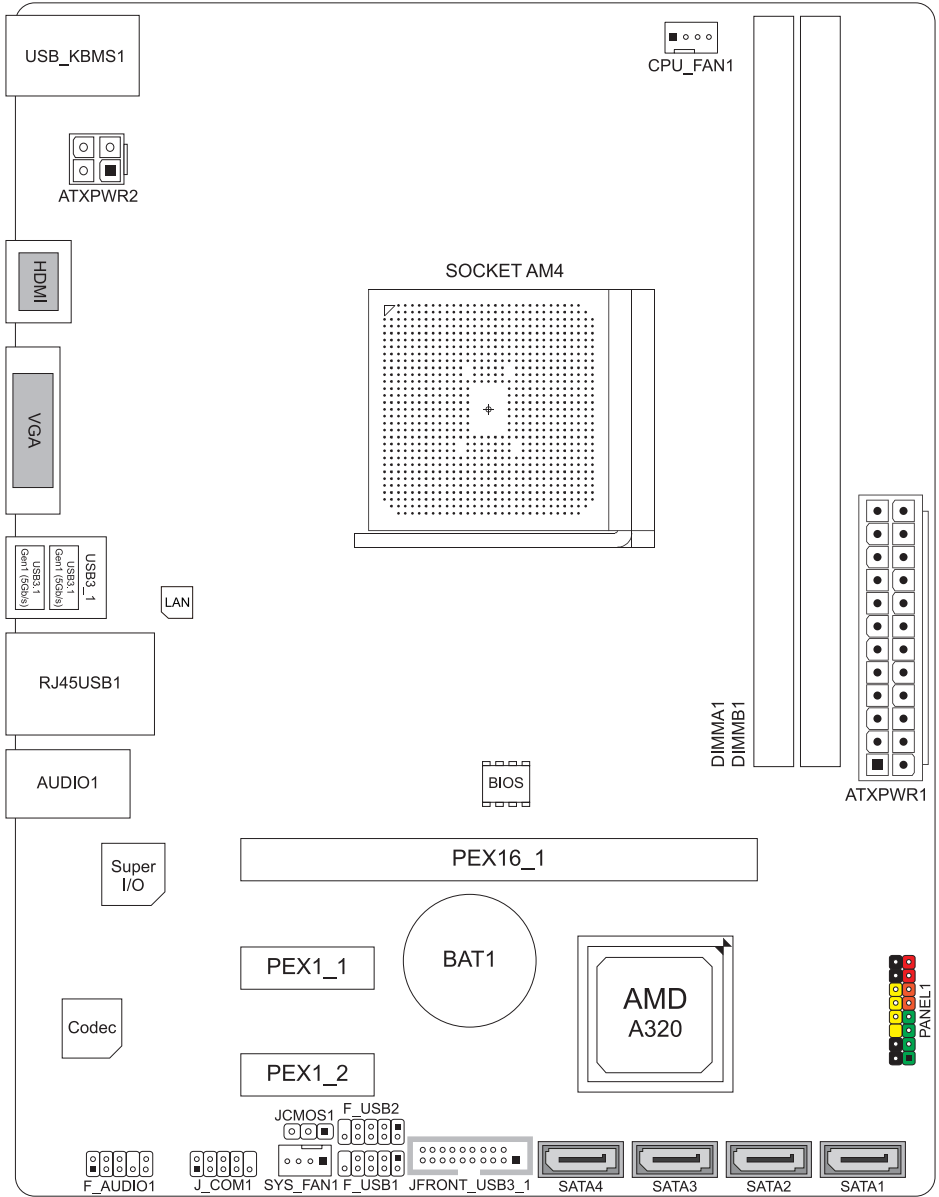
## 1.4 Rear Panel Connectors



### Note

- » HDMI / VGA output require an AMD family processor with integrated graphics.
- » Since the audio chip supports High Definition Audio Specification, the function of each audio jack can be defined by software. The input / output function of each audio jack listed above represents the default setting. However, when connecting external microphone to the audio port, please use the Line In (Blue) and Mic In (Pink) audio jack.
- » Maximum resolution  
VGA: 1920 x 1200 @60Hz  
HDMI: 4096 x 2160 @24Hz or 3840 x 2160 @30Hz
- » When using the front HD audio jack and plug in the headset / microphone, the rear sound will be automatically Disabled.

## 1.5 Motherboard Layout



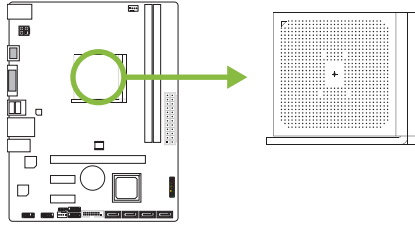
**Note**

» ■ represents the 1st pin.

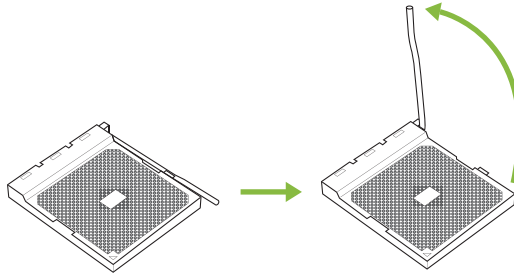
## Chapter 2: Hardware installation

### 2.1 Install Central Processing Unit (CPU)

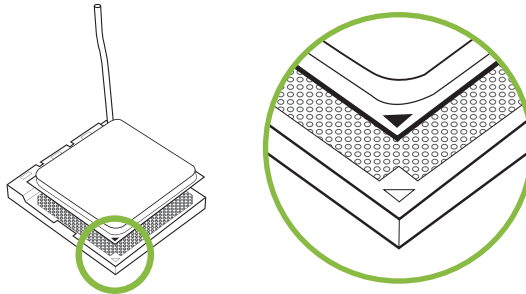
Step 1: Locate the CPU socket on the motherboard



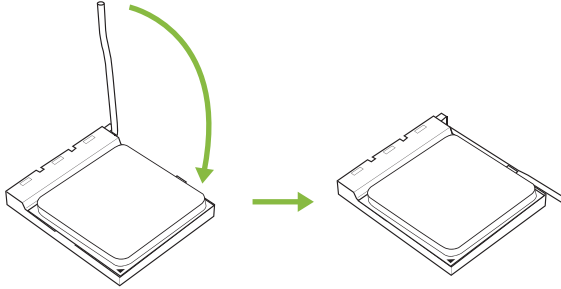
Step 2: Pull the socket locking out from the socket and then raise the lever up to a 90-degree angle.



Step 3: Look for the white triangle on socket, and the gold triangle on CPU should point towards this white triangle. The CPU will fit only in the correct orientation.



Step 4: Hold the CPU down firmly, and then close the lever to locked the position



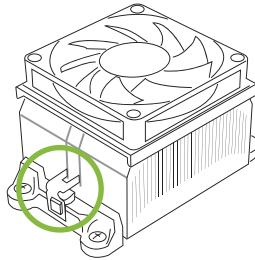
**Note**

» Please turn off the Power Supply before remove the CPU socket.

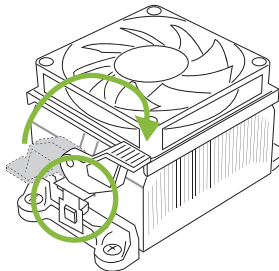
## 2.2 Install a Heatsink

### <TypeA>

Step 1: Place the heatsink and fan assembly onto the retention frame. Match the heatsink clip with the socket mounting-lug. Hook the spring clip to the mounting-lug.

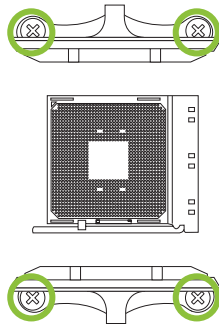


Step 2: On the other side, push the retention clip straight down to lock into the plastic lug on the retention frame, and then press down the locker until it stops.

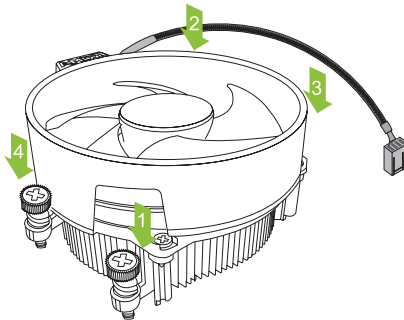


## &lt;TypeB&gt;

Step 1: Remove the heatsink and fan assembly bracket on the motherboard and keep the cooler backplane under the motherboard.



Step 2: Place the heatsink and fan assembly on top of the installed CPU and make sure that the fan cable is closest to the CPU fan connector. Please refer diagram to the following screw into the screw hole in the order shown.

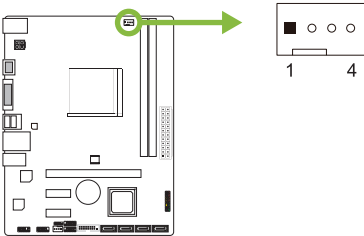
**Note**

- » Do not forget to connect the CPU fan connector.
- » For proper installation, please kindly refer to the installation manual of your CPU heatsink.

## 2.3 Connect Cooling Fans

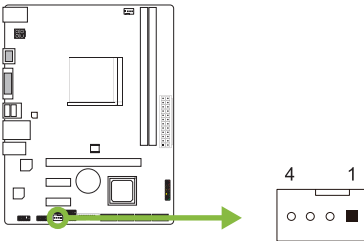
These fan headers support cooling-fans built in the computer. The fan cable and connector may be different according to the fan manufacturer.

### CPU\_FAN1: CPU Fan Header



Pin	Assignment
1	Ground
2	+12V
3	FAN RPM rate sense
4	Smart Fan Control (By Fan)

### SYS\_FAN1: System Fan Header



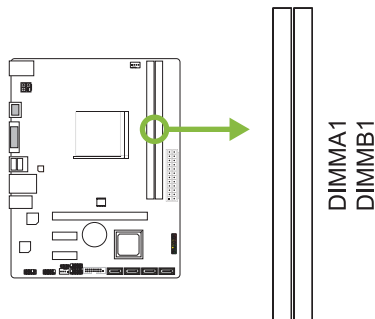
Pin	Assignment
1	Ground
2	+12V
3	FAN RPM rate sense
4	Smart Fan Control (By Fan)

#### Note

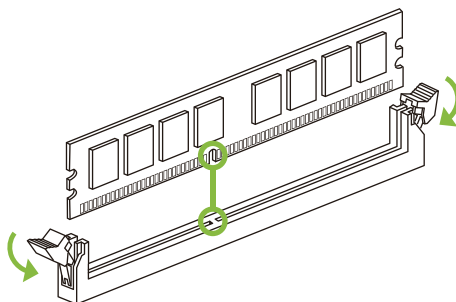
- » CPU\_FAN1, SYS\_FAN1 support 4-pin and 3-pin head connectors. When connecting with wires onto connectors, please note that the red wire is the positive and should be connected to pin#2, and the black wire is Ground and should be connected to pin#1(GND).

## 2.4 Install System Memory

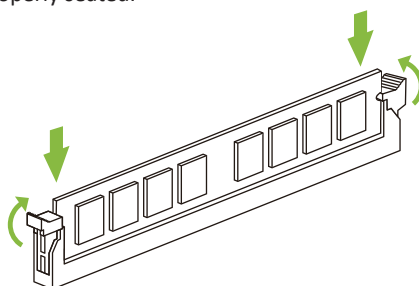
### DDR4 Modules



Step 1: Unlock a DIMM slot by pressing the retaining clips outward. Align a DIMM on the slot such that the notch on the DIMM matches the break on the slot.



Step 2: Insert the DIMM vertically and firmly into the slot until the retaining clips snap back in place and the DIMM is properly seated.



#### Note

» If the DIMM does not go in smoothly, do not force it. Pull it all the way out and try again.

## Memory Capacity

DIMM Socket Location	DDR4 Module	Total Memory Size
DIMMA1	8GB/16GB	Max is 32GB.
DIMMB1	8GB/16GB	

## Dual Channel Memory Installation

Please refer to the following requirements to activate Dual Channel function:  
Install memory module of the same density in pairs, shown in the table.

Dual Channel Status	DIMMA1	DIMMB1
Disabled	O	X
Disabled	X	O
Enabled	O	O

(O means memory installed, X means memory not installed.)

#### Note

» When installing more than one memory module, we recommend to use the same brand and capacity memory on this motherboard.

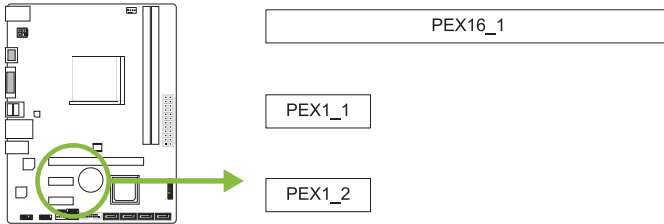
## 2.5 Expansion Slots

### PEX16\_1: PCI-Express Gen3 x16 Slot (When using APU, the bandwidth is x8 speed)

- PCI-Express 3.0 compliant.
- Theoretical maximum bandwidth using two slots simultaneously is 16GB/s for each slot, a total of 32GB/s.

### PEX1\_1/1\_2: PCI-Express Gen2 x1 Slot

- PCI-Express 2.0 compliant.
- Data transfer bandwidth up to 0.5GB/s per direction; 1GB/s in total.



### Install an Expansion Card

You can install your expansion card by following steps:

- Read the related expansion card's instruction document before install the expansion card into the computer.
- Remove your computer's chassis cover, screws and slot bracket from the computer.
- Place a card in the expansion slot and press down on the card until it is completely seated in the slot.
- Secure the card's metal bracket to the chassis back panel with a screw.
- Replace your computer's chassis cover.
- Power on the computer, if necessary, change BIOS settings for the expansion card.
- Install related driver for the expansion card.

## 2.6 Jumper & Switch Setting

The illustration shows how to set up jumpers. When the jumper cap is placed on pins, the jumper is “close”, if not, that means the jumper is “open”.

Pin opened



Pin closed

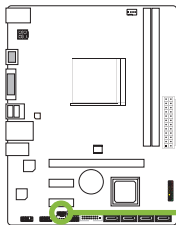


Pin 1-2 closed



### JCMOS1: Clear CMOS Jumper

The jumper allows users to restore the BIOS safe setting and the CMOS data. Please carefully follow the procedures to avoid damaging the motherboard.



Pin 1-2 Close:

Normal Operation (default).



Pin 2-3 Close:

Clear CMOS data.

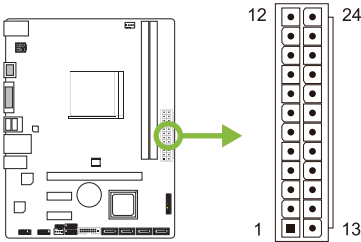
#### Clear CMOS Procedures:

1. Remove AC power line.
2. Set the jumper to “Pin 2-3 close”.
3. Wait for five seconds.
4. Set the jumper to “Pin 1-2 close”.
5. Power on the AC.
6. Load Optimal Defaults and save settings in CMOS.

## 2.7 Headers & Connectors

### ATXPWR1: ATX Power Source Connector

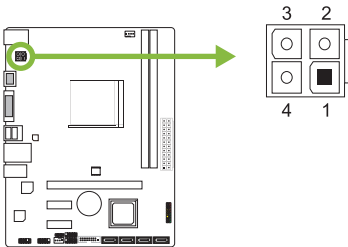
For better compatibility, we recommend to use a standard ATX 24-pin power supply for this connector. Make sure to find the correct orientation before plugging the connector.



Pin	Assignment	Pin	Assignment
13	+3.3V	1	+3.3V
14	-12V	2	+3.3V
15	Ground	3	Ground
16	PS_ON	4	+5V
17	Ground	5	Ground
18	Ground	6	+5V
19	Ground	7	Ground
20	NC	8	PW_OK
21	+5V	9	Standby Voltage+5V
22	+5V	10	+12V
23	+5V	11	+12V
24	Ground	12	+3.3V

### ATXPWR2: ATX Power Source Connector

The connector provides +12V to the CPU power circuit.



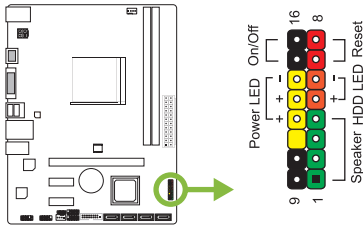
Pin	Assignment
1	+12V
2	+12V
3	Ground
4	Ground

#### Note

- » Before you power on the system, please make sure that both ATXPWR1 and ATXPWR2 connectors have been plugged-in.
- » Insufficient power supplied to the system may result in instability or the peripherals not functioning properly. Use of a PSU with a higher power output is recommended when configuring a system with more power-consuming devices.

## PANEL1: Front Panel Header

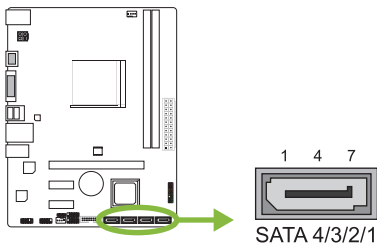
This 16-pin header includes Power-on, Reset, HDD LED, Power LED, and speaker connection.



Pin	Assignment	Function	Pin	Assignment	Function
1	+5V	Speaker Connector	9	N/A	Power LED
2	N/A		10	N/A	
3	N/A		11	N/A	
4	Speaker		12	Power LED (+)	Power-on button
5	HDD LED (+)	Hard drive LED	13	Power LED (+)	
6	HDD LED (-)		14	Power LED (-)	
7	Ground	Reset button	15	Power button	
8	Reset control		16	Ground	

## SATA1~SATA4: Serial ATA 6.0 Gb/s Connectors

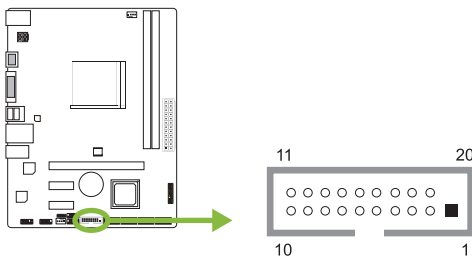
These connectors connect to SATA hard disk drives via SATA cables.



Pin	Assignment
1	Ground
2	TX+
3	TX-
4	Ground
5	RX-
6	RX+
7	Ground

## JFRONT\_USB3\_1: Header for USB 3.1 Gen1 (5Gb/s) Ports at Front Panel

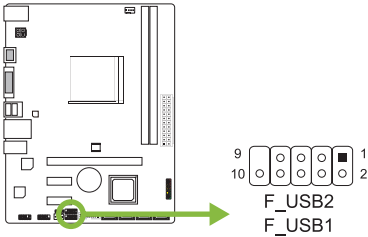
This header allows user to add additional USB ports on the PC front panel, and also can be connected with a wide range of external peripherals.



Pin	Assignment	Pin	Assignment
1	VBUS0	11	D2+
2	SSRX1-	12	D2-
3	SSRX1+	13	Ground
4	Ground	14	SSTX2+
5	SSTX1-	15	SSTX2-
6	SSTX1+	16	Ground
7	Ground	17	SSRX2+
8	D1-	18	SSRX2-
9	D1+	19	VBUS1
10	ID	20	Key

## F\_USB1/2: Header for USB 2.0 Ports at Front Panel

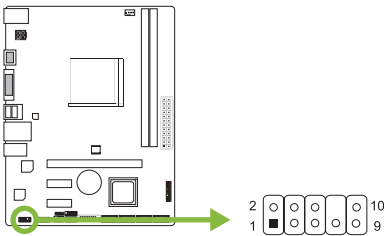
This header allows user to add additional USB ports on the PC front panel, and also can be connected with a wide range of external peripherals.



Pin	Assignment
1	+5V (fused)
2	+5V (fused)
3	USB-
4	USB-
5	USB+
6	USB+
7	Ground
8	Ground
9	Key
10	NC

## F\_AUDIO1: Front Panel Audio Header

This header allows user to connect the chassis-mount front panel audio I/O which supports HD and AC'97 audio standards.



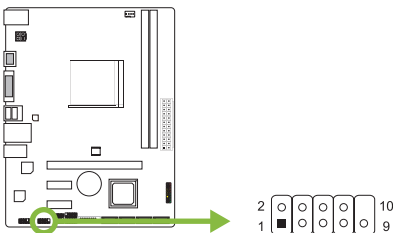
HD Audio		AC'97	
Pin	Assignment	Pin	Assignment
1	Mic Left in	1	Mic In
2	Ground	2	Ground
3	Mic Right in	3	Mic Power
4	GPIO	4	Audio Power
5	Right line in	5	RT Line Out
6	Jack Sense	6	RT Line Out
7	Front Sense	7	Reserved
8	Key	8	Key
9	Left line in	9	LFT Line Out
10	Jack Sense	10	LFT Line Out

### Note

- » It is recommended that you connect a high-definition front panel audio module to this connector to avail of the motherboard's high definition audio capability.
- » Please try to disable the "Front Panel Jack Detection" if you want to use an AC'97 front audio output cable. The function can be found via O.S. Audio Utility.

## J\_COM1: Serial Port Connector

The motherboard has a serial port header for connecting RS-232 Port.



Pin	Assignment
1	Carrier detect
2	Received data
3	Transmitted data
4	Data terminal ready
5	Signal ground
6	Data set ready
7	Request to send
8	Clear to send
9	Ring indicator
10	Key

## Chapter 3: UEFI BIOS & Software

### 3.1 UEFI BIOS Setup

- The BIOS Setup program can be used to view and change the BIOS settings for the computer. The BIOS Setup program is accessed by pressing the <DEL> key after the Power-On Self-Test (POST) memory test begins and before the operating system boot begins.
- For further information of setting up the UEFI BIOS, please refer to the UEFI BIOS Manual on our website.

### 3.2 BIOS Update

The BIOS can be updated using either of the following utilities:

- **BIOSTAR BIO-Flasher:** Using this utility, the BIOS can be updated from a file on a hard disk, a USB drive (a flash drive or a USB hard drive), or a CD-ROM.
- **BIOSTAR BIOS Update Utility:** It enables automated updating while in the Windows environment. Using this utility, the BIOS can be updated from a file on a hard disk, a USB drive (a flash drive or a USB hard drive), or a CD-ROM, or from the file location on the Web.

#### **BIOSTAR BIO-Flasher**

##### **Note**

- » *This utility only allows storage device with FAT32/16 format and single partition.*
- » *Shutting down or resetting the system while updating the BIOS will lead to system boot failure.*

Updating BIOS with BIOSTAR BIO-Flasher

1. Go to the website to download the latest BIOS file for the motherboard.
2. Then, copy and save the BIOS file into a USB flash (pen) drive. (Only supported FAT/FAT32 format)
3. Insert the USB pen drive that contains the BIOS file to the USB port.
4. Power on or reset the computer and then press <F12> during the POST process.

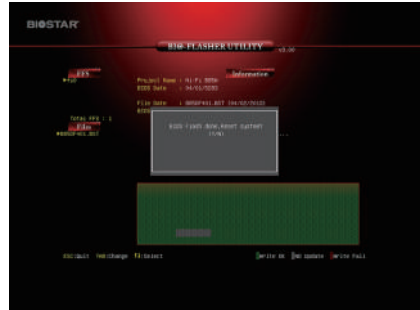
5. After entering the POST screen, the BIO-FLASHER utility pops out. Choose <fs0> to search for the BIOS file.



6. Select the proper BIOS file, and a message asking if you are sure to flash the BIOS file. Click “Yes” to start updating BIOS.



7. A dialog pops out after BIOS flash is completed, asking you to restart the system. Press the <Y> key to restart system.



8. While the system boots up and the full screen logo shows up, press <DEL> key to enter BIOS setup.

After entering the BIOS setup, please go to the <Save & Exit>, using the <Restore Defaults> function to load Optimized Defaults, and select <Save Changes and Reset> to restart the computer. Then the BIOS Update is completed.

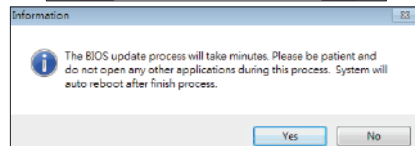
**BIOS Update Utility (through the Internet)**

1. Installing BIOS Update Utility from the DVD Driver.
2. Please make sure the system is connected to the internet before using this function.

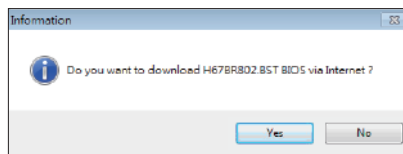
3. Launch BIOS Update Utility and click the “Online Update” button on the main screen.



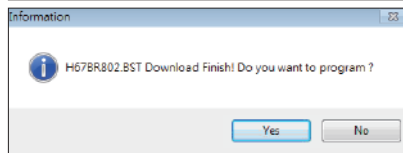
4. An open dialog will show up to request your agreement to start the BIOS update. Click “Yes” to start the online update procedure.



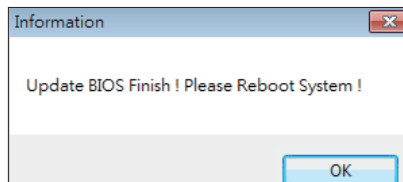
5. If there is a new BIOS version, the utility will ask you to download it. Click “Yes” to proceed.



6. After the download is completed, you will be asked to program (update) the BIOS or not. Click “Yes” to proceed.



7. After the updating process is finished, you will be asked you to reboot the system. Click “OK” to reboot.



8. While the system boots up and the full screen logo shows up, press <DEL> key to enter BIOS setup.

After entering the BIOS setup, please go to the <Save & Exit>, using the <Restore Defaults> function to load Optimized Defaults, and select <Save Changes> and <Reset> to restart the computer. Then, the BIOS Update is completed.

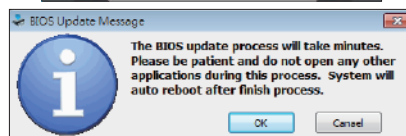
#### **BIOS Update Utility (through a BIOS file)**

1. Installing BIOS Update Utility from the DVD Driver.
2. Download the proper BIOS from <http://www.biostar.com.tw/>

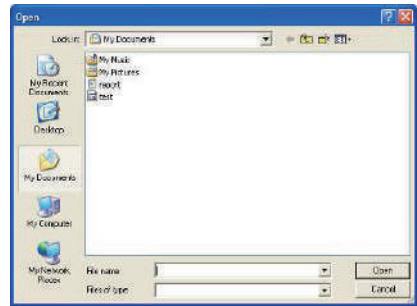
3. Launch BIOS Update Utility and click the “Update BIOS” button on the main screen.



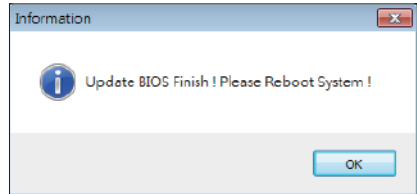
4. A warning message will show up to request your agreement to start the BIOS update. Click “OK” to start the update procedure.



5. Choose the location for your BIOS file in the system. Please select the proper BIOS file, and then click on “Open”. It will take several minutes, please be patient.



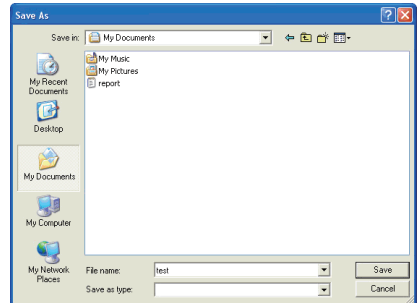
6. After the BIOS Update process is finished, click on “OK” to reboot the system.



7. While the system boots up and the full screen logo shows up, press <DEL> key to enter BIOS setup. After entering the BIOS setup, please go to the <Save & Exit>, using the <Restore Defaults> function to load Optimized Defaults, and select <Save Changes and Reset> to restart the computer. Then, the BIOS Update is completed.

### **Backup BIOS**

Click the Backup BIOS button on the main screen for the backup of BIOS, and select a proper location for your backup BIOS file in the system, and click “Save”.



## 3.3 Software

### Installing Software

1. Insert the Setup DVD to the optical drive. The driver installation program would appear if the Auto-run function has been enabled.
2. Select Software Installation, and then click on the respective software title.
3. Follow the on-screen instructions to complete the installation.

### Launching Software

After the installation process is completed, you will see the software icon showing on the desktop. Double-click the icon to launch it.

#### Note

- » All the information and content about following software are subject to be changed without notice. For better performance, the software is being continuously updated.
- » The information and pictures described below are for your reference only. The actual information and settings on board may be slightly different from this manual.

### BIOScreen Utility

This utility allows you to personalize your boot logo easily. You can choose BMP as your boot logo so as to customize your computer.



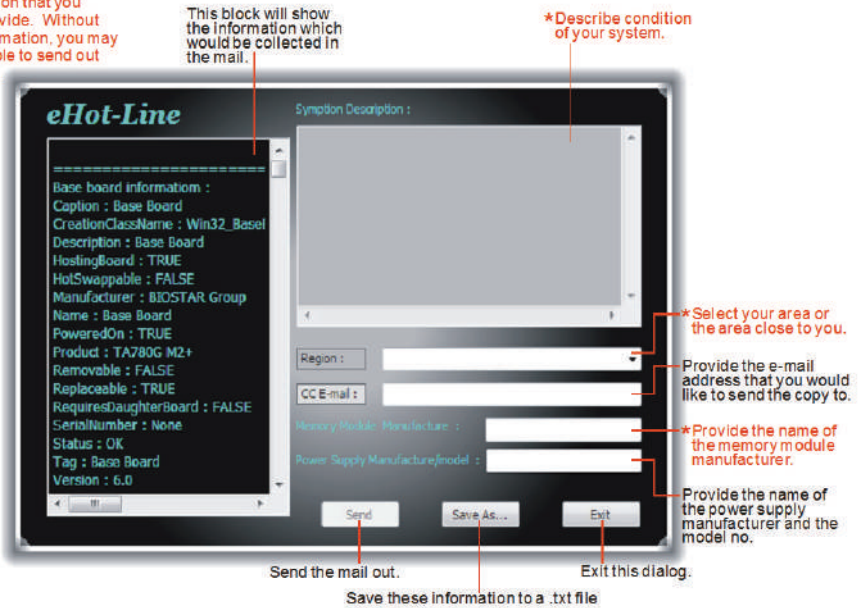
Please follow the step-by-step instructions below to update boot logo:

- Load Image: Choose the picture as the boot logo.
- Transform: Transform the picture for BIOS and preview the result.
- Update Bios: Write the picture to BIOS Memory to complete the update.

### eHot-Line

eHot-Line is a convenient utility that helps you to contact with our Tech-Support system. This utility will collect the system information which is useful for analyzing the problem you may have encountered, and then send these information to our tech-support department to help you fix the problem.

\* represents important information that you must provide. Without this information, you may not be able to send out the mail.



This block will show the information which would be collected in the mail.

\* Describe condition of your system.

\* Select your area or the area close to you.

Provide the e-mail address that you would like to send the copy to.

\* Provide the name of the memory module manufacturer.

Provide the name of the power supply manufacturer and the model no.

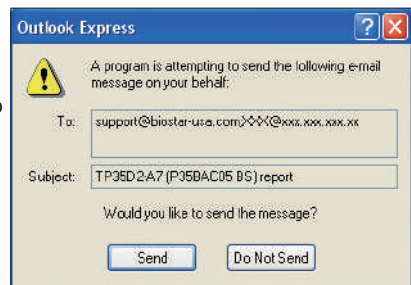
Send the mail out.

Save these information to a .txt file

Exit this dialog.

After filling up this information, click “Send” to send the mail out. A warning dialog would appear asking for your confirmation; click “Send” to confirm or “Do Not Send” to cancel.

If you want to save this information to a .txt file, click “Save As...” and then you will see a saving dialog appears asking you to enter file name.





## Chapter 4: Useful help

### 4.1 Driver Installation

After you installed your operating system, please insert the Fully Setup Driver DVD into your optical drive and install the driver for better system performance.

You will see the following window after you insert the DVD



The setup guide will auto detect your motherboard and operating system.

#### **A. Driver Installation**

To install the driver, please click on the Driver icon. The setup guide will list the compatible driver for your motherboard and operating system. Click on each device driver to launch the installation program.

#### **B. Software Installation**

To install the software, please click on the Software icon. The setup guide will list the software available for your system, click on each software title to launch the installation program.

#### **C. Manual**

Aside from the paperback manual, we also provide manual in the Driver DVD. Click on the Manual icon to browse for available manual.

---

#### **Note**

- » *If this window didn't show up after you insert the Driver DVD, please use file browser to locate and execute the file SETUP.EXE under your optical drive.*
  - » *You will need Acrobat Reader to open the manual file. Please download the latest version of Acrobat Reader software from <http://get.adobe.com/reader/>*
-

## 4.2 AMI BIOS Beep Code

### Boot Block Beep Codes

Number of Beeps	Description
Continuing	Memory sizing error or Memory module not found

### POST BIOS Beep Codes

Number of Beeps	Description
1	Success booting.
8	Display memory error (system video adapter)

## 4.3 Troubleshooting

Probable	Solution
1. There is no power in the system. Power LED does not shine; the fan of the power supply does not work. 2. Indicator light on keyboard does not shine.	1. Make sure power cable is securely plugged in. 2. Replace cable. 3. Contact technical support.
System is inoperative. Keyboard lights are on, power indicator lights are lit, and hard drives are running.	Using even pressure on both ends of the DIMM, press down firmly until the module snaps into place.
System does not boot from a hard disk drive, but can be booted from optical drive.	1. Check cable running from disk to disk controller board. Make sure both ends are securely plugged in; check the drive type in the standard CMOS setup. 2. Backing up the hard drive is extremely important. All hard disks are capable of breaking down at any time.
System only boots from an optical drive. Hard disks can be read, applications can be used, but system fails to boot from a hard disk.	1. Back up data and applications files. 2. Reformat the hard drive. Re-install applications and data using backup disks.
Screen message shows "Invalid Configuration" or "CMOS Failure."	Review system's equipment. Make sure correct information is in setup.
System cannot boot after user installs a second hard drive.	1. Set master/slave jumpers correctly. 2. Run SETUP program and select correct drive types. Call the drive manufacturers for compatibility with other drives.

### **CPU Overheated**

If the system shutdown automatically after power on system for seconds, that means the CPU protection function has been activated.

When the CPU is over heated, the motherboard will shutdown automatically to avoid a damage of the CPU, and the system may not power on again.

In this case, please double check:

1. The CPU cooler surface is placed evenly with the CPU surface.
2. CPU fan is rotated normally.
3. CPU fan speed is fulfilling with the CPU speed.

After confirmed, please follow steps below to relief the CPU protection function.

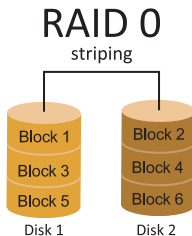
1. Remove the power cord from power supply for seconds.
2. Wait for seconds.
3. Plug in the power cord and boot up the system.

Or you can:

1. Clear the CMOS data. (See “Close CMOS Header: JCMOS1” section)
2. Wait for seconds.
3. Power on the system again.

## **4.4 RAID Functions**

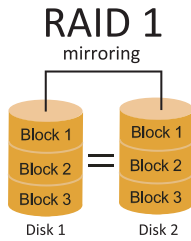
### **RAID Definitions**



In a RAID 0 system data are split up in blocks that get written across all the drives in the array. By using multiple disks (at least 2) at the same time, this offers superior I/O performance. This performance can be enhanced further by using multiple controllers, ideally one controller per disk.

### **Features and Benefits**

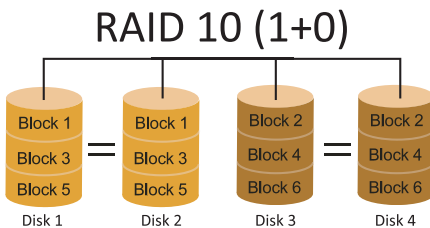
- Drives: Minimum 2, and maximum is up to 6 or 8. Depending on the platform.
- Uses: Intended for non-critical data requiring high data throughput, or any environment that does not require fault tolerance.
- Benefits: provides increased data throughput, especially for large files. No capacity loss penalty for parity.
- Drawbacks: Does not deliver any fault tolerance. If any drive in the array fails, all data is lost.
- Fault Tolerance: No.
- Total Capacity: (Minimal. HDD Capacity) x (Connected HDDs Amount)



Data are stored twice by writing them to both the data disk (or set of data disks) and a mirror disk (or set of disks). If a disk fails, the controller uses either the data drive or the mirror drive for data recovery and continues operation. You need at least 2 disks for a RAID 1 array.

### Features and Benefits

- Drives: Minimum 2, and maximum is 2.
- Uses: RAID 1 is ideal for small databases or any other application that requires fault tolerance and minimal capacity.
- Benefits: Provides 100% data redundancy. Should one drive fail, the controller switches to the other drive.
- Drawbacks: Requires 2 drives for the storage space of one drive. Performance is impaired during drive rebuilds.
- Fault Tolerance: Yes.



RAID 10 combines the advantages (and disadvantages) of RAID 0 and RAID 1 in one single system. It provides security by mirroring all data on a secondary set of disks (disk 3 and 4 in the drawing below) while using striping across each set of disks to speed up data transfers.

### Features and Benefits

- Drives: Minimum 4, and maximum is 6 or 8, depending on the platform.
- Benefits: Optimizes for both fault tolerance and performance, allowing for automatic redundancy. May be simultaneously used with other RAID levels in an array, and allows for spare disks.
- Drawbacks: Requires twice the available disk space for data redundancy, the same as RAID level 1.
- Fault Tolerance: Yes.