RX110H

Intel® Sky Lake (6th gen i7/i5/i3)/
Kaby Lake (7th gen i7/i5/i3)
Micro-ATX Mainboard

BCM P/N: 71172 ONLY

User's Manual

Edition 1.00 – Feb, 2017

FCC Statement

THIS DEVICE SUPPORTS PART 15 FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS:

(1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE.

(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 "A" DIGITAL DEVICE, PURSUANT TO PART 15 OF THE FCC RULES.

THESE LIMITS ARE DESIGNED TO PROVIDE REASONABLE PROTECTION AGAINST HARMFUL INTERFERENCE WHEN THE EQUIPMENT IS OPERATED IN A COMMERCIAL ENVIRONMENT. THIS EQUIPMENT GENERATES, USES, AND CAN RADIATE RADIO FREQUENCY ENERGY AND, IF NOT INSTATLLED AND USED IN ACCORDANCE WITH THE INSTRUCTION MANUAL, MAY CAUSE HARMFUL INTERFERENCE TO RADIO COMMUNICATIONS.

OPERATION OF THIS EQUIPMENT IN A RESIDENTIAL AREA IS LIKELY TO CAUSE HARMFUL INTERFERENCE IN WHICH CASE THE USER WILL BE REQUIRED TO CORRECT THE INTERFERENCE AT HIS OWN EXPENSE.

Notice

This guide is designed for experienced users to setup the system within the shortest time. For detailed information, please always refer to the electronic user's manual.

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If you still cannot find the answer, gather all the information or questions that apply to your problem, and with the product close at hand, call your dealer. Our dealers are well trained and ready to give you the support you need to get the most from your BCM products. In fact, most problems reported are minor and are able to be easily solved over the phone.
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Product Warranty

BCM warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by BCM, or which have been subject to misuse, abuse, accident or improper installation. BCM assumes no liability under the terms of this warranty as a consequence of such events. Because of BCM high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If any of BCM products is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details. If you think you have a defective product, follow these steps:

1. Collect all the information about the problem encountered. (For example, CPU type and speed, BCM products model name, hardware & BIOS revision number, other hardware and software used, etc.) Note anything abnormal and list any on-screen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information available.
3. If your product is diagnosed as defective, obtain an RMA (return material authorization) number from your dealer. This allows us to process your good return more quickly.
4. Carefully pack the defective product, a complete Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.

Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Manual Objectives

This manual describes in detail the BCM RX110H mainboard.

We strongly recommend that you study this manual carefully before attempting to interface with the motherboard or change the standard configurations. Whilst all the necessary information is available in this manual we would recommend that unless you are confident, you contact your supplier for guidance.

Please be aware that it is possible to create configurations within the CMOS RAM that make booting impossible. If this should happen, clear the CMOS settings, (see the description of the Jumper Settings for details).

If you have any suggestions or find any errors concerning this manual and want to inform us of these, please contact our Customer Service department with the relevant details.

Safety Precautions

Warning!

Always completely disconnect the power cord from your chassis whenever you work with the hardware. Do not make connections while the power is on. Sensitive electronic components can be damaged by sudden power surges. Only experienced electronics personnel should open the PC chassis.

Caution!

Always ground yourself to remove any static charge before touching the mainboard. Modern electronic devices are very sensitive to static electric charges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components in a static-dissipative surface or static-shielded bag when they are not in the chassis.

Document Amendment History

Revision	Date	Comment
1st (1.00)	Feb, 2017	Initial Release

Contents

Mainboard Specifications

Model	RX110H
Processor	Intel® 6th Generation LGA1151 core i3, Core i5, Core i7 (Sky Lake) Intel® 7th Generation LGA1151 core i3, Core i5, Core i7 (Kaby Lake) Note: BCM P/N: 71172 ONLY
Chipset	Intel® H110
Memory	2 x 288Pin DIMM sockets support Non-ECC, Un-buffered DDR4 memory module (PC4-17000) 2133 MHz up to 32GB (16GB maximum/slot)
Display	Intel® Integrated Graphic (CPU Dependent) 1 x DVI-D port 2 x Display port
SATA	4 x SATA III connectors
Expansion Slots	1x PCIe x16 Slot
	3x PCIe x1 Slot
USB	6 x USB 2.0 ports (4 @ 2x Header, 2 @ Rear I/O)
	4 x USB 3.0 ports (2 @ 1x Header, 2 @ Rear I/O)
Super I/O Controller	Nuvoton® NCT6106D
Serial Ports	1 x RS232/RS422/RS485 port (Rear I/O, Selectable through BIOS, with 5V/12V/RI selection jumper,) 5 x RS232 Ports (Header, with 5V/12V/RI selection jumper)
LPT	1 x LPT header
Watch Dog Timer	1 ~ 255 sec timer
HW Monitor	Yes
Audio	Realtek® ALC887
LAN	1 x 10/100/1000 LAN (Intel® i219-V PHY Gigabit LAN)
	1 x 10/100/1000 LAN (Intel® i211-AT PCIe Gigabit LAN)
DIO	8 Bit
BIOS	AMI® UEFI BIOS
	AMI BIOS with 16MB (128Mbit) SPI ROM
Onboard I/O Headers	
SATA	4 x Std. SATA III Connectors
USB	2 x USB2.0 Headers (2 ports on each header)
	1 x USB3.0 Header (2 ports on each header)

RS232	**5 x Headers**
LPT	**1 x Header**
Front Audio	**1 x Header**
Amplifier	**1 x Header**
Front Panel	**1 x Header**
Fan Header	**3 x Headers (4-pins)**
GPIO	**1 x Header**
Onboard Jumpers	
COM Port Ring-In/ Power Select	**5 x Headers provide selection of "Ring-In", or "12V" or "5V" on RS232 COM port**
AT/ATX Select	**1 x Header**
Clear CMOS	**1 x Header**
USB Port Power Setting	**5 x Header provide selection of 5V or 5VSB**
GPIO Input/ Output Power Select	**1 x Header provide selection of 12V or 5V**
GPIO Signal Pull-High/ Pull-Low Selection	**1 x Header provide selection of "Pull-High to 3V" or "Pull-Low to Ground"**
Rear I/O Panel	
PS/2	**1x PS/2 Keyboard Connector** **1 x PS/2 Mouse Connector**
DVI	**1 x DVI-D Connector**
DP (Display Port)	**2 x DP Connector**
USB3.0	**2x Stack up USB3.0 Connector (Blue)**
USB2.0	**2x Stack up USB2.0 Connector (Black)**
LAN	**2 x RJ45 Connector**
Audio	**1 x Line-In**
	1 x Line-Out
	1 x Mic-In
Power & Connector	
	1 x 24 pin ATX Connector (AC)
	1 x 4 pin ATX 12V Connector
Form Factor	
	uATX 9.6" x 9.6"

Chapter 1: System Setup

This chapter describes the mainboard features and the new technologies it supports

1.1 Welcome!

The mainboard delivers a host of new features and latest technologies, making it another line of BCM long life mainboards! Before you start installing the mainboard, and hardware devices on it, check the items in your package with the list below.

If any of the items listed below is damaged of missing, please contact with your vendor.

1.2 Packing Contents

- **Mainboard**
  - **1 x RX110H**

- **Cable**
  - **2 x SATA Power Cable**

- **Accessories**
  - **1 x RX110H I/O Shield**

1.3 Special Features

1.3.1 Product Highlights

• The 6th/ 7th Generation Intel® i7/i5/i3 LGA1151 Processor Support (BCM P/N: 71172 ONLY)

This mainboard supports the 6th generation Intel® i7/i5/i3 processors (Sky Lake) & 7th generation Intel® i7/i5/i3 processors (Kaby Lake) in the LGA1151 package.

• Intel® H110 Express Chipset

The Intel® H110 PCH provides all business with more effective costs management, safer computing environment, and deploys more responsive PCs.

• DDR4 Memory Support

The mainboard supports DDR4 memory that features data transfer rate up to 2133MHz to meet the higher bandwidth requirements of the latest 3D graphics, multimedia, and Internet applications.

• High Definition Audio

The mainboard came with the Realtek ALC887 high-definition audio CODEC that lets you enjoy high quality audio without having to buy advanced sound cards.

• PCI-E x16 support

The PCI-E x16 VGA interface specification enhances graphics performance with high bandwidth (PCIEX16 slot only).

• USB 3.0 Technology

The mainboard implements the Universal Serial Bus (USB) 3.0.

• Trusted Platform Module (TPM) Support (Optional)

By combining the onboard TPM 1.2 with TPM security software (provided by the third party), it will enhance the security level of the system.

• PRECAUTION: When TPM is enabled and utilized through TPM software, there is possibility that the encrypted data will not be accessible, or recoverable if one of the following situations occurred:

1. Lost of TPM password.

2. System or board failure, or being replaced.

3. Hard Drive failure.

1.4 Before you proceed

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

- **Unplug the power cord from the wall socket before touching any component inside the system.**
- **Use a grounded wrist strap or touch a safely grounded object or to a metal object, such as the power supply case, before handling components to avoid damaging them due to static electricity.**
- **Hold peripherals by the edges to avoid touching the ICs on them.**
- **Whenever you uninstall any peripheral, place it on a grounded antistatic pad or on the bag that came with the peripheral.**
- **Before you install or remove any peripheral, ensure that the power supply is switched off or the power cord is detached from the power supply. Failure to do so may cause severe damage to the mainboard, peripherals, and/or components.**

1.5 Mainboard Overview

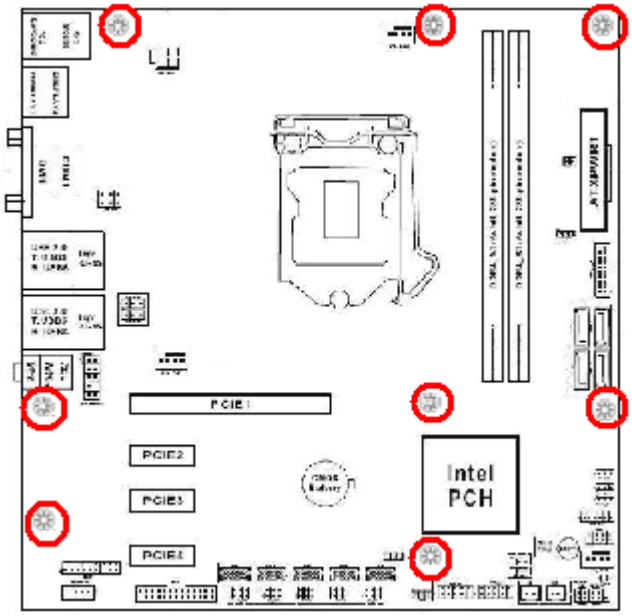
Before you install the mainboard, study the configuration of your chassis to ensure that the mainboard fits into it.

Make sure to unplug the power cord before installing or removing the mainboard. Failure to do so can cause you physical injury and damage mainboard components.

1.5.1 Mounting Holes

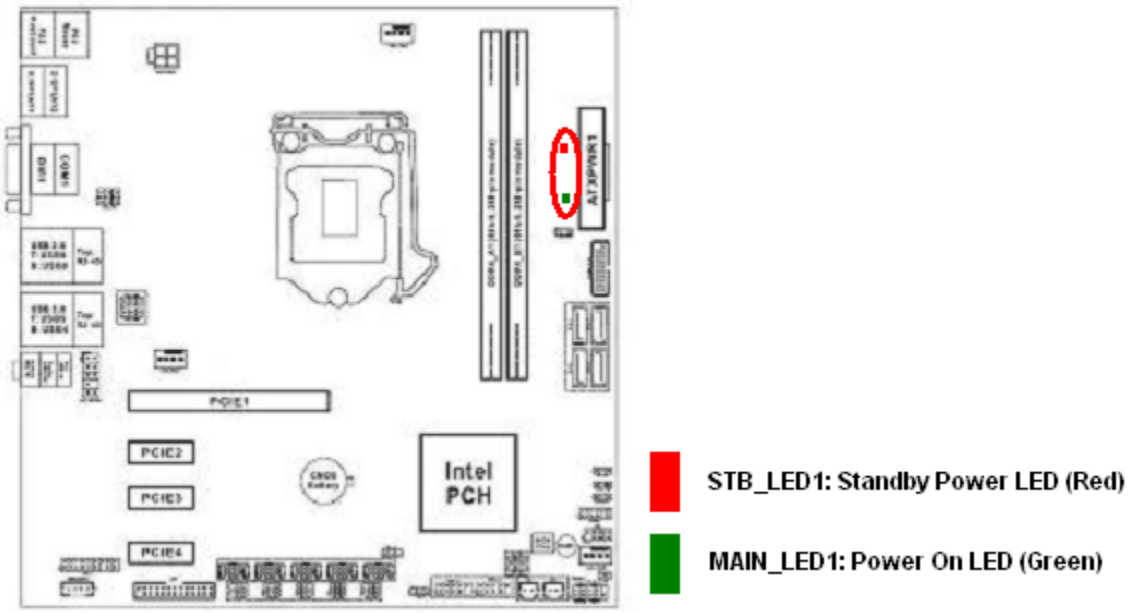
Place the screws into the mounting holes indicated by red circles (shown in the picture below) to secure the mainboard to the chassis.

Do not over-tighten the screws! Doing so may damage the mainboard.

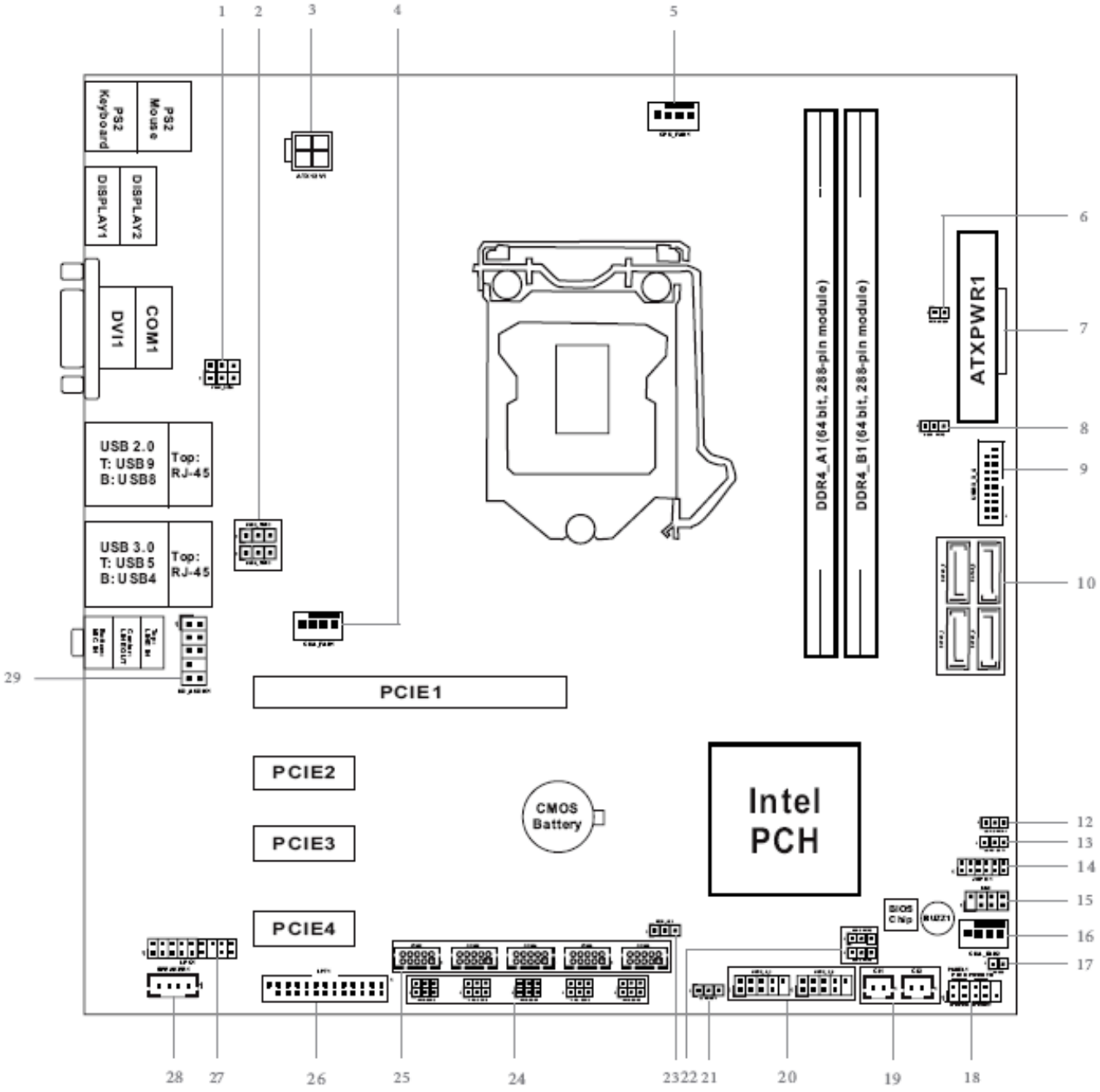


1.5.2 Onboard LEDs

The mainboard comes with a “Power On LED” (green) and one “Standby Power LED” (red) to indicate the system status. When the “Standby Power LED” lights on: It means the system is either in the standby state, or the power cable is still connected to the power source. The “Power On LED” lights on/off to indicate that the system status, in sleep mode, or in soft-off mode. This is a reminder that you should shut down the system and unplug the power cable before removing or plugging in any mainboard component. The illustration below shows the locations of onboard LEDs.



1.5.3 Mainboard Layout



1.5.4 Layout Content List

• 1.5.4.1 Slots

Label	Function	Note	Page
DDR4_A1	288-pin DDR4 DIMM slot A1	1. If there is only one memory module being installed in the system, install it on this slot.	21
DDR4_B1	288-pin DDR4 DIMM slot B1		21
PCIE1	PCI Express x16 slot		41
PCIE2	PCI Express x1 slot		41
PCIE3	PCI Express x1 slot		41
PCIE4	PCI Express x1 slot		41

• 1.5.4.2 Internal Jumpers

Label	Function	Note	Page
CLRMOS1	Clear CMOS	3 x 1 header, pitch 2.54mm	38
PWR_JP1	AT/ATX Power Select	3 x 1 header, pitch 2.54mm	39
PWR_COM1	COM1 RI (default)/ +5V/ +12V Select	3 x 2 header, pitch 2.54mm	35
USB2_PWR1 (For USB2.0 Port “USB2_89”)	Rear I/O USB 2.0 Ports Power Select: +5V/ +5VSB (default)	3 x 1 header, pitch 2.54mm	35
USB3_PWR1 (For USB3.0 Port “USB3_45”)	Rear I/O USB 3.0 Ports Power Select: +5V/ +5VSB (default)	3 x 1 header, pitch 2.54mm	35
USB3_PWR2 (For USB3.0 Port “USB3_3_4”)	USB 3.0 Header Power Select: +5V (default) / +5VSB	3 x 1 header, pitch 2.54mm	36
USB2_PWR2 (For USB2.0 Port “USB2_0_1”)	USB 2.0 Ports Power Setting Jumpers: +5V/ +5VSB (default)	3 x 1 header, pitch 2.54mm	39
USB2_PWR3 (For USB2.0 Port “USB2_2_3”)	USB 2.0 Ports Power Setting Jumpers: +5V/ +5VSB (default)	3 x 1 header, pitch 2.54mm	39

JGPIO_PWR1	GPIO Input/ Output Power Select: +5V (default) / +12V	3 x 1 header, pitch 2.54mm	36
JGPIO_SET1	GPIO Signals Pull-High/ Pull-Low Select: Pull-High to +3V (default)/ Pull-Low to Ground	3 x 1 header, pitch 2.54mm	37
PWR_COM2, PWR_COM3, PWR_COM4, PWR_COM5, PWR_COM6	COM2/3/4/5/6 Pin#9 Power Setting Jumper: RI (default)/ +5V/ +12V Select	3 x 2 header, pitch 2.54mm	40

• 1.5.4.3 Internal Headers

Label	Function	Note	Page
ATX12V1	4-Pin ATX Power Connector	2 x 2 header	24
ATXPWR1	24-Pin ATX Power Connector	12 x 2 header	24
CPU_FAN1	CPU Fan Connector	4 x 1 wafer, Pitch 2.54mm	29
CHA_FAN1	System Fan Connector 1	4 x 1 wafer, Pitch 2.54mm	29
CHA_FAN2	System Fan Connector 2	4 x 1 wafer, Pitch 2.54mm	29
SATA3_1, SATA3_2, SATA3_3, SATA3_4	Serial ATA 3.0 Connectors 1~4	7-pin header	27
USB3_3_4	USB3.0 Header (2 Ports)	10 x 2 wafer, pitch 2.00mm	27
USB2_0_1, USB2_2_3	USB2.0 Headers (2 Ports/ Header)	5 x 2 header, pitch 2.54mm	31
JGPIO1	Digital Input/ Output Header:	6 x 2 header, pitch 2.00mm	28
BUZZ2	External Buzzer Connector	2 x 1 header, pitch 2.54mm	30
PANEL1	System Panel Header	5 x 2 header, pitch 2.54mm	30
CI1, CI2	Chassis Intrusion Headers	2 x 1 wafer, pitch 2.54mm	31
COM2, COM3, COM4, COM5, COM6	COM2, COM3, COM4, COM5, COM6 Headers (RS232 ONLY)	5 x 2 wafer, pitch 2.00mm	32

LPT1	LPT Port Header	13 x 2 wafer, pitch 2.00mm	32
SPEAKER1	3W Audio AMP Output	4 x 1 wafer, pitch 2.00mm	33
HD_AUDIO1	Front Panel Audio Header	5 x 2 header, pitch 2.54mm	34

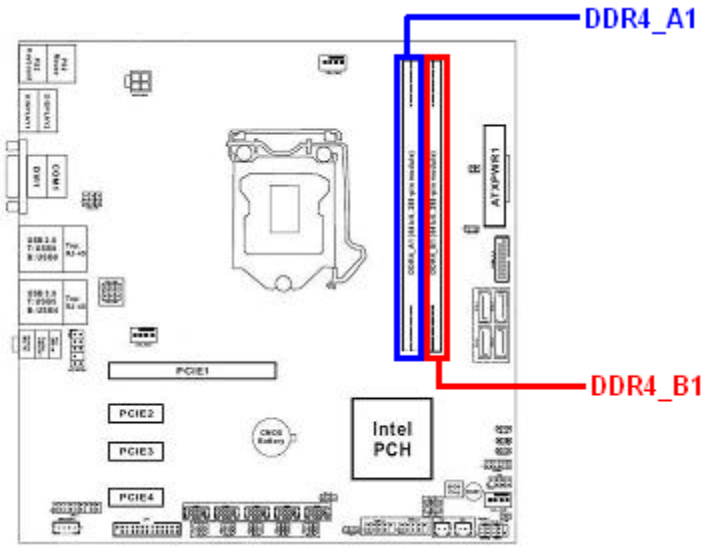
• 1.5.4.4 Back Panel Connectors

Label	Function	Note	Page
PS2_KBMS1	PS/2 Mouse Connector	PS/2 Mouse Connection.	25
DP1	Display Port 1	This port provides Display Port Connection.	25
COM1	Serial COM Port 1	This port provides serial port connection. (RS232 (default), RS422, RS485 Selection available under BIOS)	25
LAN1, LAN2	Gigabit LAN RJ-45 Connector 1/2		25
Audio	Lin-in Port (Light Blue)	This port connects a tape, CD, DVD player, or other audio sources.	25
Audio	Line-out Port (Green)	This port connects a headphone or a speaker.	26
Audio	Microphone Port (Pink)	This port connects a microphone.	26
USB3_45	USB3.0 Connectors	These two Universal Serial Bus (USB) ports are available for connecting USB 3.0 devices.	26
USB2_89	USB2.0 Connectors	These two Universal Serial Bus (USB) ports are available for connecting USB2.0 devices.	26
DVI1	DVI Video Port	This port provides DVI-D (Display Visual Interface) display connection.	26
DP2	Display Port 2	This port provides Display Port connection.	26
KBMS	PS/2 Keyboard Connector	PS/2 Keyboard connection.	26

1.6 System Memory

1.6.1 Overview

The mainboard provides two 288-pin DDR4 (Double Data Rate 4) DIMM slots, and supports Dual Channel Memory Technology.



1.6.2 Memory Configurations

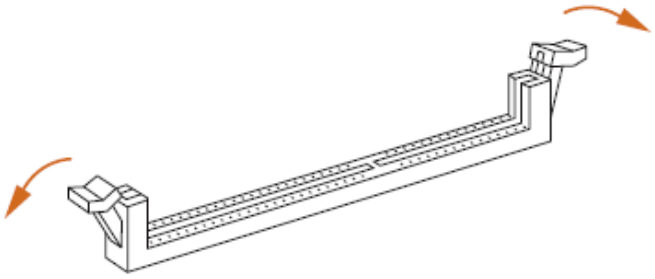
You may ONLY install 288-pin Non-ECC, Un-buffered DDR4 memory module (PC4-17000) 2133 MHz up to 32GB (16GB maximum/slot) on this board.

- **When there is only one DDR4 memory module to be installed, install it on "DDR4_A1" slot ONLY.**
- **In dual-channel configuration, install only identical (same brand, same model, same speed, and same chip-type) DDR4 memory modules; one installed at socket "DDR4_A1", the other installed at socket "DDR4_B1".**
- **Always install DIMMs with the same CAS latency. It is recommended that you obtain the exact same model (and same batch) of memory modules from the same vendor.**
- **It is not allowed to install DDR, DDR2, or DDR3 memory module on this board. Doing so may damage the mainboard.**
- **The DIMM module only fits in one correct orientation. It will cause damage to the mainboard and the DIMM module if you force the DIMM module into the memory slot at incorrect orientation.**

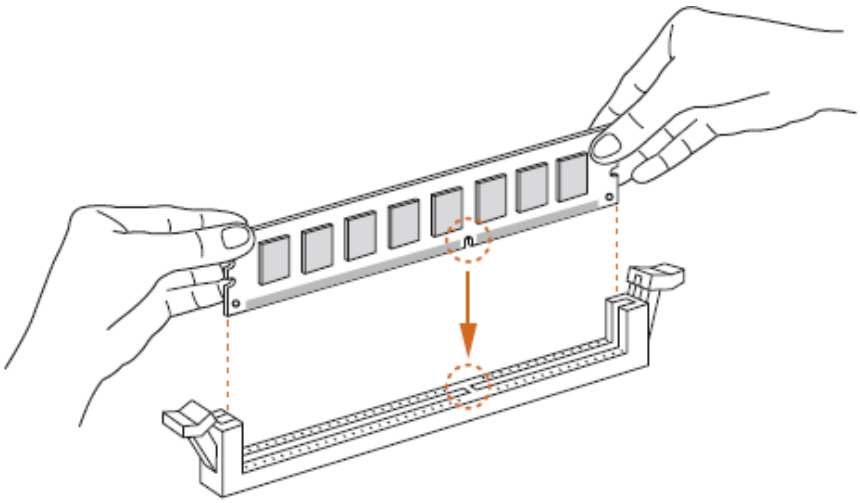
1.6.3 Installing the DDR4 DIMM

Make sure to unplug the power supply before adding or removing DIMMs or other peripherals from the system. Failure to do so may cause severe damage to both the mainboard and the peripherals.

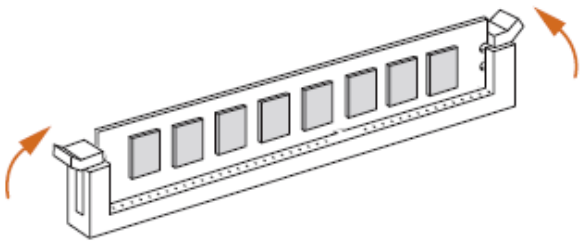
1. Unlock a DIMM socket by pressing the retaining clips outward.



2. Align a DIMM on the socket such that the notch on the DIMM matches the break on the socket.



3. Firmly insert the DIMM into the socket until the retaining clips snap back in place and the DIMM is properly seated.

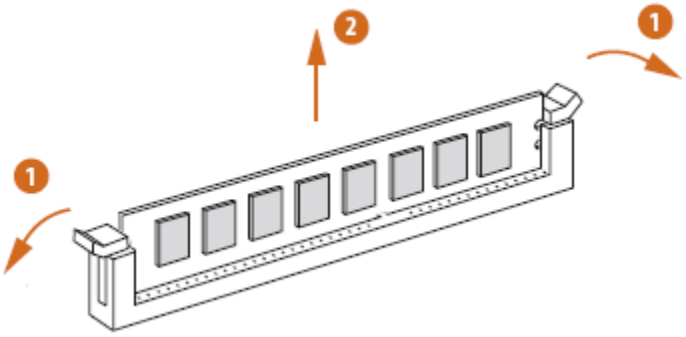


1. **A DDR4 memory module is keyed with a notch so that it fits in only one direction.**
2. **DO NOT force the memory module into the socket in order to avoid damage the memory module and the slot.**
3. **DDR4 memory modules are not interchangeable with DDR, DDR2, or DDR3.**
4. **DDR4 standard IS NOT backward compatible.**

1.6.4 Removing the DDR4 DIMM

Follow these steps to remove a DIMM.

1. Simultaneously press the retaining clips outward to unlock the DIMM.



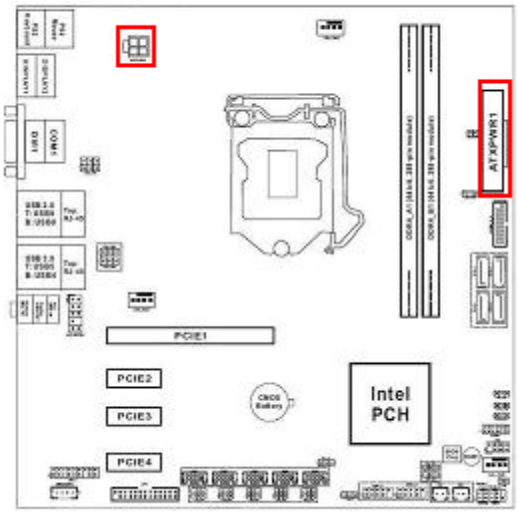
2. Remove the DIMM from the socket.

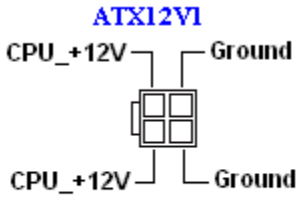
1.7 Power Supply

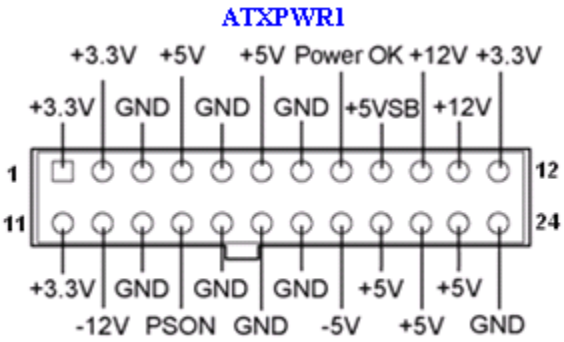
1.7.1 ATX Power Connectors: ATXPWR1, ATX12V1

These ATX power connectors provide connections from power supply unit (PSU) to the mainboard. Both connectors need to be installed in order for the mainboard to function properly. The power supply plugs are designed to fit with these ATX power connectors in one orientation only. To connect these power supply plugs; find the proper orientation first, and then push down the power supply plugs firmly until the connectors are completely fit.

If you'd like to use the 20-pin ATX power supply, please align the 20-pin power connector from PSU to pin 1 & pin 13 of "EATXPWR1". There is also a foolproof design on pin 11, 12, 23, & 24 to avoid wrong installation.



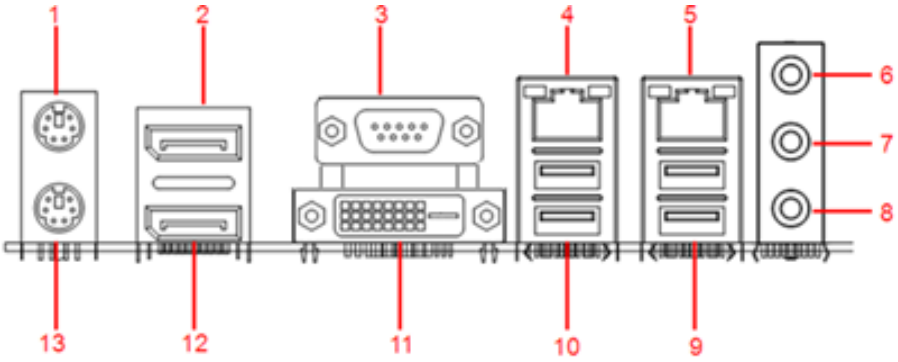


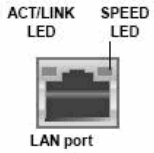


1. **It is recommended that you use a power supply unit (PSU) that complies with ATX 12V specification 2.0 (or later version), and provides a minimum power of 500W. If you are planning to fully loaded the slots and/or use a PCI-E x16 graphic card, a power supply with minimum power of 600W or more might be needed.**
2. **Do not forget to connect the 4-pin "ATX12V1" power plug; otherwise, the system will not boot.**
3. **Use of a PSU with a higher power output is recommended when configuring a system with more power-consuming devices. The system may become unstable or may not boot if the power supply is inadequate.**

1.8 Back Panel

1.8.1 Back Panel Connectors



Item	Name	Function	Description
1	PS2_KBMS1	PS/2 Mouse Connector	PS/2 Mouse Connection.
2	DP1	Display Port 1	This port provides Display Port connection.
3	COM1	Serial COM Port 1	This port provides serial port connection. (RS232 (default), RS422, RS485 Selection available under BIOS)
4/5	LAN1/ LAN2	Gigabit LAN (RJ-45) Connectors 	This port allows Gigabit connection to a Local Area Network (LAN) through a network hub. Refer to the table below for the LAN port LED indications.
6	AUDIO	Line-in port (Light blue)	This port connects a tape, CD, DVD player, or other audio sources.

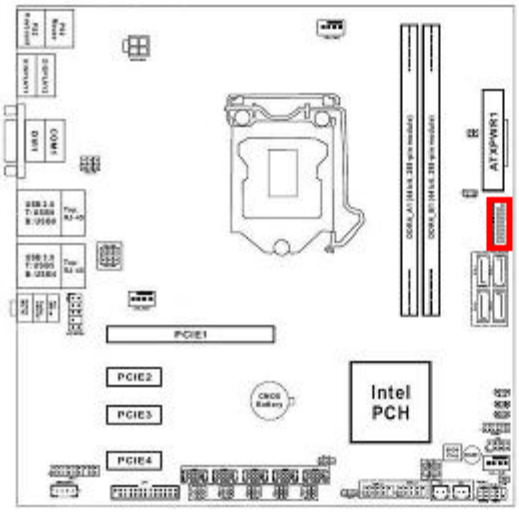
ACT/Link LED		Speed LED	
Status	Description	Status	Description
OFF	No link	OFF	10Mbps connection
ON	Linked	Orange	100Mbps connection
Blinking	Data activity	Green	1Gbps connection

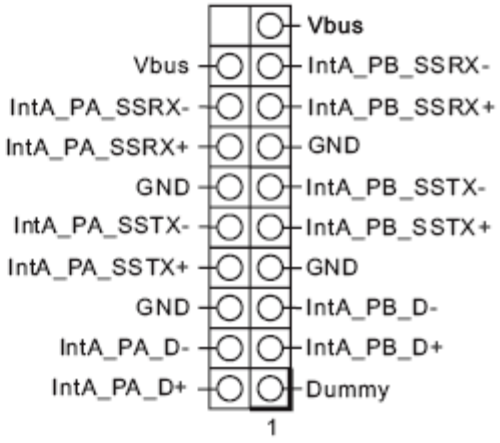
7	AUDIO	Line-out port (Green)	This port connects a headphone or a speaker.
8	AUDIO	Microphone port (Pink)	This port connects a microphone.
9	USB3_45	USB 3.0 Connectors	These two Universal Serial Bus (USB) ports are available for connecting USB 3.0 devices.
10	USB2_89	USB 2.0 Connectors	These two 4-pin Universal Serial Bus (USB) ports are available for connecting USB 2.0 devices.
11	DVI1	DVI Video Port	This port provides DVI-D (Display Visual Interface) display connection.
12	DP2	Display Port 2	This port provides Display Port connection.
13	KBMS	PS/2 Keyboard Connector	PS/2 keyboard Connection.

1.9 Connectors/ Headers

1.9.1 USB3.0 Header: USB3_3_4

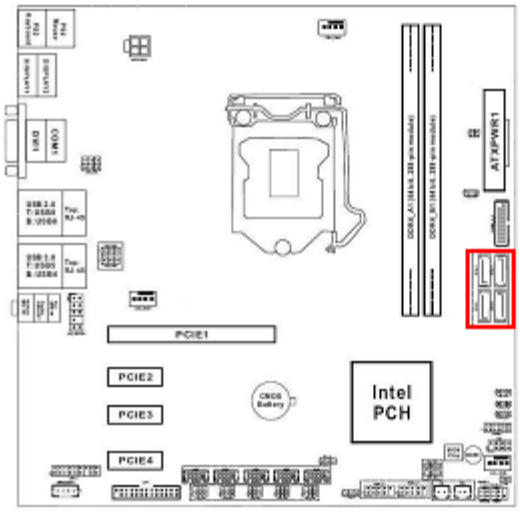
The internal USB3.0 header (Provides two USB3.0 ports).





1.9.2 Serial ATA 3.0 Connectors: SATA3_1, SATA3_2, SATA3_3, SATA3_4

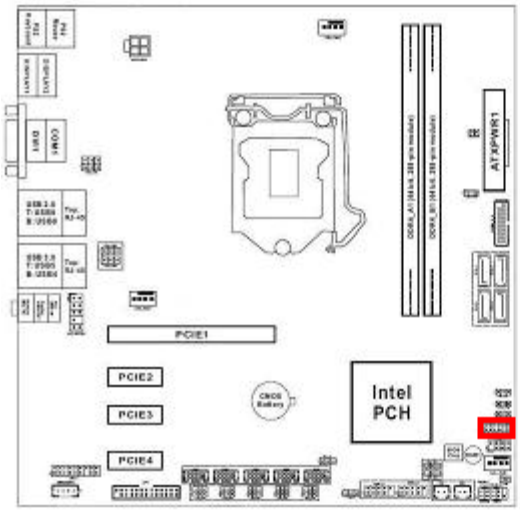
SATA ports “SATA3_1”, “SATA3_2”, “SATA3_3”, “SATA3_4” support SATA3.0 standard.



Please do not fold the Serial ATA cable into 90-degree angle, data loss may occur during data transmission.

1.9.3 Digital Input/ Output Header: JGPIO1

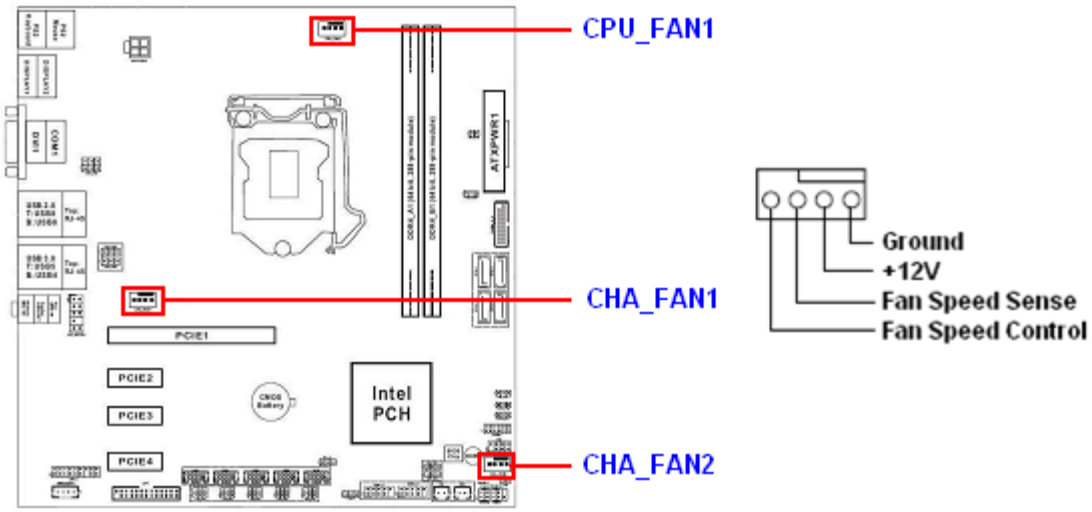
This header provides 8-bit GPIO connections to external device. Customer can write the monitoring program to monitor the status of external device connected with this header.



PIN	Signal Name	PIN	Signal Name	PIN	Signal Name	PIN	Signal Name	PIN	Signal Name	PIN	Signal Name
2	PCH_ GPP_C16	4	PCH_ GPP_C17	6	PCH_ GPP_C18	8	PCH_GPP_ C19	10	SMB_ DATA	12	GND
1	PCH_ GPP_C20	3	PCH_ GPP_C21	5	PCH_ GPP_C22	7	PCH_GPP_ C23	9	SMB_CLK	11	JGPIO_ PWR1

1.9.4 CPU & System Fan Connectors: CPU_FAN1, CHA_FAN1, CHA_FAN2

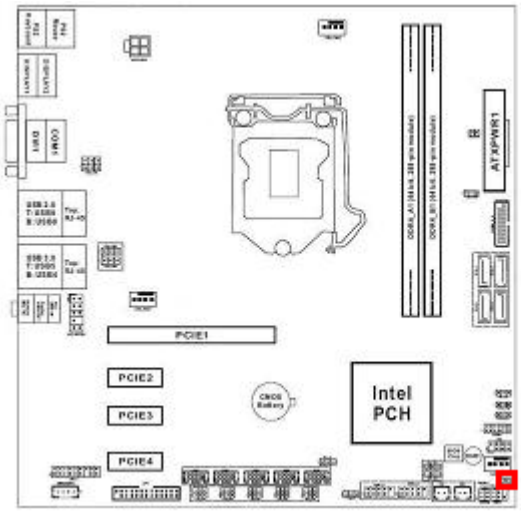
The fan power connectors support system cooling fan with +12V. When connecting the wire to these fan connectors, please note that the red wire is designated as “Power” and should be connected to “+12V” pin; the black wire is designated as “Ground” and should be connected to “GND”. In order to take the advantage of System Hardware Monitor and Smartfan feature, be sure to use the fan which is specifically designed with speed sensor.



Please refer to the recommended CPU fans at processor’s official website or consult with the fan vendor for selection of proper CPU cooling fan.

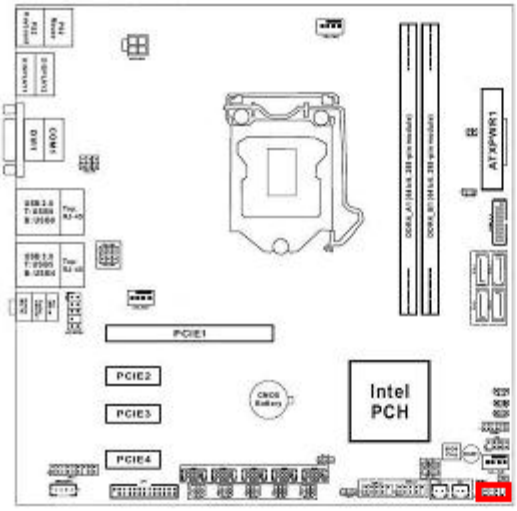
1.9.5 External Buzzer Connector: BUZZ2

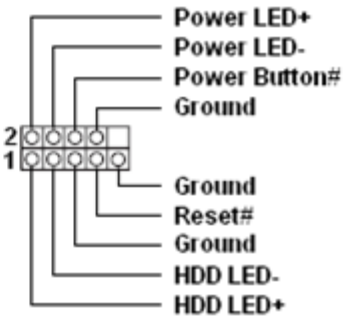
This header provides connection to external buzzer on chassis.



1.9.6 System Panel Header: PANEL1

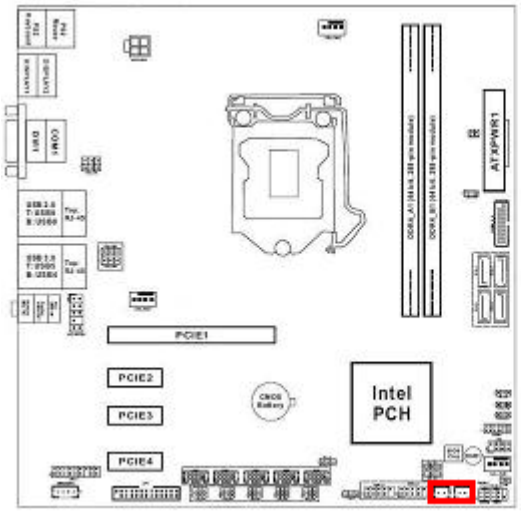
This header provides front panel connections (Power button, Reset button, Power LED, HDD LED) on chassis.

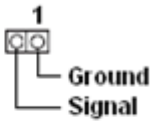




1.9.7 Chassis Intrusion Headers: CI1, CI2

Two chassis instruction headers, choose the one that matches with the chassis intrusion connection in the chassis.



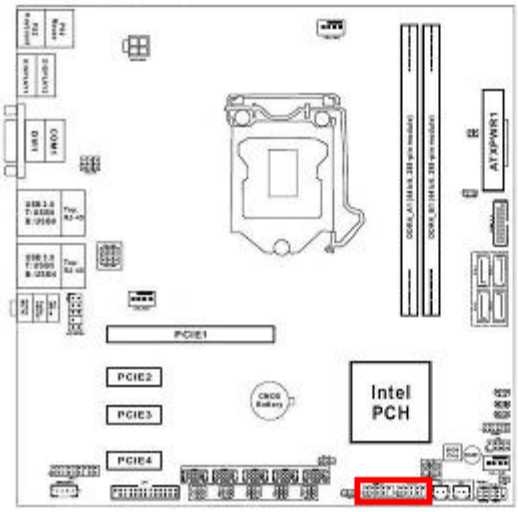


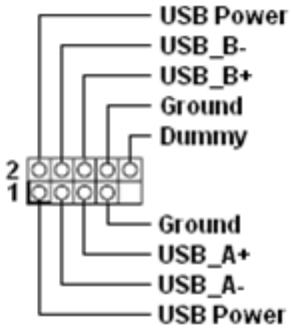
CI1:
Close: Active Case Open
Open: Normal

CI2:
Close: Normal
Open: Active Case Open

1.9.8 USB2.0 Headers: USB2_0_1, USB2_2_3

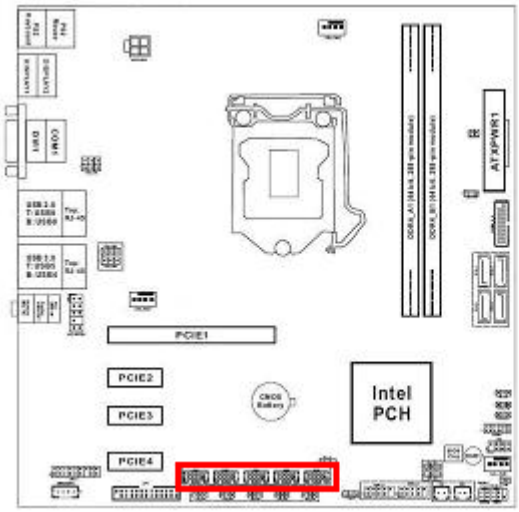
Two internal USB2.0 headers (two USB2.0 ports/ header).

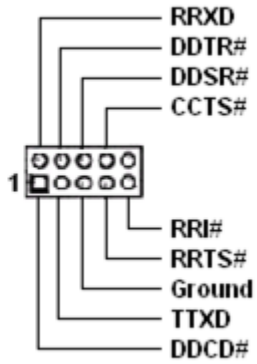




1.9.9 COM2, COM3, COM4, COM5, COM6 Headers (RS232 ONLY): COM2, COM3, COM4, COM5, COM6

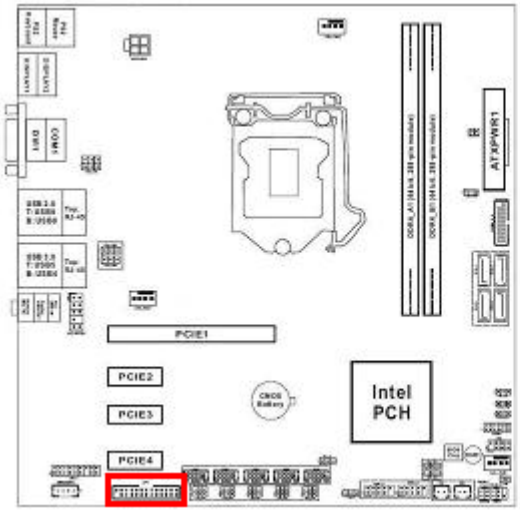
The COM2, 3, 4, 5, 6 that provides RI in RS232 only.

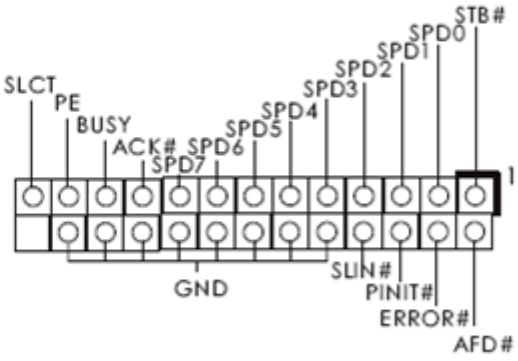




1.9.10 LPT Port Header: LPT1

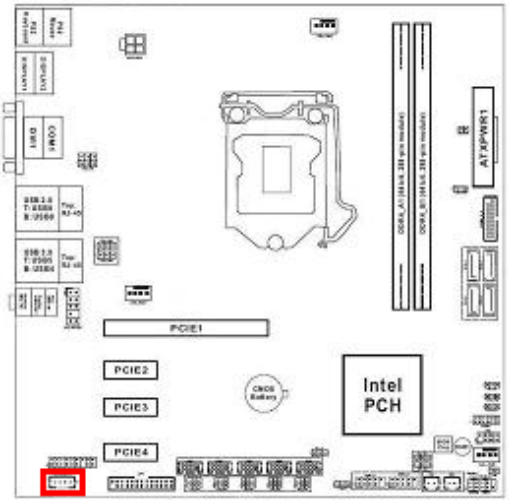
This header provides parallel port connection.





1.9.11 3W Audio AMP Output: SPEAKER1

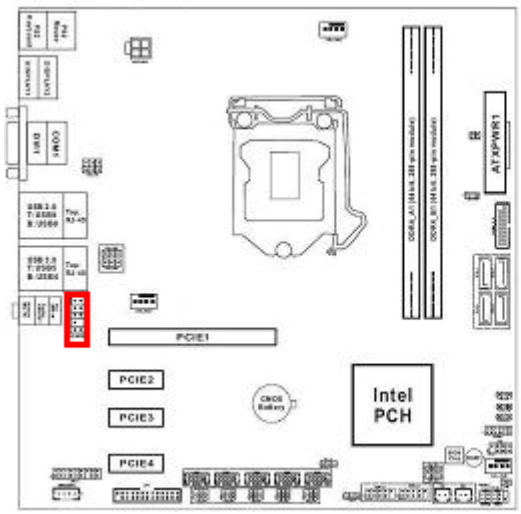
This header provides amplified speaker output (3W) for simple two external speaker connection. Its volume control is available under the BIOS.

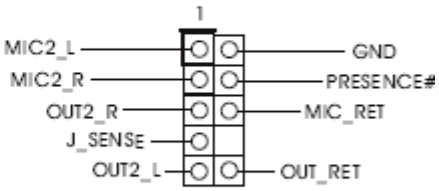


PIN	Signal Name	PIN	Signal Name	PIN	Signal Name	PIN	Signal Name
4	OUTRN	3	OUTRP	2	OUTLP	1	OUTLN

1.9.12 Front Panel Audio Header: HD_AUDIO1

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



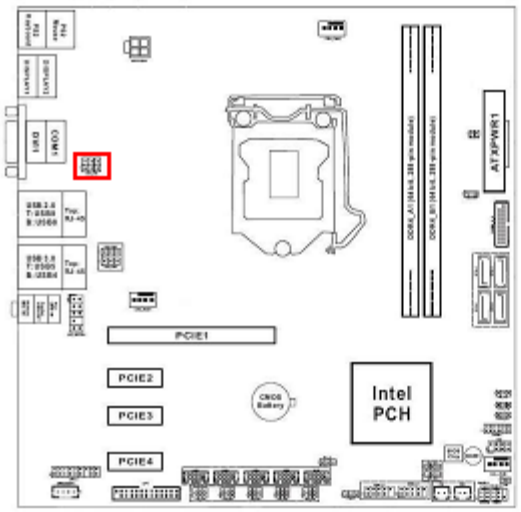


1. High Definition Audio supports Jack Sensing, but the panel wire on the chassis must support HDA to function correctly. Please follow the instruction in our manual and chassis manual to install your system.
2. If you use AC'97 audio panel, please install it to the front panel audio header as below:
   A. Connect Mic_IN (MIC) to MIC2_L.
   B. Connect Audio_R (RIN) to OUT2_R and Audio_L (LIN) to OUT2_L.
   C. Connect Ground (GND) to Ground (GND).
   D. MIC_RET and OUT_RET are for HD audio panel only. You don't need to connect them for AC'97 audio panel.
   E. To activate the front mic.
      Go to the "FrontMic" Tab in the Realtek Control panel. Adjust "Recording Volume".

1.10 Jumpers

1.10.1 COM1 Pin#9 Power Setting Jumper: PWR_COM1

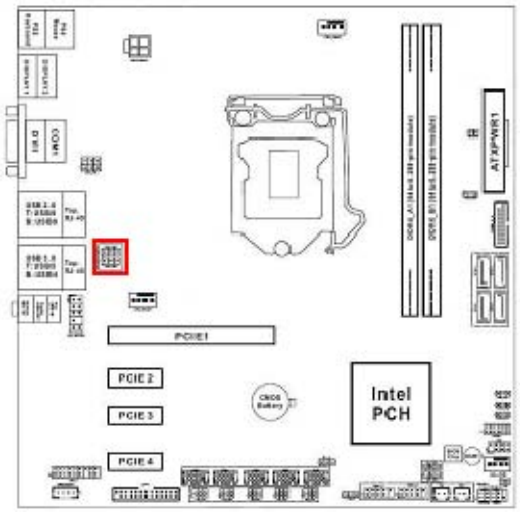
This header provides power selection for COM1 Pin#9.



1-2: +12V
3-4: RI#
5-6: +5V

1.10.2 Rear I/O USB Ports Power Setting Jumpers: USB2_PWR1 (For USB2.0 Port “USB2_89”), USB3_PWR1 (For USB3.0 Port “USB3_45”)

This header provides power selection for rear I/O USB ports.



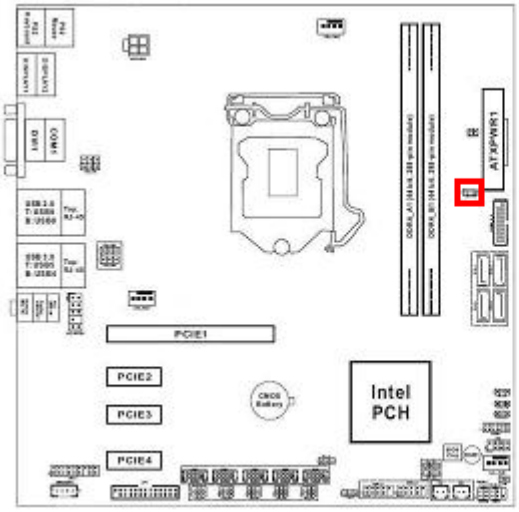
USB2_PWR1 (For "USB2_89" on rear I/O)

USB3_PWR1 (For "USB3_45" on rear I/O)

1-2: +5V
2-3: +5VSB (Default)

1.10.3 USB Power Setting Jumper for USB3.0 Header “USB3_3_4”: USB3_PWR2

This header provides power selection for USB3.0 header “USB3_3_4”.

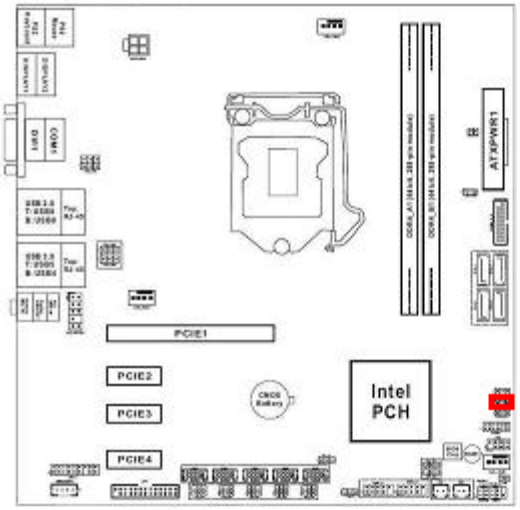


1 3
USB3_PWR2 (For "USB3_3_4")

1-2: +5V (Default)
2-3: +5VSB

1.10.4 GPIO Input/ Output Power Select: JGPIO_PWR1

This header provides power selection for GPIO Input/Output.

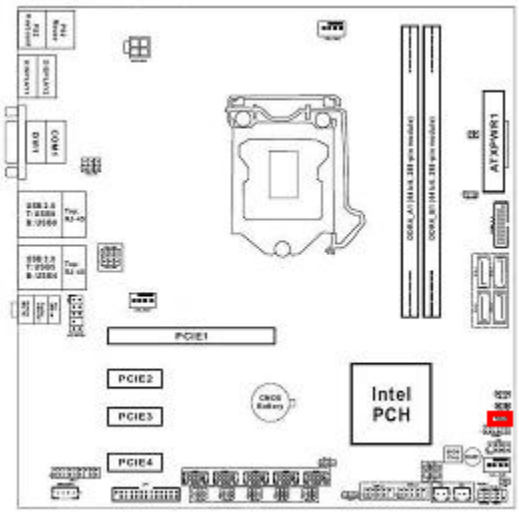


1 3

1-2: +12V
2-3: +5V (Default)

1.10.5 GPIO Signals Pull-High/ Pull-Low Selection: JGPIO_SET1

This header provides Pull-High/Pull-Low selection for GPIO header.



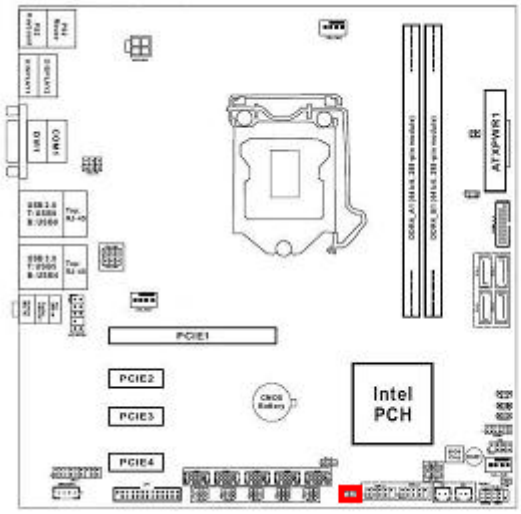
1-2: Pull-High to +3V (Default)
2-3: Pull-Low to Ground

1.10.6 Clear CMOS Header: CLRMOS1

There is a CMOS RAM onboard that has the power supplied from an external battery to maintain the registry settings of system configuration.

For normal state (default), the jumper is set on pin location 1 and 2.

To clear the CMOS, disconnect all power connections to mainboard first, then set the CLRMOS1 jumper to pin location 2 and 3 for at least 30 seconds while the system is off, then place the jumper back to pin 1-2 for normal operation.

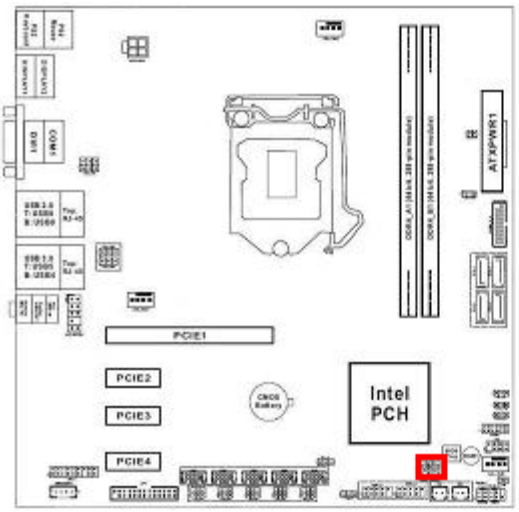


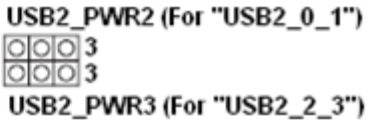
1-2: Normal (Default)
2-3: Clear CMOS

Avoid clearing the CMOS while the system is ON; this may damage the mainboard.

1.10.7 USB Ports Power Setting Jumpers: USB2_PWR2 (For USB2.0 Port “USB2_0_1”), USB2_PWR3 (For USB2.0 Port “USB2_2_3”)

These headers provide power selection for USB2.0 headers “USB2_0_1” and “USB2_3_3”.



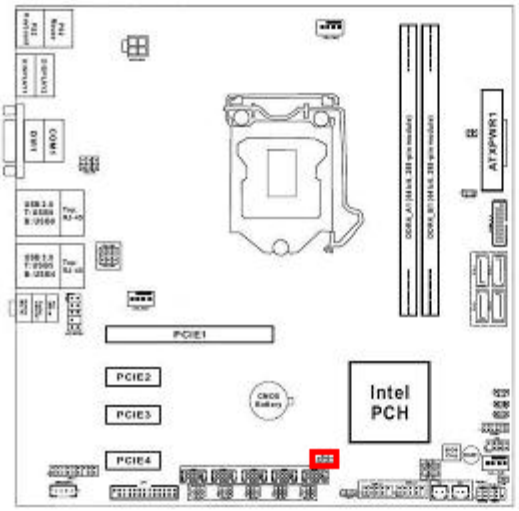


1-2: +5V
2-3: +5VSB (Default)

1.10.8 ATX/ AT Mode Select: PWR_JP1

This header provides the option to boot the system in the form of ATX mode (default) or AT mode.

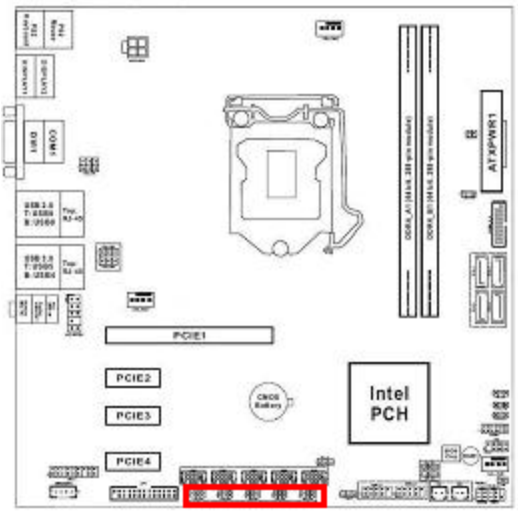
When the system is set in AT mode, the system power on/off will be controlled directly by the power switch on power supply. And some of the power saving modes will not function as ATX mode provided.



1-2: AT Mode
2-3: ATX Mode (Default)

1.10.9 COM2/3/4/5/6 Pin#9 Power Setting Jumper: PWR_COM2, PWR_COM3, PWR_COM4, PWR_COM5, PWR_COM6

This header provides power selection for COM2,3, 4, 5, 6 Pin#9.



1-2: +12V
3-4: RI# (Default)
5-6: +5V

1.11 The Expansion Slots

In the future, you may need to install expansion cards. The following sub-sections describe the expansion slots and the expansion cards that they support.

Make sure to unplug the power cord before adding or removing expansion cards. Fail to do so may cause injury and damage mainboard.

There are 4 PCI Express slots on this motherboard:

PCIE1 (PCIE x16 slot) is used for PCI Express x16, or PCI Express x4 cards.

PCIE2 (PCIE x1 slot) is used for PCI Express x1 cards.

PCIE3 (PCIE x1 slot) is used for PCI Express x1 cards.

PCIE4 (PCIE x1 slot) is used for PCI Express x1 cards.

1.11.1 Installation of Expansion Card

To install an expansion Card:

1. Before install the expansion card, read the documentation that came with it and make the necessary hardware setting for the card.
2. Remove the chassis cover (if the mainboard is installed in a chassis).
3. Remove the expansion slot bracket from the chassis on the slot that you intend to use. Keep the screw for later use.
4. Align the card connector with the slot and press it firmly until the card is completely seated on the slot.
5. Secure the card to the chassis with the screw that have been removed earlier (in step 3).
6. Place the chassis cover back on.

1.11.2 Setup An Expansion Card

After installing the expansion card, configure it by adjusting the software settings.

1. Turn on the system and change the BIOS settings if necessary.
2. Assign an IRQ to the card if necessary.
3. Install the software drivers for the expansion card.

Chapter 2: Starting Up the System

2.1 Starting Up Your System

1. After all connections are made, close your computer case cover.
2. Be sure all the switches are off, and check that the power supply input voltage is set to the local voltage, usually in-put voltage is 220V~240V or 110V~120V depending on your country's voltage used.
3. Connect the power supply cord into the power supply located on the back of your system case according to your system user's manual.
4. Turn on your peripheral in following order:
   a. Your monitor.
   b. Other external peripheral (Printer, Scanner, External Modem etc…)
   c. Your system power. For ATX power supplies, you need to turn on the power supply and press the ATX power switch on the front side of the case.
5. The power LED on the front panel of the system case will light. The LED on the monitor may light up or switch between orange and green after the system is on. If it complies with green standards or if it is has a power standby feature. The system will then run power-on test. While the test are running, the BIOS will alarm beeps or additional message will appear on the screen.

   If you do not see any thing within 30 seconds from the time you turn on the power. The system may have failed on power-on test. Recheck your jumper settings and connections or call your retailer for assistance.

Beep	**Meaning**
One short beep when displaying logo	No error during POST
Long beeps in an endless loop	No DRAM install or detected
One long beep followed by three short beeps	Video card not found or video card memory bad
High frequency beeps when system is working	CPU overheated System running at a lower frequency

6. During power-on, press <Del> key to enter BIOS setup. Follow the instructions in BIOS SETUP.
7. If you wish to boot from a different bootable device other than the default arrangement under the BIOS, you may press <F11> key during the system power-on (post); a menu with all detected bootable

devices which are attached to the system will be displayed. Then you may select the desired first bootable device from this menu.

8. **Power off your computer:** You must first exit or shut down your operating system before switch off the power switch. If you use Windows Operating Systems, click **"Start"** button, click **"Shut down"** and then click **"Shut down the computer"** The power supply should turn off after windows shut down.

Chapter 3: BIOS Setup

3.1 BIOS Flash Related Procedure

1. **After the BIOS is flashed, shut down the system.**
2. **Disconnect all power connections from power supply to the mainboard.**
3. **Clear the CMOS by relocate the jumper connector on header "CLRMOS" from pin 1-2 to pin 2-3 for at least 30 seconds.**
4. **Relocate the jumper connector on header "CLRMOS" from pin 2-3 back to pin 1-2.**
4. **Reconnect all power connections from power supply to the mainboard.**
5. **When the system is booting at first time after the new BIOS is flashed, it is recommended to enter the BIOS; load the option "Load Optimized Defaults", and then "Save and Exit Setup".**

IF ANY OF THE STEPS DESCRIBED ABOVE IS NOT FOLLOWED, IT MAY CAUSE THE FLASHED BIOS NOT FUNCTION PROPERLY.

3.2 Introducing BIOS

The BIOS is a program located on a Flash Memory on the motherboard. This program is a bridge between motherboard and operating system. When you start the computer, the BIOS program gains control. The BIOS first operates an auto-diagnostic test called POST (power on self test) for all the necessary hardware, it detects the entire hardware device and configures the parameters of the hardware synchronization. Only when these tasks are completed, the BIOS then transfer the control of the computer to operating system (OS). Since the BIOS is the only channel for hardware and software to communicate, it is the key factor for system stability, and in ensuring that your system performance as its best.

In the BIOS Setup main menu, you can see several options. We will explain these options step by step in the following pages of this chapter, but let us first see a short description of the function keys you may use here:

- Press <Esc> to quit the BIOS Setup.
- Press ↑↓←→ (up, down, left, right) to choose, in the main menu, the option you want to confirm or to modify.
- Press <F10> when you have completed the setup of BIOS parameters to save these parameters and to exit the BIOS Setup menu.

- Press Page Up/Page Down or +/– keys when you want to modify the BIOS parameters for the active option.

3.3 Entering BIOS Setup Menu

Power on the computer and by pressing <DEL> immediately allows you to enter BIOS Setup Menu.

If you are not able to enter the BIOS menu but you still wish to enter Setup, restart the system to try again by turning it OFF then ON or pressing the “RESET” button on the system case. You may also restart by simultaneously pressing <Ctrl>, <Alt> and <Delete> keys.

The items under each BIOS category described in this chapter are under continuous update for better system performance. Therefore, the description may be slightly different from the latest BIOS and should be held for reference only.

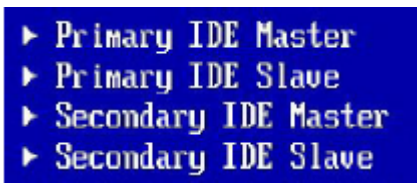
3.4 Getting Help

Main Menu

The main menu lists the setup functions you can make changes to. You can use the arrow keys to select the item. The on-line description of the highlighted setup function is displayed at the bottom of the screen.

Sub- Menu

If you find a right pointer symbol (as shown in the picture below) appears to the left of certain fields that means a sub-menu can be launched from this field. A sub-menu contains additional options for a field parameter. You can use arrow keys to highlight the field and press <Enter> to call up the sub-menu. Then you can use the control keys to enter values and move from field to field within a sub-menu. If you want to return to the main menu, just press the <ESC>.



General Help <F1>

The BIOS setup program provides a General Help screen. You can call up this screen from any menu by simply pressing <F1>. The Help screen lists the appropriate keys to use and the possible selections for the highlighted item. Press <Esc> to exit the Help screen.

3.4.1 UEFI Menu Bar

The top of the screen has a menu bar with the following selections:

Main	To set up the system time/date information
Advanced	To set up the advanced UEFI features
H/W Monitor	To display current hardware status
Security	To set up the security features
Boot	To set up the default system device to locate and load the Operating System
Exit	To exit the current screen or the UEFI SETUP UTILITY

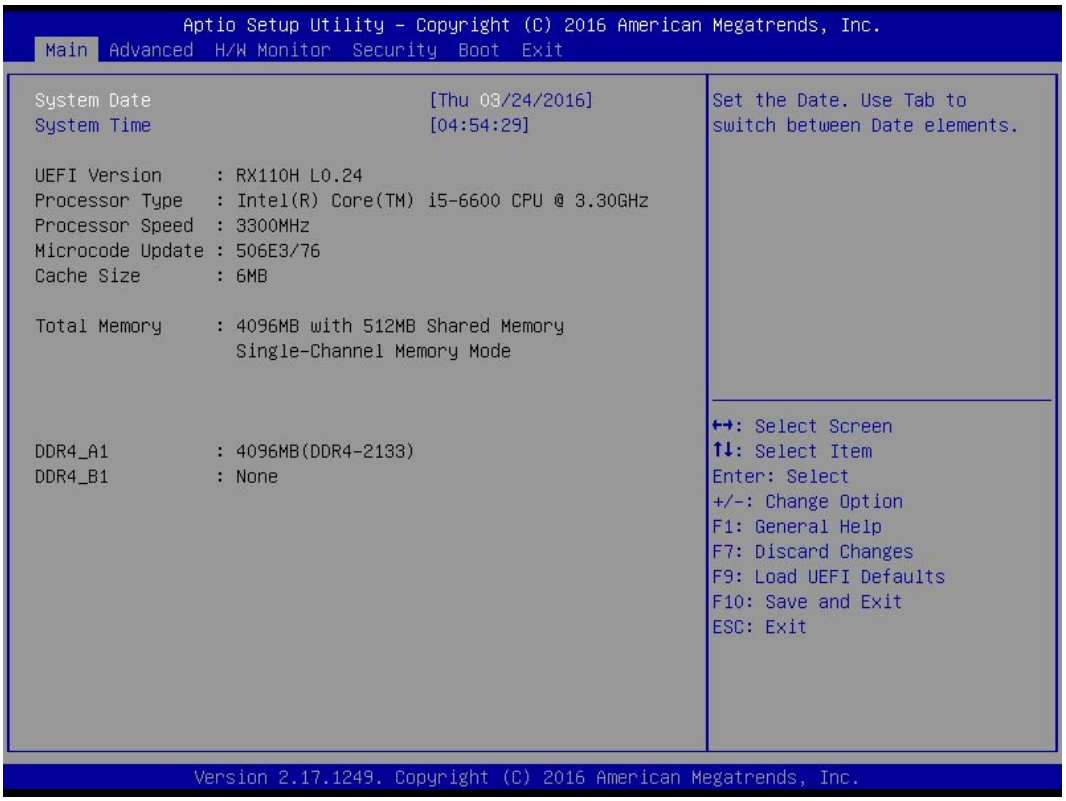
3.4.2 Navigation Keys

Please refer to the table below for the function description of navigation keys.

Navigation Key(s)	Function Description
← / →	Moves cursor left or right to select Screens
↑ / ↓	Moves cursor up or down to select items
+ / -	To change option for the selected items
<Enter>	To bring up the selected screen
<F1>	To display the General Help Screen
<F7>	Discard changes
<F9>	To load optimal default values for all the settings
<F10>	To save changes and exit the UEFI SETUP UTILITY
<F12>	Print screen
<ESC>	To jump to the Exit Screen or exit the current screen

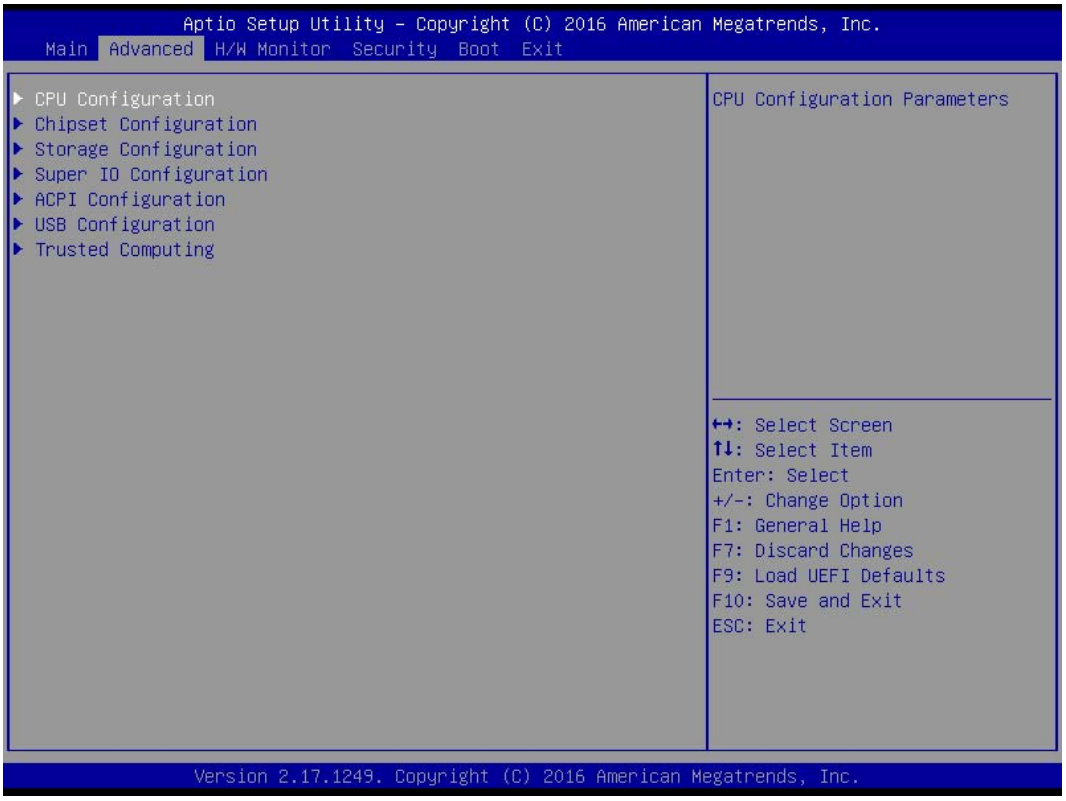
3.5 Main Screen

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



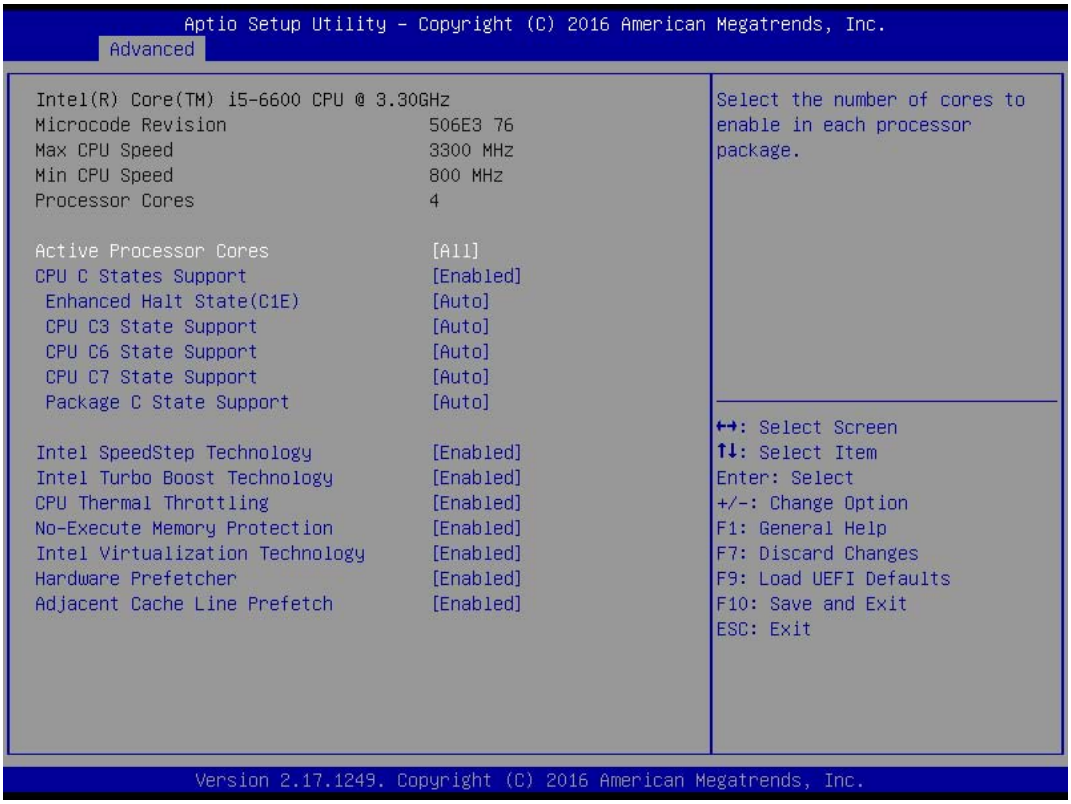
3.6 Advanced Screen

In this section, you may set the configurations for the following items: CPU Configuration, Chipset Configuration, Storage Configuration, Super IO Configuration, ACPI Configuration, USB Configuration and Trusted Computing.



Setting wrong values in this section may cause the system not function properly.

3.6.1 CPU Configuration



Active Processor Cores

Use this item to select the number of cores to enable in each processor package. The default value is [All].

CPU C States Support

Enable CPU C States Support for power saving. It is recommended to keep C3, C6 and C7 all enabled for better power saving.

Enhanced Halt State (C1E)

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

CPU C3 State Support

Use this to enable or disable CPU C3 (ACPI C2) report to OS.

CPU C6 State Support

Use this to enable or disable CPU C6 (ACPI C3) report to OS.

CPU C7 State Support

Use this to enable or disable CPU C7 (ACPI C7) report to OS.

Package C State Support

Selected option will program into C State package limit register. The default value is [Auto].

Intel SpeedStep Technology

Intel SpeedStep technology is Intel's new power saving technology. Processors can switch between multiple frequencies and voltage points to enable power saving. The default value is [Enabled]. Configuration options:

[Enabled] and [Disabled]. If you install Windows® 8 / 8.1 and want to enable this function, please set this item to [Enabled]. This item will be hidden if the current CPU does not support Intel SpeedStep technology.

Please note that enabling this function may reduce CPU voltage and lead to system stability or compatibility issues with some power supplies. Please set this item to [Disabled] if above issues occur.

Intel Turbo Boost Technology

Intel Turbo Boost Technology enables the processor to run above its base operating frequency when the operating system requests the highest performance state.

CPU Thermal Throttling

You may select [Enabled] to enable CPU internal thermal control mechanism to keep the CPU from overheating.

No-Execute Memory Protection

No-Execution (NX) Memory Protection Technology is an enhancement to the IA-32 Intel Architecture. An IA-32 processor with "No Execute (NX) Memory Protection" can prevent data pages from being used by malicious software to execute codes. This option will be hidden if the current CPU does not support No-Excute Memory Protection.

Intel Virtualization Technology

When this option is set to [Enabled], a VMM (Virtual Machine Architecture) can utilize the additional hardware capabilities provided by Vanderpool Technology. This option will be hidden if the installed CPU does not support Intel Virtualization Technology.

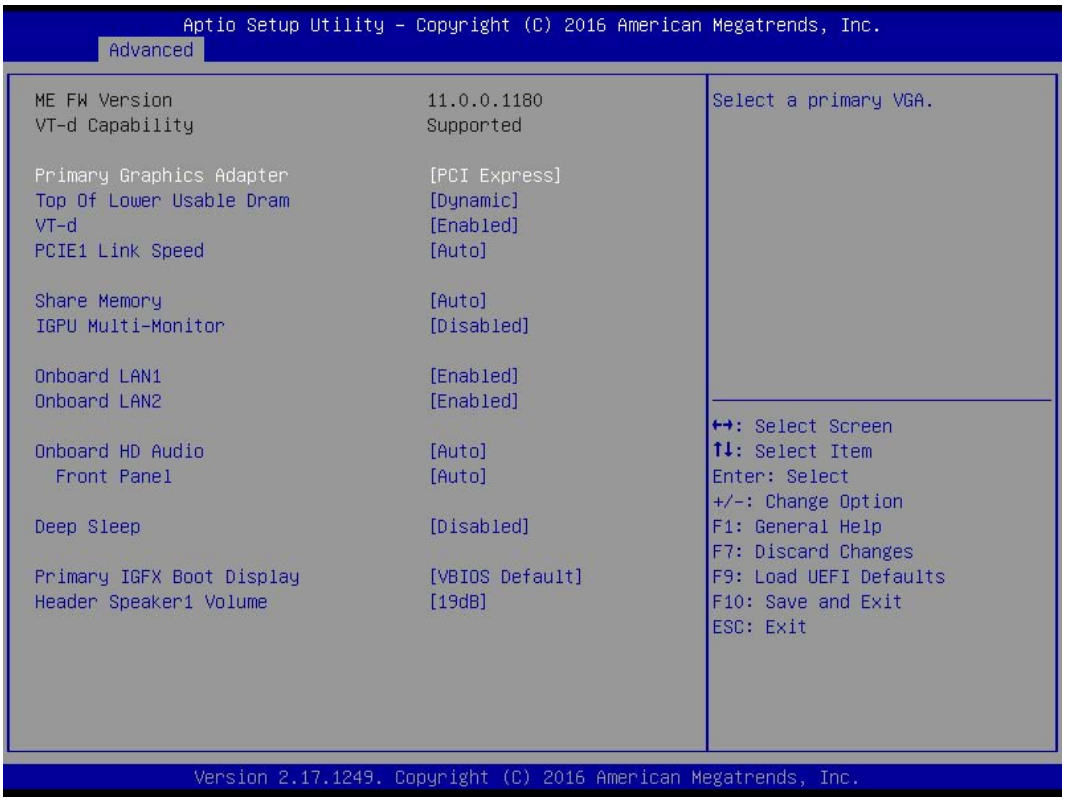
Hardware Prefetcher

Use this item to turn on/off the MLC streamer prefetcher.

Adjacent Cache Line Prefetch

Use this item to turn on/off prefetching of adjacent cache lines.

3.6.2 Chipset Configuration



Primary Graphics Adapter

This allows you to select [Onboard] or [PCI Express] as the boot graphic adapter priority. The default value is [PCI Express].

Top of Lower Usable Dram

The default value is [Dynamic].

VT-d

Use this to enable or disable Intel® VT-d technology (Intel® Virtualization Technology for Directed I/O). The default value of this feature is [Disabled].

PCIE1 Link Speed

Select the link speed for PCIE1.

Share Memory

Configure the size of memory that is allocated to the integrated graphics processor when the system boots up.

IGPU Multi-Moniter

This allows you to enable or disable IGPU Multi-Moniter. The default value is [Enabled]. If you install the PCI Express card under Windows® XP / VistaTM OS, please disable this option.

Onboard LAN 1

This allows you to enable or disable the Onboard LAN 1 feature.

Onboard LAN 2

This allows you to enable or disable the Onboard LAN 2 feature.

Onboard HD Audio

Select [Auto], [Enabled] or [Disabled] for the onboard HD Audio feature.

Front Panel

Select [Auto] or [Disabled] for the onboard HD Audio Front Panel.

Deep Sleep

Mobile platforms support Deep S5 in DC only and desktop platforms support Deep S5 in AC only. The default value is [Disabled].

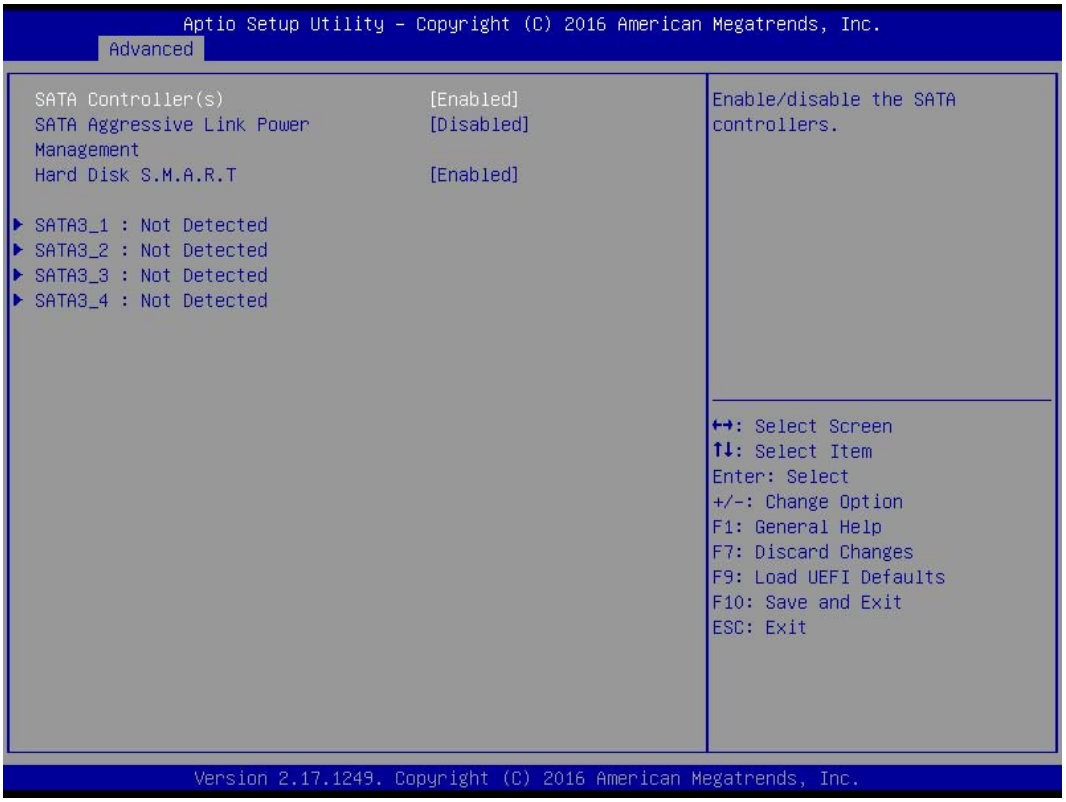
Primary IGFX Boot Display

Select a primary display output.

Header Speaker1 Volume

Select the header speaker1 volume.

3.6.3 Storage Configuration



SATA Controller(s)

Use this item to enable or disable the SATA Controller feature.

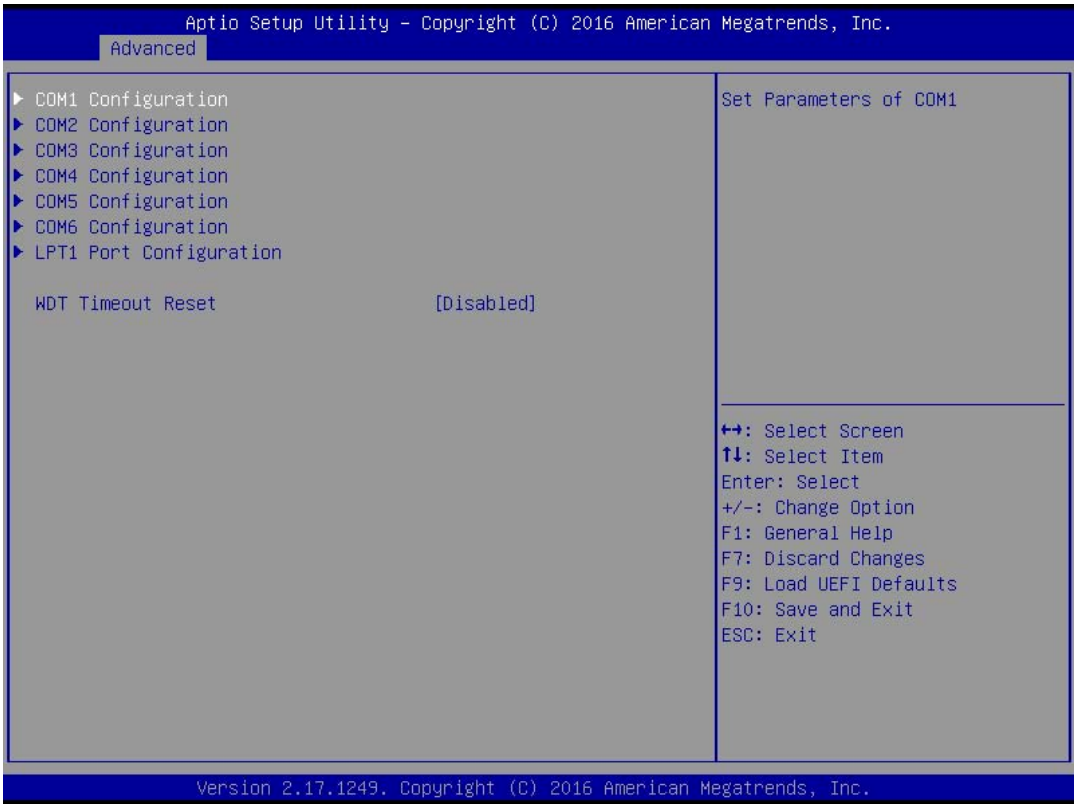
SATA Aggressive Link Power Management

Use this item to configure SATA Aggressive Link Power Management.

Hard Disk S.M.A.R.T.

Use this item to enable or disable the S.M.A.R.T. (Self-Monitoring, Analysis, and Reporting Technology) feature. Configuration options: [Disabled] and [Enabled].

3.6.4 Super IO Configuration



COM1 Configuration

Use this to set parameters of COM1. Select COM1 port type: [RS232] (default), [RS422] or [RS485].

COM2 Configuration

Use this to set parameters of COM2.

COM3 Configuration

Use this to set parameters of COM3.

COM4 Configuration

Use this to set parameters of COM4.

COM5 Configuration

Use this to set parameters of COM5.

COM6 Configuration

Use this to set parameters of COM6.

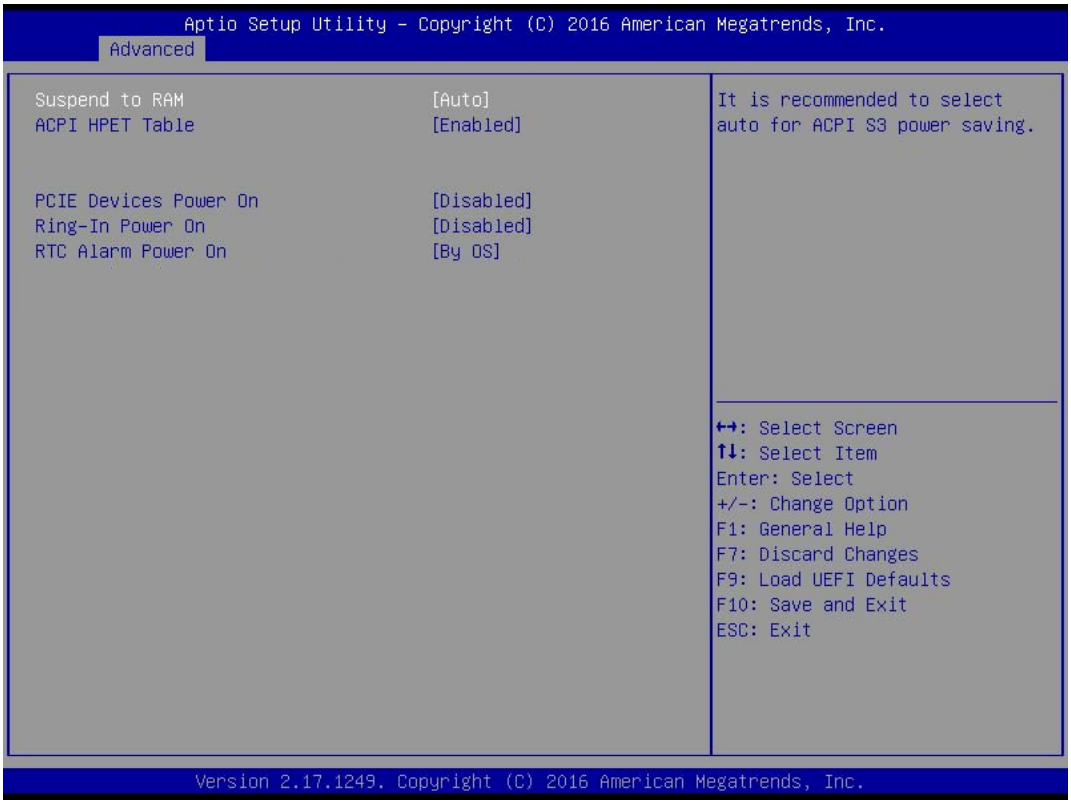
LPT1 Port Configuration

Use this set parameters of the onboard parallel port.

WDT Timeout Reset

This allows users to enable/disable the Watch Dog Timer timeout to reset system. The default value is [Disabled].

3.6.5 ACPI Configuration



Suspend to RAM

Use this item to select whether to auto-detect or disable the Suspend-to-RAM feature. Select [Auto] will enable this feature if the installed OS supports it.

ACPI HPET Table

Use this item to enable or disable ACPI HPET Table. The default value is [Enabled]. Please set this option to [Enabled] if you plan to use this motherboard to submit Windows® certification.

PCIE Devices Power On

Use this item to enable or disable PCIE devices to turn on the system from the power-soft-off mode.

Ring-In Power On

Allow the system to be waked up by onboard COM port modem Ring-In signals.

RTC Alarm Power On

Use this item to enable or disable RTC (Real Time Clock) to power on the system.

3.6.6 USB Configuration

USB Controller

Use this item to enable or disable the use of USB controller.

Legacy USB Support

Use this option to select legacy support for USB devices. There are four configuration options: [Enabled], [Auto] and [UEFI Setup Only]. The default value is [Auto]. Please refer to below descriptions for the details of these four options:

[Enabled] - Enables support for legacy USB.

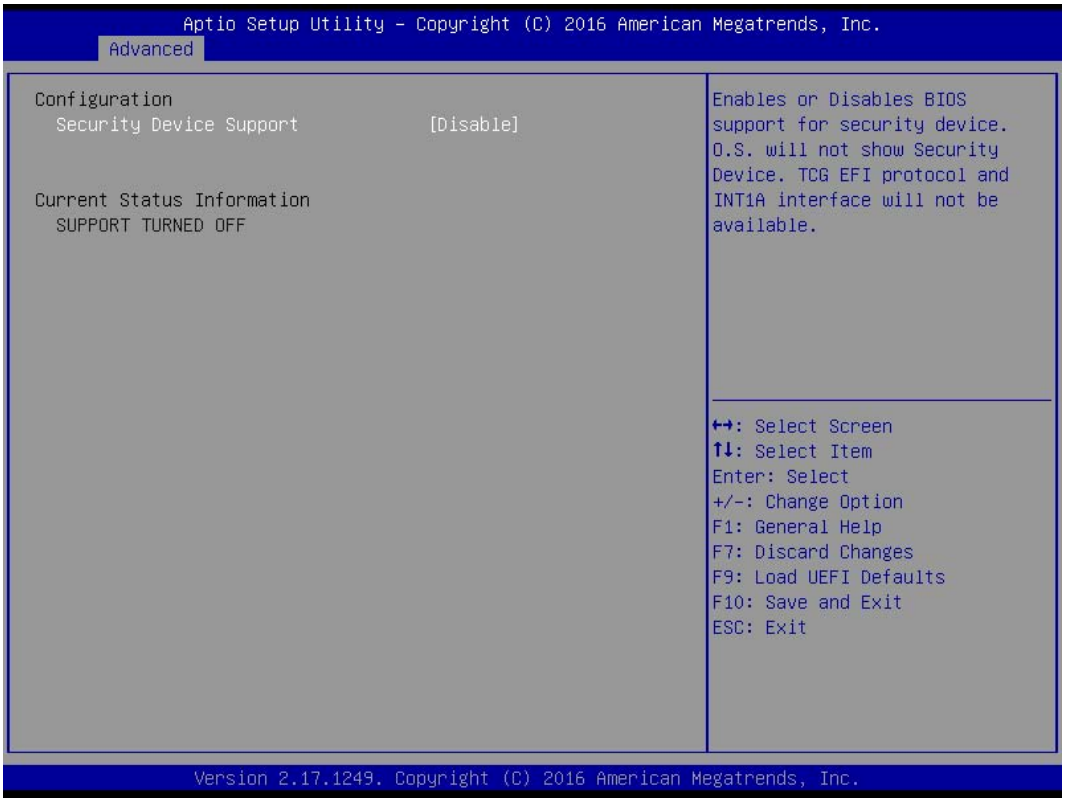
[Auto] - Enables legacy support if USB devices are connected.

[UEFI Setup Only] - USB devices are allowed to use only under UEFI setup and Windows / Linux OS.

PS/2 Simulator

The default value is [Disabled].

3.6.7 Trusted Computing

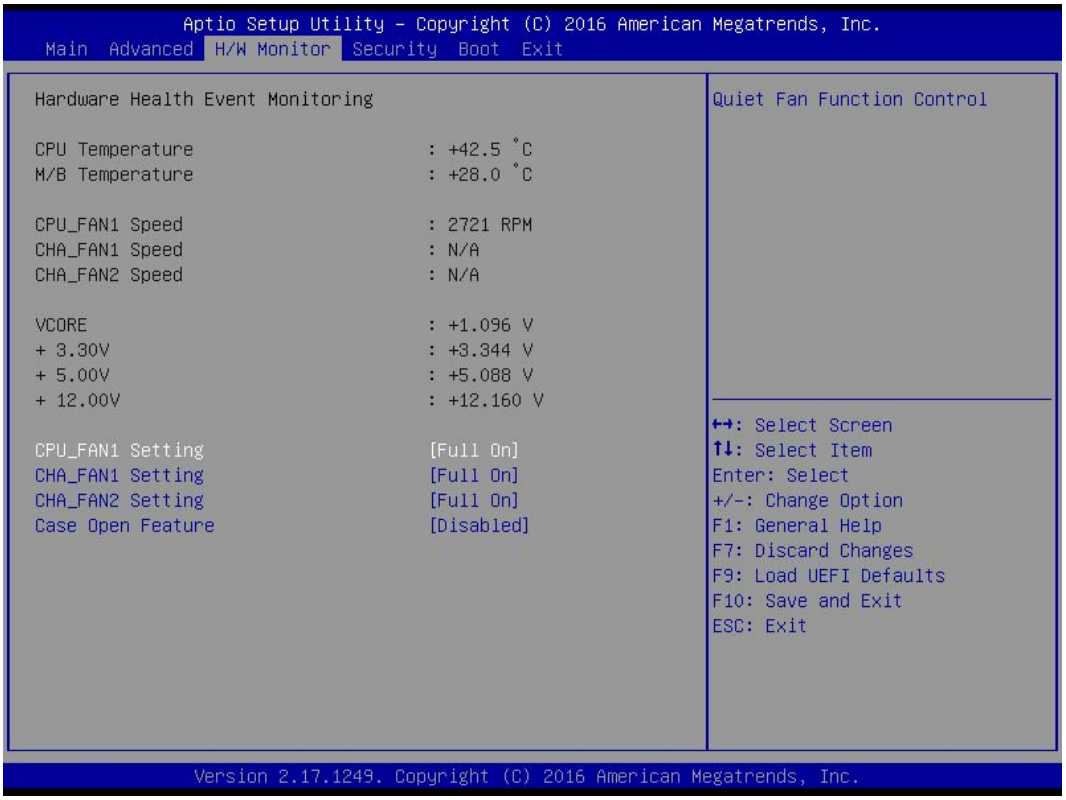


Security Device Support

Enable or disable BIOS support for security device.

3.7 Hardware Health Event Monitoring Screen

In this section, it allows you to monitor the status of the hardware on your system, including the parameters of the CPU temperature, motherboard temperature, CPU fan speed, chassis fan speed, and the critical voltage.



CPU_FAN1 Setting

This allows you to set CPU_FAN1's speed. Configuration options: [Full On] and [Automatic Mode]. The default value is [Full On].

CHA_FAN1 Setting

This allows you to set CHA_FAN1's speed. Configuration options: [Full On] and [Automatic Mode]. The default value is [Full On].

CHA_FAN2 Setting

This allows you to set CHA_FAN2's speed. Configuration options: [Full On] and [Automatic Mode]. The default value is [Full On].

Case Open Feature

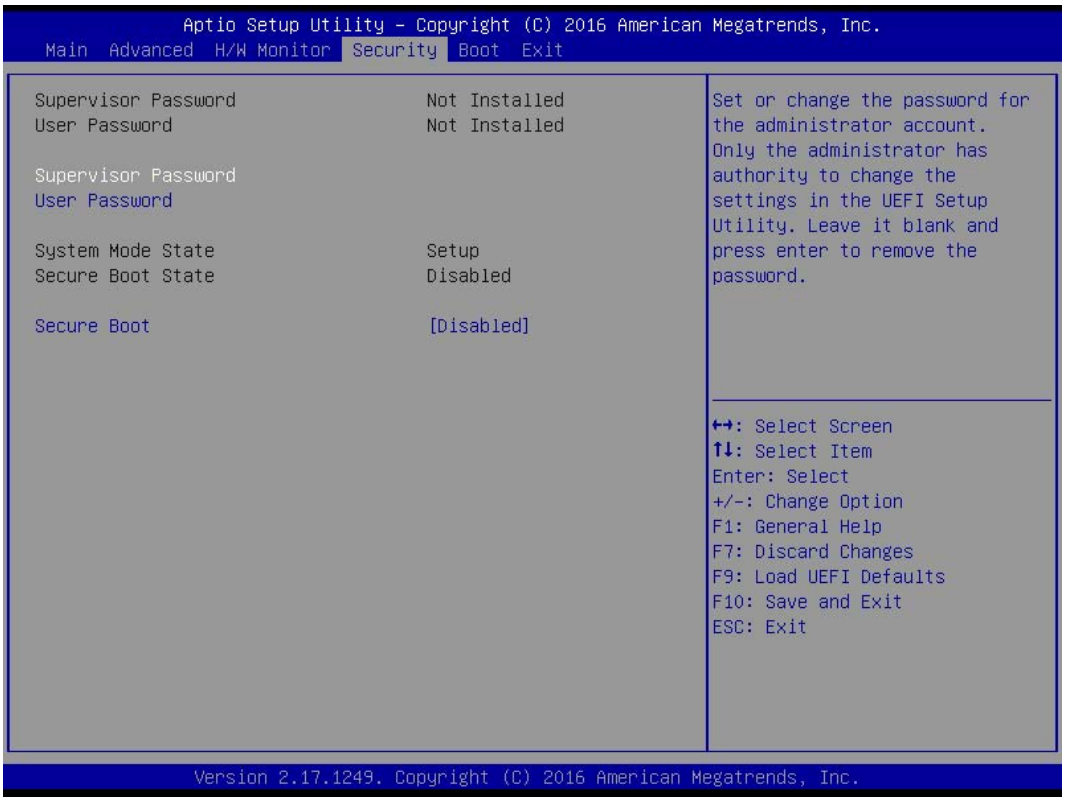
This allows you to enable or disable case open detection feature. The default is value [Disabled].

Clear Status

This option appears only when the case open has been detected. Use this option to keep or clear the record of previous chassis intrusion status.

3.8 Security Screen

In this section, you may set, change or clear the supervisor/user password for the system.



Supervisor Password

Set or change the password for the administrator account. Only the administrator has authority to change the settings in the UEFI Setup Utility. Leave it blank and press enter to remove the password.

User Password

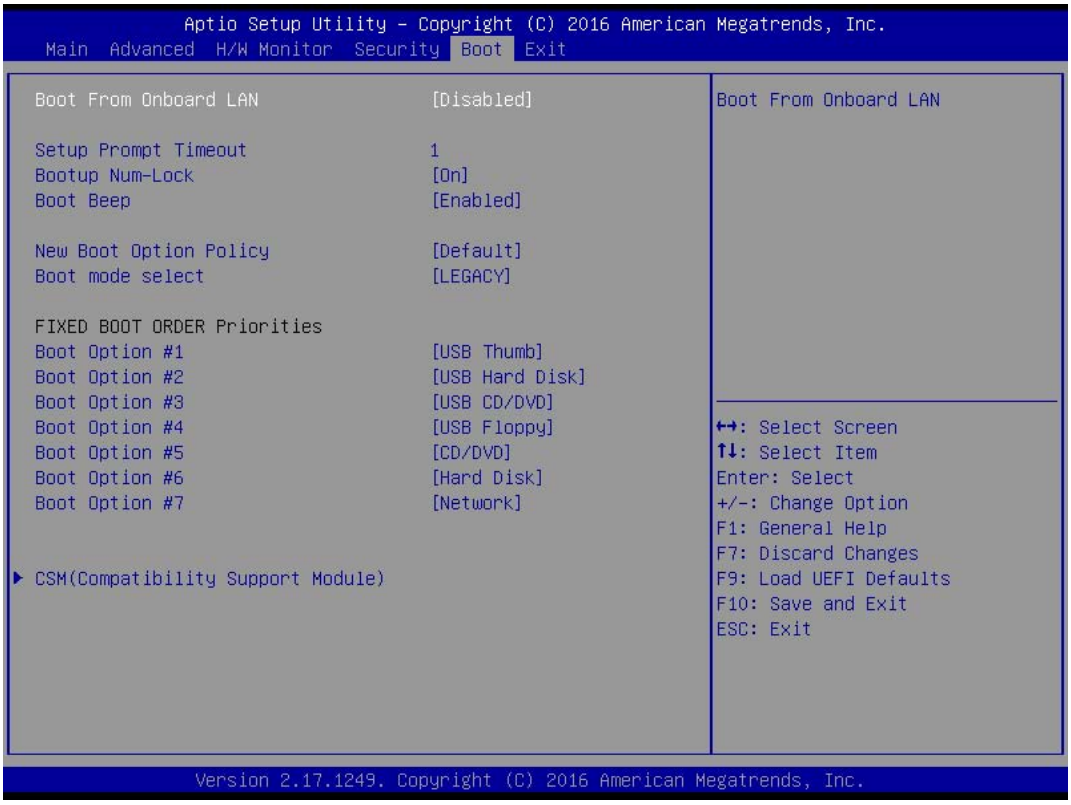
Set or change the password for the user account. Users are unable to change the settings in the UEFI Setup Utility. Leave it blank and press enter to remove the password.

Secure Boot

Enable to support Windows 64-bit Secure Boot.

3.9 Boot Screen

In this section, it will display the available devices on your system for you to configure the boot settings and the boot priority.



Boot From Onboard LAN

Use this item to enable or disable the Boot From Onboard LAN feature.

Setup Prompt Timeout

This shows the number of seconds to wait for setup activation key.

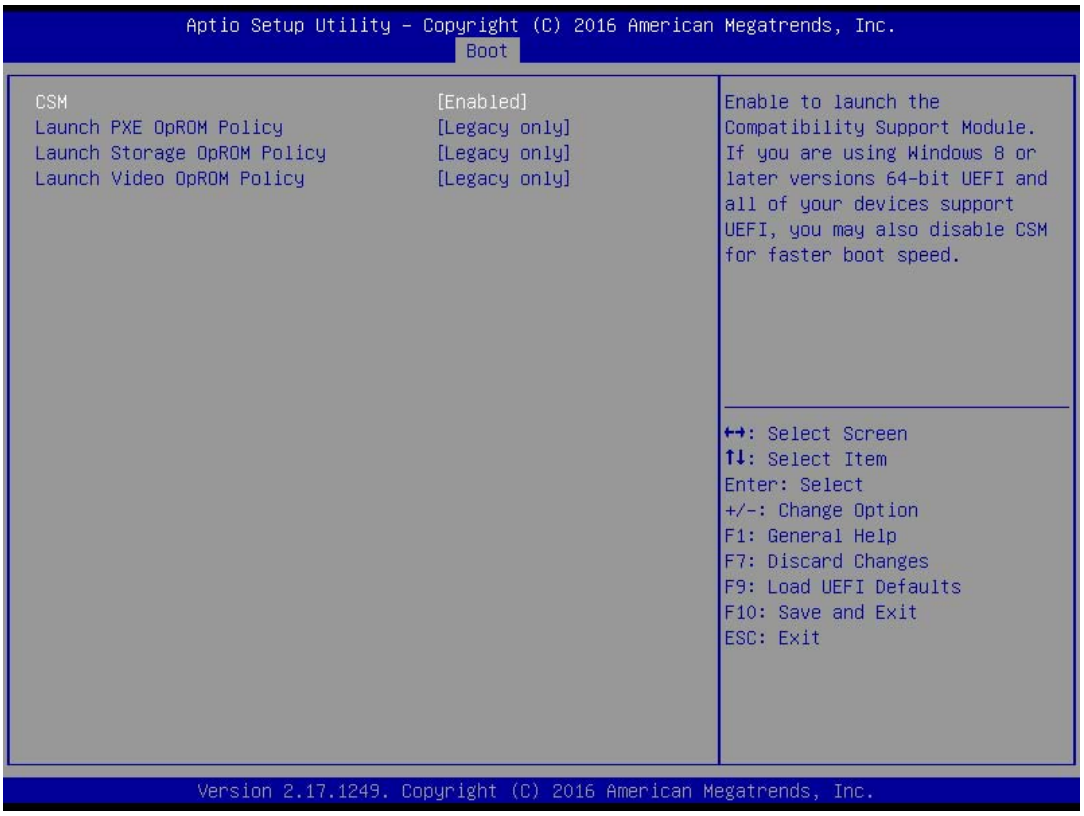
Bootup Num-Lock

If this item is set to [On], it will automatically activate the Numeric Lock function after boot-up.

Boot Beep

Select whether the Boot Beep should be turned on or off when the system boots up. Please note that a buzzer is needed.

3.9.1 CSM (Compatibility Support Module)



CSM

Enable to launch the Compatibility Support Module. Please do not disable unless you're running a WHCK test. If you are using Windows® 8 64-bit and all of your devices support UEFI, you may also disable CSM for faster boot speed.

Launch PXE OpROM Policy

Select UEFI only to run those that support UEFI option ROM only. Select Legacy only to run those that support legacy option ROM only. Select Do not launch to not execute both legacy and UEFI option ROM.

Launch Storage OpROM Policy

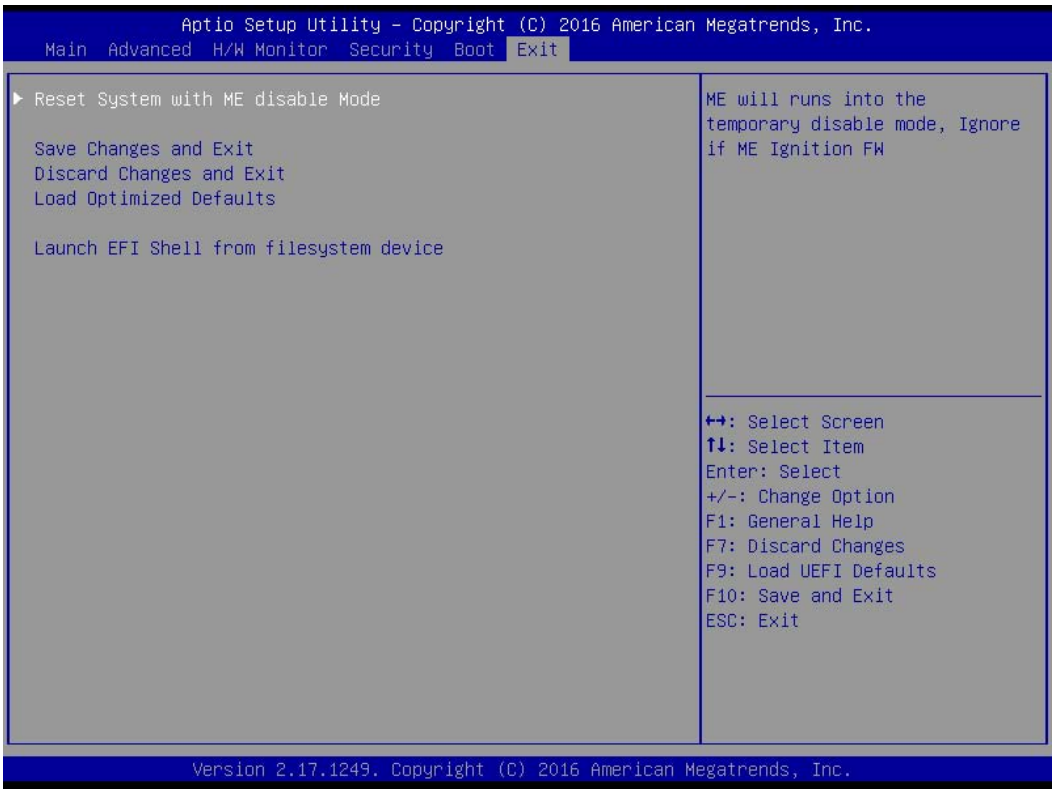
Select UEFI only to run those that support UEFI option ROM only. Select Legacy only to run those that support legacy option ROM only. Select Do not launch to not execute both legacy and UEFI option ROM.

Launch Video OpROM Policy

Select UEFI only to run those that support UEFI option ROM only. Select Legacy only to run those

that support legacy option ROM only. Select Do not launch to not execute both legacy and UEFI option ROM.

3.10 Exit Screen



Reset System with ME disable Mode

ME will run into the temporary disable mode. Ignore it if ME Ignition FW.

Save Changes and Exit

When you select this option, it will pop-out the following message, “Save configuration changes and exit setup?” Select [OK] to save the changes and exit the UEFI SETUP UTILITY.

Discard Changes and Exit

When you select this option, it will pop-out the following message, “Discard changes and exit setup?” Select [OK] to exit the UEFI SETUP UTILITY without saving any changes.

Load Optimized Defaults

Load optimized default values for all the setup questions.

Launch EFI Shell from filesystem device

Attempts to Launch EFI Shell application (Shell64.efi) from one of the available filesystem devices.

Chapter 4: Application Note

Please read the following application notes before proceed with the system setup and/or OS installation:

1. **None**