



**OPEN** Industry Standard, Flexible Architecture

**GREEN** Less Heat, Less Power Consumption

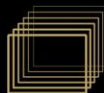
**STABLE** Robust Design, Quality Parts

Stable and  
Reliable Solution

**Server/Workstation**  
Motherboard

**EPC602D8A**  
**EPC602D8A-V+**

User Manual



Version 1.1

Published July 2014

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- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

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The Lithium battery adopted on this motherboard contains Perchlorate, a toxic substance controlled in Perchlorate Best Management Practices (BMP) regulations passed by the California Legislature. When you discard the Lithium battery in California, USA, please follow the related regulations in advance.

“Perchlorate Material-special handling may apply, see [www.dtsc.ca.gov/hazardouswaste/perchlorate](http://www.dtsc.ca.gov/hazardouswaste/perchlorate)”

**ASRock Rack's Website: [www.ASRockRack.com](http://www.ASRockRack.com)**

## Contact Information

If you need to contact ASRock Rack or want to know more about ASRock Rack, you're welcome to visit ASRock Rack's website at [www.ASRockRack.com](http://www.ASRockRack.com); or you may contact your dealer for further information.

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# Chapter 1 Introduction

Thank you for purchasing ASRock Rack **EPC602D8A/EPC602D8A-V+** motherboard, a reliable motherboard produced under ASRock Rack's consistently stringent quality control. It delivers excellent performance with robust design conforming to ASRock Rack's commitment to quality and endurance.

In this manual, chapter 1 and 2 contains introduction of the motherboard and step-by-step guide to the hardware installation. Chapter 3 and 4 contains the configuration guide to BIOS setup and information of the Support CD.



*Because the motherboard specifications and the BIOS software might be updated, the content of this manual will be subject to change without notice. In case any modifications of this manual occur, the updated version will be available on ASRock Rack website without further notice. You may find the latest memory and CPU support lists on ASRock Rack website as well. ASRock Rack's Website: [www.ASRockRack.com](http://www.ASRockRack.com)*

*If you require technical support related to this motherboard, please visit our website for specific information about the model you are using.  
[www.asrock.com/support/index.asp](http://www.asrock.com/support/index.asp)*

## 1.1 Package Contents

- ASRock Rack EPC602D8A / EPC602D8A-V+ Motherboard  
(ATX Form Factor: 12.0-in x 9.6-in, 30.5 cm x 24.4 cm)
- Support CD
- User Manual
- 4 x SATA3 cables (50cm)
- 2 x SATA3 cables (60cm)
- 1 x I/O Shield



*If any items are missing or appear damaged, contact your authorized dealer.*

## 1.2 Specifications

| EPC602D8A / EPC602D8A-V+                                 |                                                                                                                                                                                                    |
|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MB Physical Status                                       |                                                                                                                                                                                                    |
| Form Factor                                              | ATX                                                                                                                                                                                                |
| Dimension                                                | 12" x 9.6" (30.5 cm x 24.4 cm)                                                                                                                                                                     |
| Processor System                                         |                                                                                                                                                                                                    |
| CPU                                                      | - Intel® Xeon processor E5-1600/2600/4600 & v2 series<br>- Supports Hyper-Threading Technology                                                                                                     |
| Socket                                                   | Single Socket R (LGA2011)                                                                                                                                                                          |
| Chipset                                                  | Intel® C602                                                                                                                                                                                        |
| System Memory                                            |                                                                                                                                                                                                    |
| Capacity                                                 | - 8 x 240-pin DDR3 DIMM slots<br>- Support up to 256GB DDR3 R/LR DIMM ; 64GB ECC/non-ECC unbuffered UDIMM                                                                                          |
| Type                                                     | - Quad Channel DDR3 memory technology<br>- Supports DDR3 1600/1333/1066 R/LR ECC and UDIMM                                                                                                         |
| Voltage                                                  | 1.5V, 1.35V                                                                                                                                                                                        |
| Expansion Slot <i>(Slot 1 is the closest to the CPU)</i> |                                                                                                                                                                                                    |
| Slot 1                                                   | x8                                                                                                                                                                                                 |
| Slot 2                                                   | x16 (x16/x0 or x8/x8 with Slot 1)                                                                                                                                                                  |
| Slot 3                                                   | x8                                                                                                                                                                                                 |
| Slot 4                                                   | x16 (x16/x0 or x8/x8 with Slot 3)                                                                                                                                                                  |
| Slot 5                                                   | x8 slot with EE x8/x0 or x4/x4 with Slot 6                                                                                                                                                         |
| Slot 6                                                   | x8 slot with EE x4                                                                                                                                                                                 |
| Slot 7                                                   | x8 (EEx2 from C602, Gen2)                                                                                                                                                                          |
| Storage                                                  |                                                                                                                                                                                                    |
| SATA Controller                                          | Intel® C602 : 2 x SATA3 6.0 Gb/s, 8 x SATA2 3.0 Gb/s (4 from SATA ports; the others from mini SAS port), support RAID 0, 1, 5, 10 and Intel® Rapid Storage 3.0, NCQ, AHCI and "Hot Plug" functions |
| Additional SATA Controller                               | Marvell SE9172: 2 x SATA3 6.0 Gb/s                                                                                                                                                                 |
| Ethernet                                                 |                                                                                                                                                                                                    |
| Interface                                                | Gigabit LAN 10/100/1000 Mb/s                                                                                                                                                                       |
| LAN Controller                                           | - 2 x Intel® i210<br>- Supports Wake-On-LAN<br>- Supports Energy Efficient Ethernet 802.3az<br>- Supports Dual LAN with Teaming function<br>- Supports PXE                                         |

| Management          |                                                                                                                                                                                                                                         |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BMC Controller      | <b>For EPC602D8A only:</b><br>ASPEED AST2300<br><b>For EPC602D8A-V+ only:</b><br>N/A                                                                                                                                                    |
| IPMI Dedicated GLAN | <b>For EPC602D8A Only:</b><br>1 x Realtek RTL8211E for dedicated management GLAN<br><b>For EPC602D8A-V+ Only:</b><br>N/A                                                                                                                |
| Features            | - Watch Dog<br>- NMI                                                                                                                                                                                                                    |
| Graphics            |                                                                                                                                                                                                                                         |
| Controller          | <b>For EPC602D8A only:</b><br>ASPEED AST2300<br><b>For EPC602D8A-V+ only:</b><br>ASPEED AST1300                                                                                                                                         |
| VRAM                | DDR3 16MB                                                                                                                                                                                                                               |
| Output              | Supports D-Sub with max. resolution up to 1920x1200 @ 60Hz                                                                                                                                                                              |
| Audio               |                                                                                                                                                                                                                                         |
| Audio code          | 7.1 CH HD Audio with Content Protection (Realtek ALC892 Audio Codec)<br><i>*To configure 7.1 CH HD Audio, it is required to use an HD front panel audio module and enable the multi-channel audio feature through the audio driver.</i> |
| Rear Panel I/O      |                                                                                                                                                                                                                                         |
| VGA Port            | 1 x D-Sub                                                                                                                                                                                                                               |
| USB 2.0 Port        | 2                                                                                                                                                                                                                                       |
| USB 3.0 Port        | 2                                                                                                                                                                                                                                       |
| Lan Port            | - 2 x RJ45 Gigabit Ethernet LAN ports<br>- LAN Ports with LED (ACT/LINK LED and SPEED LED)<br><b>For EPC602D8A only:</b><br>- 1 x RJ45 Dedicated IPMI LAN port                                                                          |
| COM Port            | 1 (COM1)                                                                                                                                                                                                                                |
| Audio               | 3 Jack                                                                                                                                                                                                                                  |
| 1394 port           | 1                                                                                                                                                                                                                                       |

| Internal Connector     |                                                                                                                                                                                                                                |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| COM Port Header        | 1 (COM2)                                                                                                                                                                                                                       |
| Auxiliary Panel Header | 1 (includes chassis intrusion, location button & LED, front LAN LED)                                                                                                                                                           |
| TPM Header             | 1                                                                                                                                                                                                                              |
| Thermal Sensor Header  | 1                                                                                                                                                                                                                              |
| IPMB Header            | 1                                                                                                                                                                                                                              |
| Buzzer                 | 1                                                                                                                                                                                                                              |
| Fan Header             | 5 x 4-pin                                                                                                                                                                                                                      |
| ATX Power              | 1 (24-pin) + 1 (8-pin)                                                                                                                                                                                                         |
| USB 3.0 Header         | 1 (each supports 2 USB 3.0 ports)                                                                                                                                                                                              |
| USB 2.0 Header         | 1 (each supports 2 USB 2.0 ports)                                                                                                                                                                                              |
| Type A USB 2.0 Port    | 1                                                                                                                                                                                                                              |
| Front Audio panel      | 1                                                                                                                                                                                                                              |
| SPDIF Header           | 1                                                                                                                                                                                                                              |
| 1394 Header            | 1                                                                                                                                                                                                                              |
| Front Panel            | 1                                                                                                                                                                                                                              |
| Speaker                | 1                                                                                                                                                                                                                              |
| Dr. Debug with LED     | 1                                                                                                                                                                                                                              |
| System BIOS            |                                                                                                                                                                                                                                |
| BIOS Type              | 64Mb AMI UEFI Legal BIOS                                                                                                                                                                                                       |
| BIOS Features          | <ul style="list-style-type: none"> <li>- Plug and Play (PnP)</li> <li>- ACPI 1.1 Compliance Wake Up Events</li> <li>- SMBIOS 2.3.1 Support</li> <li>- DRAM Voltage Multi-adjustment</li> <li>- ASRock Instant Flash</li> </ul> |
| Hardware Monitor       |                                                                                                                                                                                                                                |
| Temperature            | <ul style="list-style-type: none"> <li>- CPU Temperature Sensing</li> <li>- System Temperature Sensing</li> </ul>                                                                                                              |
| Fan                    | <ul style="list-style-type: none"> <li>- CPU/Rear/Front Fan Tachometer</li> <li>- CPU Quiet Fan (Allow CPU Fan Speed Auto-Adjust by CPU Temperature)</li> <li>- CPU/Rear/Front Fan Multi-Speed Control</li> </ul>              |
| Voltage                | Voltage Monitoring: CPU1/2, DRAM1/2, VCCM, VCCSA1/2, 3V/5V/ 12V, +1.05V_PCH, +BAT, 3VSB, 5VSB                                                                                                                                  |

| Support OS  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OS          | <p>Microsoft® Windows®</p> <ul style="list-style-type: none"> <li>- Windows 7 ( 32 / 64 bit)</li> <li>- Windows 8 ( 32 / 64 bit)</li> <li>- Windows 8.1 ( 32 / 64 bit)</li> <li>- Server 2008 R2 (64 bit)</li> <li>- Server 2012 (64 bit)</li> <li>- Server 2012 R2 (64 bit)</li> </ul> <p>Linux®</p> <ul style="list-style-type: none"> <li>- RedHat Enterprise Linux Server 5.9/6.4 (32 / 64 bit)</li> <li>- CentOS 5.9 / 6.4 (32 / 64 bit)</li> <li>- SUSE Enterprise Linux Server 11 SP3 (32 / 64 bit)</li> <li>- FreeBSD 9.1 (32 / 64 bit)</li> <li>- Fedora core 19 (64 bit)</li> <li>- Ubuntu 12.04.2 (64 bit) / 12.10 (64 bit)</li> </ul> <p>Virtual</p> <ul style="list-style-type: none"> <li>- VMWare® ESXi 5.5</li> </ul> |
| Environment |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Temperature | <p>Operation temperature: 10°C ~ 35°C / Non operation temperature: -40°C ~ 70°C</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |



*This motherboard supports Wake from on Board LAN. To use this function, please make sure that the "Wake on Magic Packet from power off state" is enabled in Device Manager > Intel® Ethernet Connection I210 > Power Management. And the "PCI Devices Power On" is enabled in UEFI SETUP UTILITY > Advanced > ACPI Configuration. After that, onboard LAN1&2 can wake up S5 under OS.*



*If you install Intel® LAN utility or Marvell SATA utility, this motherboard may fail Windows® Hardware Quality Lab (WHQL) certification tests. If you install the drivers only, it will pass the WHQL tests.*

## 1.3 Unique Features

ASRock Instant Flash is a BIOS flash utility embedded in Flash ROM. This convenient BIOS update tool allows you to update system BIOS without entering operating systems first like MS-DOS or Windows<sup>®</sup>. With this utility, you can press the <F6> key during the POST or the <F2> key to enter into the BIOS setup menu to access ASRock Rack Instant Flash. Just launch this tool and save the new BIOS file to your USB flash drive, floppy disk or hard drive, then you can update your BIOS only in a few clicks without preparing an additional floppy diskette or other complicated flash utility. Please be noted that the USB flash drive or hard drive must use FAT32/16/12 file system.

## EPC602D8A

## English

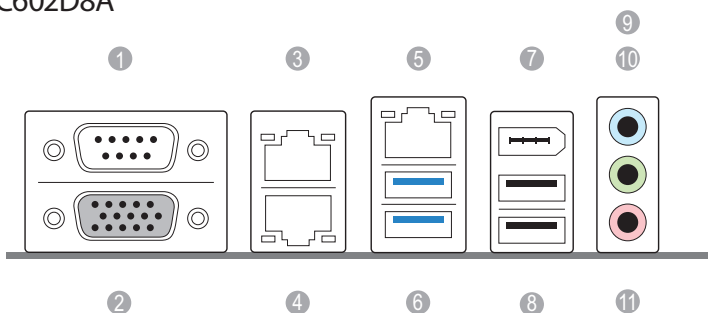


| No. | Description                                           |
|-----|-------------------------------------------------------|
| 1   | Rear Fan Connector (REAR_FAN1)                        |
| 2   | USB 3.0 Header (USB3_3_4)                             |
| 3   | 2 x 240-pin DDR3 DIMM Slots (DDR3_C2, DDR3_D2, White) |
| 4   | 2 x 240-pin DDR3 DIMM Slots (DDR3_C1, DDR3_D1, Blue)  |
| 5   | PSU SMBus (PSU_SMB1)                                  |
| 6   | ATX 12V Power Connector (ATX12V1)                     |
| 7   | Front Fan Connector (FRONT_FAN1)                      |
| 8   | ATX Power Connector (ATXPWR1)                         |
| 9   | 2 x 240-pin DDR3 DIMM Slots (DDR3_A2, DDR3_B2, White) |
| 10  | CPU Fan Connector (CPU_FAN1)                          |
| 11  | 2 x 240-pin DDR3 DIMM Slots (DDR3_A1, DDR3_B1, Blue)  |
| 12  | Front Fan Connector (FRONT_FAN2)                      |
| 13  | Auxiliary Panel Header (AUX_PANEL1)                   |
| 14  | SATA SGPIO Connector (SATA_SGPIO1)                    |
| 15  | SATA SGPIO Connector (SATA_SGPIO2)                    |
| 16  | SATA2 Connector (SATA_4), Blue                        |
| 17  | SATA3 Connector (SATA_M0), White                      |
| 18  | SATA3 Connector (SATA_M1), White                      |
| 19  | SATA2 Connector (SATA_5), Blue                        |
| 20  | Non Maskable Interrupt Button (NMI_BTN1)              |
| 21  | Front Fan Connector (FRONT_FAN3)                      |
| 22  | SATA2 Connector (SATA_2), Blue                        |
| 23  | SATA2 Connector (SATA_3), Blue                        |
| 24  | SATA3 Connector (SATA_1), White                       |
| 25  | SATA3 Connector (SATA_0), White                       |
| 26  | SCU Connector (SCU_0-3)                               |
| 27  | TPM Header (TPM1)                                     |
| 28  | USB 2.0 Header (USB_3_4)                              |
| 29  | Thermal Sensor header (TR1)                           |
| 30  | System Panel Header (PANEL1)                          |
| 31  | Speaker Header (SPEAKER1)                             |
| 32  | BMC SMBus Header (BMC_SMB_3)                          |
| 33  | BMC SMBus Header (BMC_SMB_2)                          |

| No. | Description                                         |
|-----|-----------------------------------------------------|
| 34  | BMC SMBus Header (BMC_SMB_1)                        |
| 35  | IEEE 1394 Header (1394_2)                           |
| 36  | COM Port Header (COM2)                              |
| 37  | Intelligent Platform Management Bus header (IPMB_1) |
| 38  | Vertical Type A USB 2.0 (USB_5)                     |
| 39  | ME Recovery Jumper (ME_RECOVERY1)                   |
| 40  | HDMI_SPDIF Header (HDMI_SPDIF1)                     |
| 41  | Front Panel Audio Header (HD_AUDIO1)                |

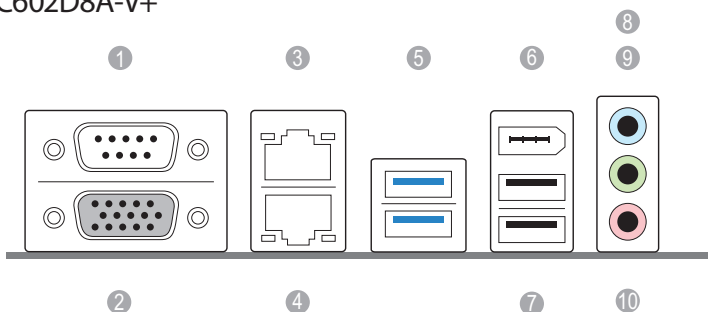
## 1.5 I/O Panel

### EPC602D8A



| No. | Description                 | No. | Description             |
|-----|-----------------------------|-----|-------------------------|
| 1   | Serial Port (COM1)          | 7   | IEEE 1394 Port (LAN2)   |
| 2   | VGA Port (VGA1)             | 8   | USB 2.0 Ports (USB_1-2) |
| 3   | LAN RJ-45 Port (LAN2)*      | 9   | Line In (Light Blue)    |
| 4   | LAN RJ-45 Port (LAN1)*      | 10  | Front Speaker (Lime)    |
| 5   | LAN RJ-45 Port (IPMI_LAN)** | 11  | Microphone (Pink)       |
| 6   | USB 3.0 Ports (USB3_1-2)    |     |                         |

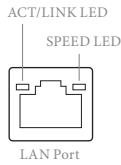
### EPC602D8A-V+



| No. | Description              | No. | Description             |
|-----|--------------------------|-----|-------------------------|
| 1   | Serial Port (COM1)       | 6   | IEEE 1394 Port (LAN2)   |
| 2   | VGA Port (VGA1)          | 7   | USB 2.0 Ports (USB_1-2) |
| 3   | LAN RJ-45 Port (LAN2)*   | 8   | Line In (Light Blue)    |
| 4   | LAN RJ-45 Port (LAN1)*   | 9   | Front Speaker (Lime)    |
| 5   | USB 3.0 Ports (USB3_1-2) | 10  | Microphone (Pink)       |

LAN Port LED Indications

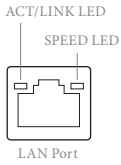
\*There are two LED next to the LAN port. Please refer to the table below for the LAN port LED indications.



Dedicated IPMI LAN Port LED Indications

| Activity / Link LED |                    | Speed LED |                    |
|---------------------|--------------------|-----------|--------------------|
| Status              | Description        | Status    | Description        |
| Off                 | No Link            | Off       | 10Mbps connection  |
| Blinking            | Data Activity      | Orange    | 100Mbps connection |
| On                  | 100Mbps connection | Green     | 1Gbps connection   |

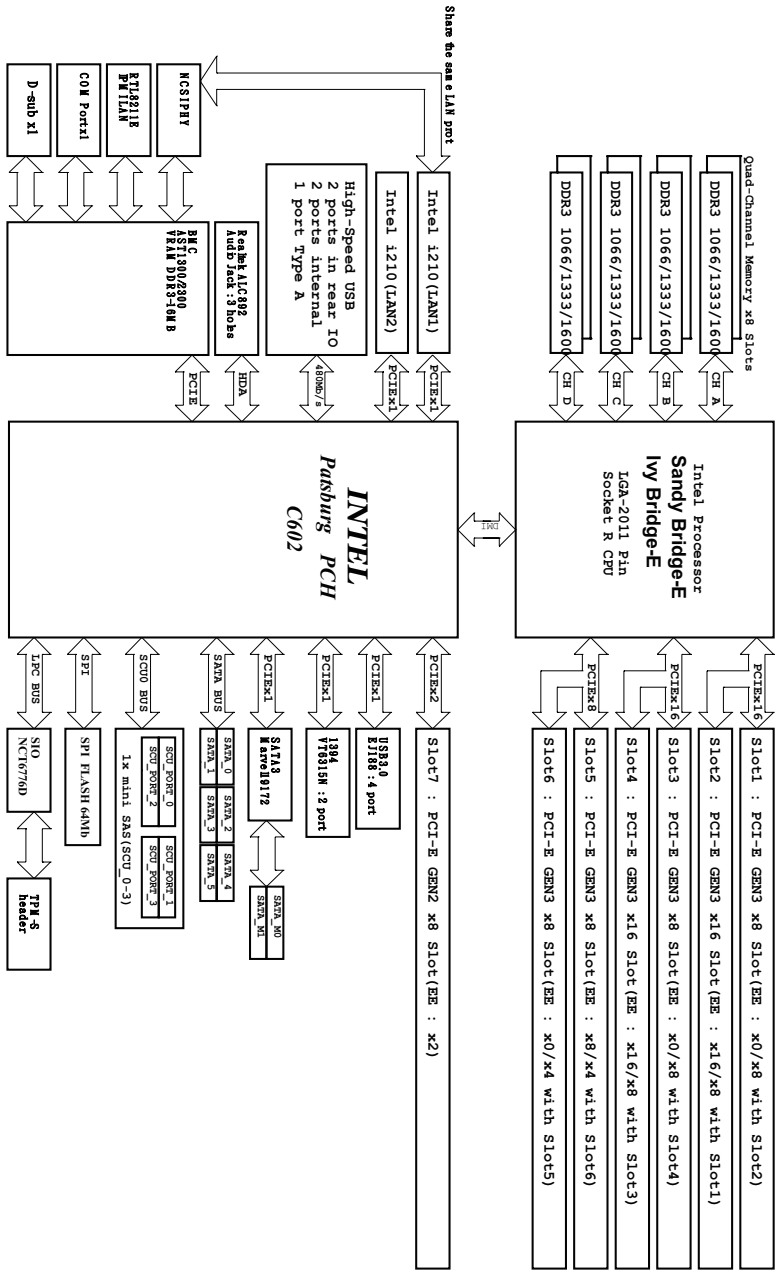
\*\*There are two LEDs on each LAN port. Please refer to the table below for the LAN port LED indications.



LAN Port (LAN1, LAN2) LED Indications

| Activity / Link LED |                    | Speed LED |                    |
|---------------------|--------------------|-----------|--------------------|
| Status              | Description        | Status    | Description        |
| Off                 | No Link            | Off       | 10Mbps connection  |
| Blinking            | Data Activity      | Off       | 100Mbps connection |
| On                  | 100Mbps connection | Green     | 1Gbps connection   |

1.6 Block Diagram



## Chapter 2 Installation

This is an ATX form factor (12" x 9.6", 30.5 cm x 24.4 cm) motherboard. Before you install the motherboard, study the configuration of your chassis to ensure that the motherboard fits into it.



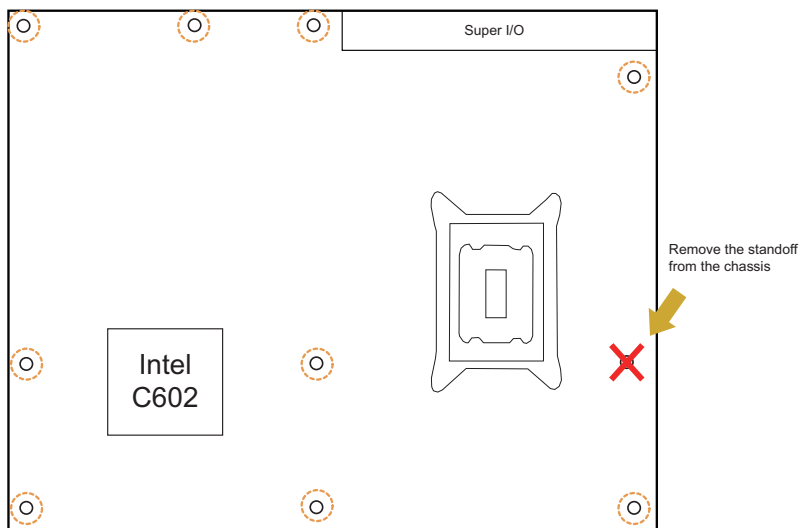
*Make sure to unplug the power cord before installing or removing the motherboard. Failure to do so may cause physical injuries to you and damages to motherboard components.*

### 2.1 Screw Holes

Place screws into the holes indicated by circles to secure the motherboard to the chassis.



*Attention! Before installing this motherboard, be sure to unscrew and remove the standoff at the marked location, under the motherboard, from the chassis, in order to avoid electrical short circuit and damage to your motherboard.*



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

## 2.2 Pre-installation Precautions

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

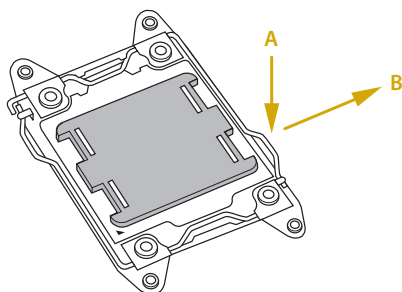
1. Unplug the power cord from the wall socket before touching any components.
2. To avoid damaging the motherboard's components due to static electricity, NEVER place your motherboard directly on the carpet or the like. Also remember to use a grounded wrist strap or touch a safety grounded object before you handle the components.
3. Hold components by the edges and do not touch the ICs.
4. Whenever you uninstall any component, place it on a grounded anti-static pad or in the bag that comes with the component.
5. When placing screws into the screw holes to secure the motherboard to the chassis, please do not over-tighten the screws! Doing so may damage the motherboard.



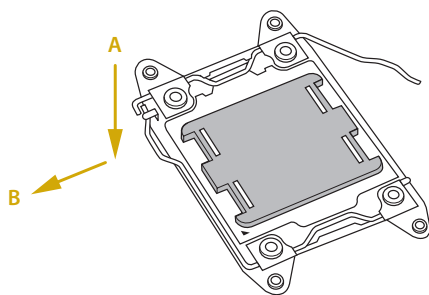
*Before you install or remove any component, ensure that the power is switched off or the power cord is detached from the power supply. Failure to do so may cause severe damage to the motherboard, peripherals, and/or components.*

## 2.3 Installing the CPU

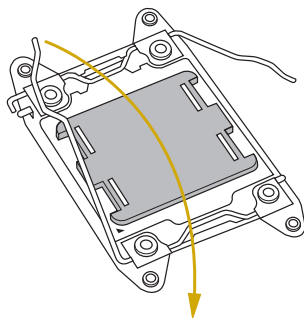
1



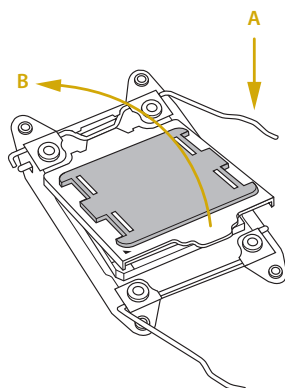
2



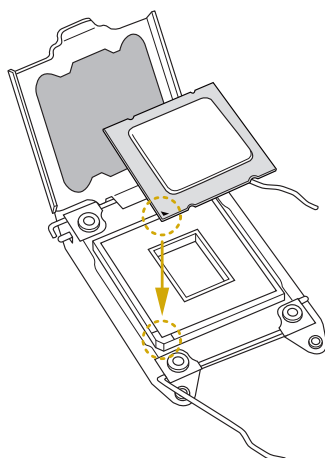
3



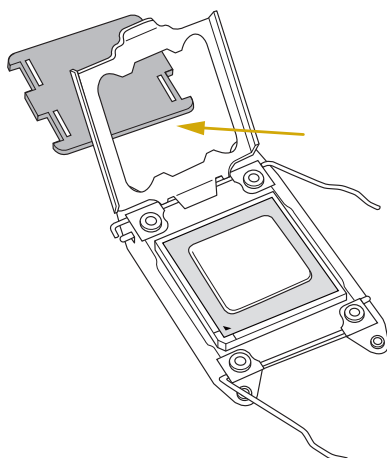
4



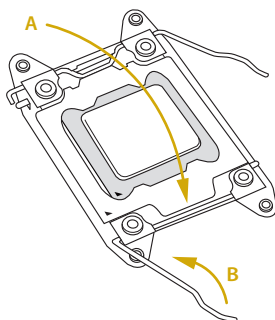
5



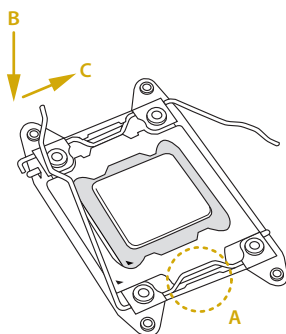
6



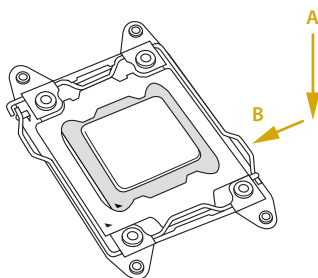
7



8



9

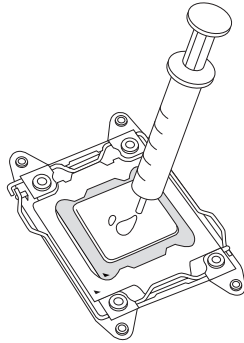


The cover must be placed if returning the motherboard for after service.

## 2.4 Installing the CPU Fan and Heatsink

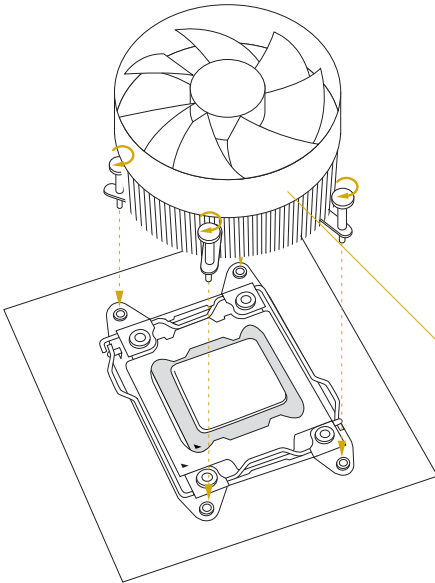
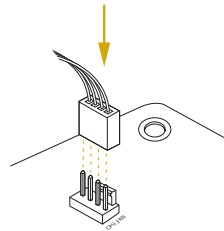


1. Before you installed the heatsink, you need to spray thermal interface material between the CPU and the heatsink to improve heat dissipation.
2. Be sure to use a CPU fan for narrow ILM socket.



1

2



CPU fan for narrow ILM socket  
\*Support an active or passive heatsink

## 2.5 Installation of Memory Modules (DIMM)

This motherboard provides eight 240-pin DDR3 (Double Data Rate 3) DIMM slots, and supports Dual Channel Memory Technology.



1. For dual channel configuration, you always need to install identical (the same brand, speed, size and chip-type) DDR3 DIMM pairs.
2. It is unable to activate Dual Channel Memory Technology with only one or three memory module installed.
3. It is not allowed to install a DDR or DDR2 memory module into a DDR3 slot; otherwise, this motherboard and DIMM may be damaged.

### Dual Channel Memory Configuration

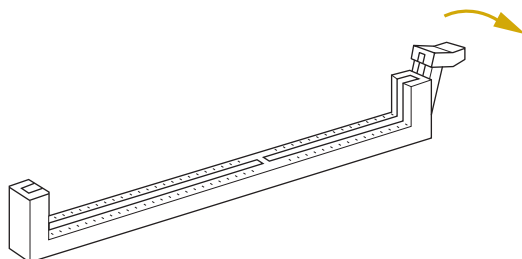
| Priority | DDR3_A1   | DDR3_A2   | DDR3_B1   | DDR3_B2   |
|----------|-----------|-----------|-----------|-----------|
| 1        | Populated |           | Populated |           |
| 2        | Populated | Populated | Populated | Populated |

| Priority | DDR3_C1   | DDR3_C2   | DDR3_D1   | DDR3_D2   |
|----------|-----------|-----------|-----------|-----------|
| 1        | Populated |           | Populated |           |
| 2        | Populated | Populated | Populated | Populated |

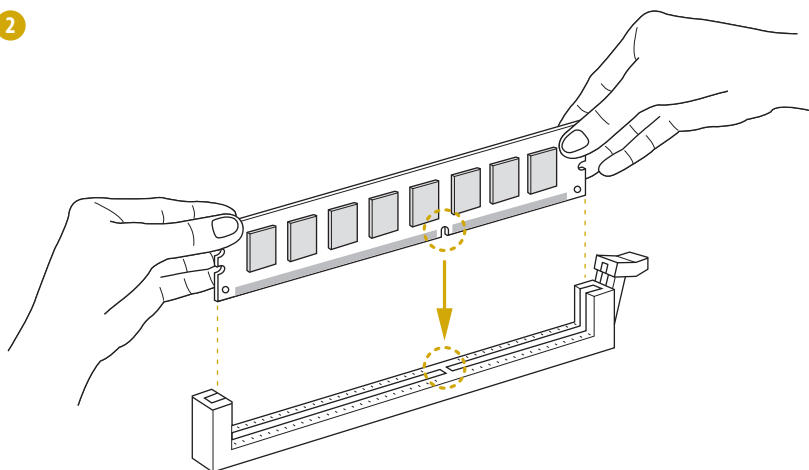


*The DIMM only fits in one correct orientation. It will cause permanent damage to the motherboard and the DIMM if you force the DIMM into the slot at incorrect orientation.*

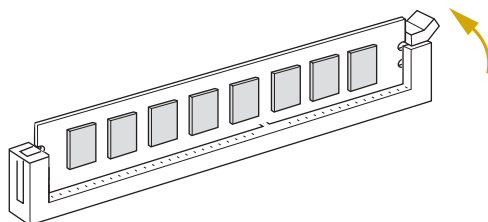
1



2



3



## 2.6 Expansion Slots (PCI and PCI Express Slots)

There are 7 PCI Express slots on this motherboard.

### PCIe slot:

PCIe7 (PCIe 2.0 x8 slot, from Intel C602 chipset) is used for PCI Express x2 lane width graphics cards.

PCIe1, PCIe3, PCIe5 and PCIe6 (PCIe 3.0 x8 slot, from CPU) are used for PCI Express x8 lane width graphics cards.

PCIe2 and PCIe4 (PCIe 3.0 x16 slot, from CPU) are used for PCI Express x16 lane width graphics cards.

| Slot   | Generation | Mechanical | Electrical | Source             |
|--------|------------|------------|------------|--------------------|
| PCIe 1 | 3.0        | x8         | x8         | CPU                |
| PCIe 2 | 3.0        | x16        | x16        | CPU                |
| PCIe 3 | 3.0        | x8         | x8         | CPU                |
| PCIe 4 | 3.0        | x16        | x16        | CPU                |
| PCIe 5 | 3.0        | x8         | x8         | CPU                |
| PCIe 6 | 3.0        | x8         | x8         | CPU                |
| PCIe 7 | 2.0        | x8         | x2         | Intel C602 chipset |

### PCI Express Slot Configuration

|                      | PCIe 1 | PCIe 2 |
|----------------------|--------|--------|
| Single Graphics Card |        | x16    |
| Two Graphics Cards   | x8     | x8     |

| No.                  | PCIe 3 | PCIe 4 |
|----------------------|--------|--------|
| Single Graphics Card |        | x16    |
| Two Graphics Cards   | x8     | x8     |

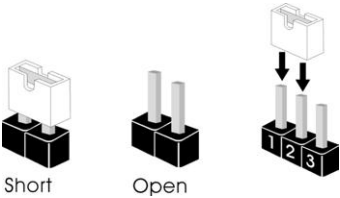
| No.                  | PCIe 5 | PCIe 6 |
|----------------------|--------|--------|
| Single Graphics Card | x8     |        |
| Two Graphics Cards   | x4     | x4     |

## Installing an expansion card

- Step 1. Before installing an expansion card, please make sure that the power supply is switched off or the power cord is unplugged. Please read the documentation of the expansion card and make necessary hardware settings for the card before you start the installation.
- Step 2. Remove the system unit cover (if your motherboard is already installed in a chassis).
- Step 3. Remove the bracket facing the slot that you intend to use. Keep the screws for later use.
- Step 4. Align the card connector with the slot and press firmly until the card is completely seated on the slot.
- Step 5. Fasten the card to the chassis with screws.
- Step 6. Replace the system cover.

## 2.7 Jumper Setup

The illustration shows how jumpers are setup. When the jumper cap is placed on the pins, the jumper is “Short”. If no jumper cap is placed on the pins, the jumper is “Open”. The illustration shows a 3-pin jumper whose pin1 and pin2 are “Short” when a jumper cap is placed on these 2 pins.



---

ME Recovery Jumper  
(3-pin ME\_RECOVERY1)  
(see p.7, No. 39)

**1\_2**  
  
Default

**2\_3**  
  
ME Recovery Mode

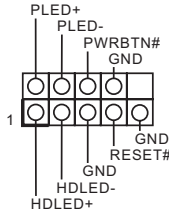
---

## 2.8 Onboard Headers and Connectors



Onboard headers and connectors are NOT jumpers. Do NOT place jumper caps over these headers and connectors. Placing jumper caps over the headers and connectors will cause permanent damage to the motherboard.

System Panel Header  
(9-pin PANEL1)  
(see p.7, No. 30)



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



**PWRBTN (Power Switch):**

Connect to the power switch on the chassis front panel. You may configure the way to turn off your system using the power switch.

**RESET (Reset Switch):**

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

**PLED (System Power LED):**

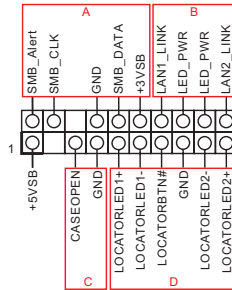
Connect to the power status indicator on the chassis front panel. The LED is on when the system is operating. The LED keeps blinking when the system is in S1/S3 sleep state. The LED is off when the system is in S4 sleep state or powered off (S5).

**HDLED (Hard Drive Activity LED):**

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

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

**Auxiliary Panel Header**  
(18-pin AUX PANEL\_1)  
(see p.7, No. 13)

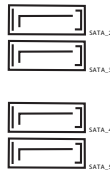


This header supports multiple functions on the front panel, including the front panel SMB, internet status indicator and chassis intrusion pin.



- A. Front panel SMBus connecting pin (6-1 pin FPSMB)**  
This header allows you to connect SMBus (System Management Bus) equipment. It can be used for communication between peripheral equipment in the system, which has slower transmission rates, and power management equipment.
- B. Internet status indicator (2-pin LAN1\_LED, LAN2\_LED)**  
These two 2-pin headers allow you to use the Gigabit internet indicator cable to connect to the LAN status indicator. When this indicator flickers, it means that the internet is properly connected.
- C. Chassis intrusion pin (2-pin CHASSIS)**  
This header is provided for host computer chassis with chassis intrusion detection designs. In addition, it must also work with external detection equipment, such as a chassis intrusion detection sensor or a microswitch. When this function is activated, if any chassis component movement occurs, the sensor will immediately detect it and send a signal to this header, and the system will then record this chassis intrusion event. The default setting is set to the CASEOPEN and GND pin; this function is off.
- D. Locator LED (6-pin LOCATOR)**  
This header is for the locator switch and LED on the front panel.

**Serial ATA2 Connectors**  
(SATA\_2)  
(see p.7, No. 22)  
(SATA\_3)  
(see p.7, No. 23)  
(SATA\_4)  
(see p.7, No. 16)  
(SATA\_5)  
(see p.7, No. 19)



These four SATA2 connectors support SATA data cables for internal storage devices with up to 3.0 Gb/s data transfer rate.

## Serial ATA3 Connectors

(SATA\_M0)

(see p.7, No. 17)

(SATA\_M1)

(see p.7, No. 18)

(SATA\_0)

(see p.7, No. 25)

(SATA\_1)

(see p.7, No. 24)

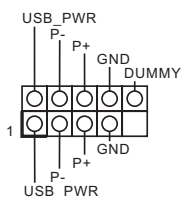


These four SATA3 connectors support SATA data cables for internal storage devices with up to 6.0 Gb/s data transfer rate.

## USB 2.0 Header

(9-pin USB\_3\_4)

(see p.7, No. 28)



Besides two USB 2.0 ports on the I/O panel, there is one header on this motherboard. Each USB 2.0 header can support two ports.

## USB 2.0 Connector

(USB\_5)

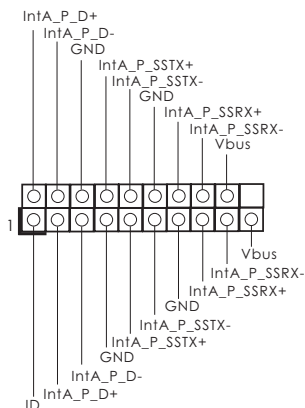
(see p.7, No. 38)



## USB 3.0 Header

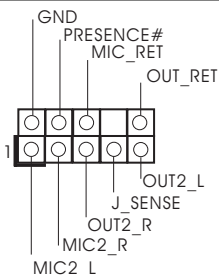
(19-pin USB3\_3\_4)

(see p.7, No. 2)



Besides two default USB 3.0 ports on the I/O panel, there is one USB 3.0 header on this motherboard. This USB 3.0 header can support two USB 3.0 ports.

Front Panel Audio Header  
(9-pin HD\_AUDIOI1)  
(see p.7, No. 41)



This is an interface for the front panel audio cable that allows convenient connection and control of audio devices.



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.

Chassis Speaker Header  
(4-pin SPEAKER1)  
(see p.7, No. 31)



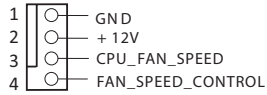
Please connect the chassis speaker to this header.

HDMI\_SPDIF Header  
(2-pin HDMI\_SPDIF1)  
(see p.7 No. 40)



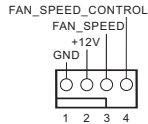
HDMI\_SPDIF header, providing SPDIF audio output to HDMI VGA card, allows the system to connect HDMI Digital TV/projector/LCD devices. Please connect the HDMI connector of HDMI VGA card to this header.

CPU Fan Connector  
(4-pin CPU\_FAN1)  
(see p.7, No. 10)

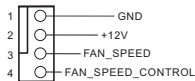


This motherboard provides a 4-Pin CPU fan (Quiet Fan) connector. If you plan to connect a 3-Pin CPU fan, please connect it to Pin 1-3.

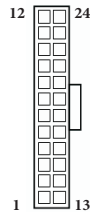
Front and Rear Fan Connectors  
(4-pin FRONT\_FAN1)  
(4-pin FRONT\_FAN2)  
(4-pin FRONT\_FAN3)  
(see p.7, No. 7, 12, 21)  
  
(4-pin REAR\_FAN1)  
(see p.7, No. 1)



Please connect fan cables to the fan connectors and match the black wire to the ground pin. All fans support Fan Control.



ATX Power Connector  
(24-pin ATXPWR1)  
(see p.7, No. 8)



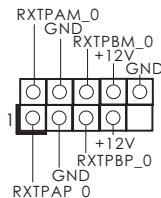
This motherboard provides a 24-pin ATX power connector. To use a 20-pin ATX power supply, please plug it along Pin 1 and Pin 13.

ATX 12V Power Connector  
(8-pin ATX12V1)  
(see p.7, No. 6)



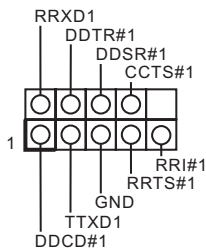
This motherboard provides a 8-pin ATX 12V power connector.

IEEE 1394 Header  
(9-pin 1394\_2)  
(see p.7 No. 35)



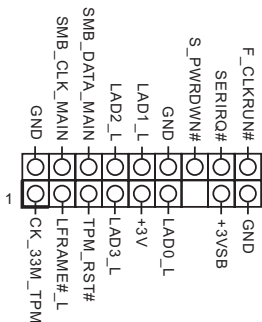
Besides one default IEEE 1394 port on the I/O panel, there is one IEEE 1394 header (1394\_2) on this motherboard. This IEEE 1394 header can support one IEEE 1394 port.

Serial Port Header  
(9-pin COM2)  
(see p.7, No. 36)



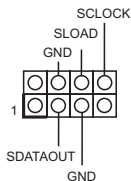
This COM2 header supports a serial port module.

TPM Header  
(17-pin TPM1)  
(see p.7, No. 27)



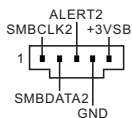
This connector supports Trusted Platform Module (TPM) system, which can securely store keys, digital certificates, passwords, and data. A TPM system also helps enhance network security, protects digital identities, and ensures platform integrity.

Serial General Purpose  
Input/Output Headers  
(7-pin SATA\_SGPIO1)  
(see p.7, No. 14)  
(7-pin SATA\_SGPIO2)  
(see p.7, No. 15)



These headers support Serial Link interface for onboard SATA connections.

PSU SMBus  
(PSU\_SMB1)  
(see p.7, No. 5)



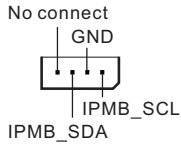
PSU SMBus monitors the status of the power supply, fan and system temperature.

Non Maskable Interrupt  
Button Header  
(NMI\_BTN1)  
(see p.7, No. 20)



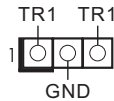
Please connect a NMI device to this header.

Intelligent Platform  
Management Bus header  
(4-pin IPMB\_1)  
(see p.7, No. 37)



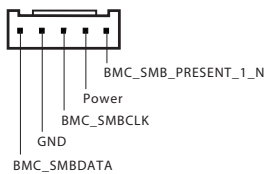
This 4-pin connector is used to provide a cabled base-board or front panel connection for value added features and 3rd-party add-in cards, such as Emergency Management cards, that provide management features using the IPMB.

Thermal Sensor Header  
(3-pin TR1)  
(see p.7, No. 29)



Please connect the thermal sensor cable to either pin 1-2 or pin 2-3 and the other end to the device which you wish to monitor its temperature.

Baseboard Management  
Controller SMBus Headers  
(5-pin BMC\_SMB\_1)  
(5-pin BMC\_SMB\_2)  
(5-pin BMC\_SMB\_3)  
(see p.7, No. 34, 33, 32)



These headers are used for the SM BUS devices.

SCU Connector  
(SCU\_0-3)  
(see p.7, No. 26)



This SCU connector supports SAS/SATA data cables for internal storage devices. The current SAS2/SATA3 interface allows up to 6.0 Gb/s data transfer rate. For connecting SAS HDDs, please contact SAS data cable dealers.

## 2.9 Dr. Debug

Dr. Debug is used to provide code information, which makes troubleshooting even easier. Please see the diagrams below for reading the Dr. Debug codes.

| Code                                                    | Description                                                                                                                                                                                          |
|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>00</b>                                               | Please check if the CPU is installed correctly and then clear CMOS.                                                                                                                                  |
| <b>0d</b>                                               | Problem related to memory, VGA card or other devices. Please clear CMOS, re-install the memory and VGA card, and remove other USB, PCI devices.                                                      |
| <b>01 - 54</b><br>(except <b>0d</b> ),<br><b>5A- 60</b> | Problem related to memory. Please re-install the CPU and memory then clear CMOS. If the problem still exists, please install only one memory module or try using other memory modules.               |
| <b>55</b>                                               | The Memory could not be detected. Please re-install the memory and CPU. If the problem still exists, please install only one memory module or try using other memory modules.                        |
| <b>61 - 91</b>                                          | Chipset initialization error. Please press reset or clear CMOS.                                                                                                                                      |
| <b>92 - 99</b>                                          | Problem related to PCI-E devices. Please re-install PCI-E devices or try installing them in other slots. If the problem still exists, please remove all PCI-E devices or try using another VGA card. |
| <b>A0 - A7</b>                                          | Problem related to IDE or SATA devices. Please re-install IDE and SATA devices. If the problem still exists, please clear CMOS and try removing all SATA devices.                                    |
| <b>b0</b>                                               | Problem related to memory. Please re-install the CPU and memory. If the problem still exists, please install only one memory module or try using other memory modules.                               |
| <b>b4</b>                                               | Problem related to USB devices. Please try removing all USB devices.                                                                                                                                 |
| <b>b7</b>                                               | Problem related to memory. Please re-install the CPU and memory then clear CMOS. If the problem still exists, please install only one memory module or try using other memory modules.               |
| <b>d6</b>                                               | The VGA could not be recognized. Please clear CMOS and try re-installing the VGA card. If the problem still exists, please try installing the VGA card in other slots or use other VGA cards.        |
| <b>d7</b>                                               | The Keyboard and mouse could not be recognized. Please try re-installing the keyboard and mouse.                                                                                                     |
| <b>d8</b>                                               | Invalid Password.                                                                                                                                                                                    |
| <b>FF</b>                                               | Please check if the CPU is installed correctly and then clear CMOS.                                                                                                                                  |

## 2.10 Driver Installation Guide

To install the drivers to your system, please insert the support CD to your optical drive first. Then, the drivers compatible to your system can be auto-detected and listed on the support CD driver page. Please follow the order from top to bottom to install those required drivers. Therefore, the drivers you install can work properly.

## 2.11 Dual LAN and Teaming Operation Guide

Dual LAN with Teaming enabled on this motherboard allows two single connections to act as one single connection for twice the transmission bandwidth, making data transmission more effective and improving the quality of transmission of distant images. Fault tolerance on the dual LAN network prevents network downtime by transferring the workload from a failed port to a working port.



*The speed of transmission is subject to the actual network environment or status even with Teaming enabled.*

Before setting up Teaming, please make sure whether your Switch (or Router) supports Teaming (IEEE 802.3ad Link Aggregation). You can specify a preferred adapter in Intel PROSet. Under normal conditions, the Primary adapter handles all non-TCP/IP traffic. The Secondary adapter will receive fallback traffic if the primary fails. If the Preferred Primary adapter fails, but is later restored to an active status, control is automatically switched back to the Preferred Primary adapter.

### **Step 1**

From **Device Manager**, open the properties of a team.

### **Step 2**

Click the **Settings** tab.

### **Step 3**

Click the **Modify Team** button.

### **Step 4**

Select the adapter you want to be the primary adapter and click the **Set Primary** button.

If you do not specify a preferred primary adapter, the software will choose an adapter of the highest capability (model and speed) to act as the default primary. If a failover occurs, another adapter becomes the primary. The adapter will, however, rejoin the team as a non-primary.

## Chapter 3 UEFI Setup Utility

### 3.1 Introduction

This section explains how to use the UEFI SETUP UTILITY to configure your system. The UEFI chip on the motherboard stores the UEFI SETUP UTILITY. You may run the UEFI SETUP UTILITY when you start up the computer. Please press <F2> or <Del> during the Power-On-Self-Test (POST) to enter the UEFI SETUP UTILITY; otherwise, POST will continue with its test routines.

If you wish to enter the UEFI SETUP UTILITY after POST, restart the system by pressing <Ctrl> + <Alt> + <Delete>, or by pressing the reset button on the system chassis. You may also restart by turning the system off and then back on.



*Because the UEFI software is constantly being updated, the following UEFI setup screens and descriptions are for reference purpose only, and they may not exactly match what you see on your screen.*

#### 3.1.1 UEFI Menu Bar

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

| Item        | Description                                                                 |
|-------------|-----------------------------------------------------------------------------|
| Main        | To set up the system time/date information                                  |
| OC Tweaker  | To set up overclocking features                                             |
| Advanced    | To set up the advanced UEFI features                                        |
| H/W Monitor | To display current hardware status                                          |
| Server Mgmt | To manage the server <i>(not supported for EPC602D8A-V+)</i>                |
| Boot        | To set up the default system device to locate and load the Operating System |
| Security    | To set up the security features                                             |
| Exit        | To exit the current screen or the UEFI SETUP UTILITY                        |
| Event Logs  | For event log configuration                                                 |

Use <←> key or <↔> key to choose among the selections on the menu bar, and then press <Enter> to get into the sub screen. You can also use the mouse to click your required item.

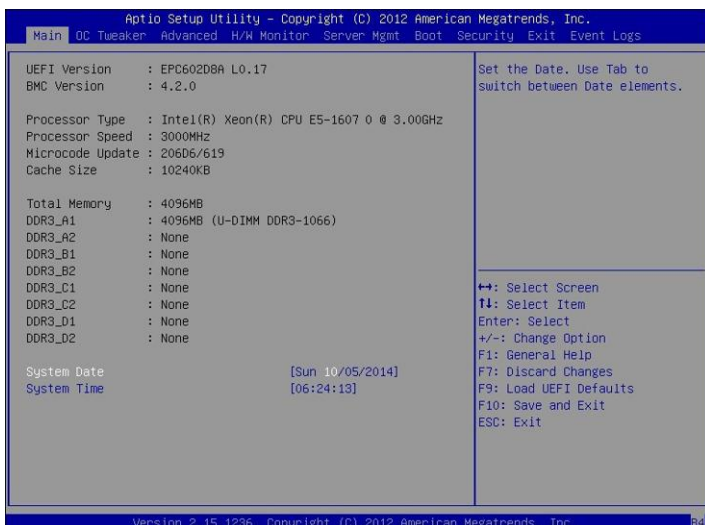
### 3.1.2 Navigation Keys

Please check the following table for the function description of each navigation key.

| 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            |
| <Tab>             | Switch to next function                            |
| <Enter>           | To bring up the selected screen                    |
| <PGUP>            | Go to the previous page                            |
| <PGDN>            | Go to the next page                                |
| <HOME>            | Go to the top of the screen                        |
| <END>             | Go to the bottom of the screen                     |
| <F1>              | To display the General Help Screen                 |
| <F7>              | Discard changes and exit the UEFI SETUP UTILITY    |
| <F9>              | Load optimal default values for all the settings   |
| <F10>             | Save changes and exit the UEFI SETUP UTILITY       |
| <F12>             | Print screen                                       |
| <ESC>             | Jump to the Exit Screen or exit the current screen |

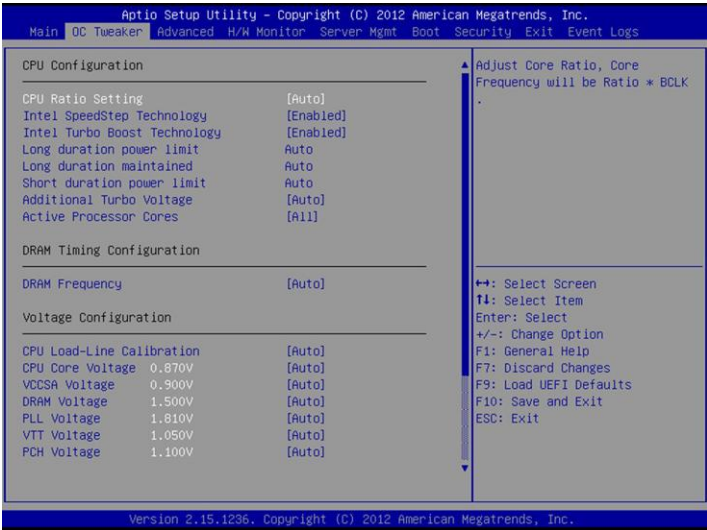
## 3.2 Main Screen

Once you enter the UEFI SETUP UTILITY, the Main screen will appear and display the system overview. The Main screen provides system overview information and allows you to set the system time and date.



### 3.3 OC Tweaker Screen

In the OC Tweaker screen, you can set up overclocking features.



#### 3.3.1 CPU Configuration

##### CPU Ratio Setting

Use this item to adjust the Core Ratio. The CPU speed is determined by the CPU Ratio multiplied with the BCLK. Increasing the CPU Ratio will increase the internal CPU clock speed without affecting the clock speed of other components.

##### Max Ratio

When the CPU Ratio Setting is set to [All Core], use this item to set the maximum core ratio for all cores. The valid value ranges differently according to your CPU model.

##### x-Core Ratio Limit (x means number)

When the CPU Ratio Setting is set to [Per Core], use this item to set the CPU core ratio individually. The valid value ranges differently according to your CPU model. (Supported only for overclocking CPU models)

## 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® Vista™ / 7 / 8 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(R) 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

Use this item to enable or disable Intel Turbo Boost Technology. Turbo Boost allows processor cores to run faster than marked frequency in specific conditions. The default value is [Enabled].

## Long Duration Power Limit

Use this item to configure long duration power limit in watts. When the limit is exceeded, the CPU ratio will be lowered after a period of time. A lower limit can protect the CPU and save power, while a higher limit may improve performance.

## Long Duration Maintained

Use this item to configure time window which the long duration power is maintained.

## Short Duration Power Limit

Use this item to configure short duration power limit in watts. When the limit is exceeded, the CPU ratio will be lowered immediately. A lower limit can protect the CPU and save power, while a higher limit may improve performance.

## Additional Turbo Voltage

Use this item to add voltage when CPU is in Turbo mode.

## Active Processor Cores

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

## 3.3.2 DRAM Timing Configuration

### DRAM Frequency

If [Auto] is selected, the motherboard will detect the memory module(s) inserted and

assign the appropriate frequency automatically.

### 3.3.3 Voltage Configuration

#### CPU Load-Line Calibration

CPU Load-Line Calibration helps prevent CPU voltage droop when the system is under heavy load.

#### CPU Core Voltage

Use this to select CPU Core Voltage. The default value is [Auto].

#### VCCSA Voltage

Use this to select VCCSA Voltage. The default value is [Auto].

#### DRAM Voltage

Use this to configure DRAM Voltage. The default value is [Auto].

#### PLL Voltage

Use this to select PLL Voltage. The default value is [Auto].

#### VTT Voltage

Use this to select VTT Voltage. The default value is [Auto].

#### PCH Voltage

Use this to configure PCH Voltage. The default value is [Auto].

### 3.3.4 Saving Current Settings as User Defaults

In this option, you are allowed to load and save three user defaults according to your own requirements.

#### Save 1st User Default

Type the name and press [ENTER] to save the changes as the 1st User Default.

#### Save 2nd User Default

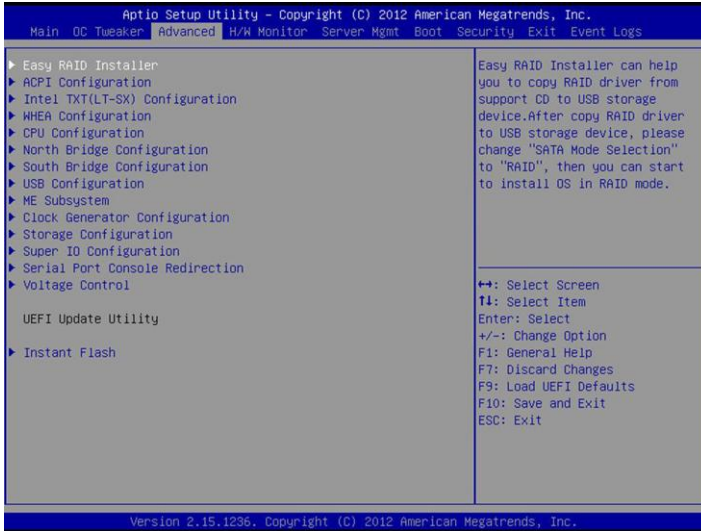
Type the name and press [ENTER] to save the changes as the 2nd User Default.

#### Save 3rd User Default

Type the name and press [ENTER] to save the changes as the 3rd User Default.

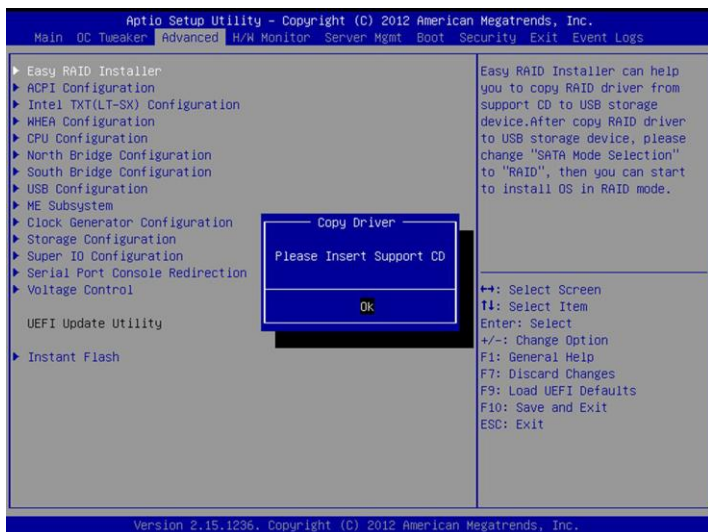
### 3.4 Advanced Screen

In this section, you may set the configurations for the following items: Easy RAID Installer, ACPI Configuration, Intel TXT(LS-SX) Configuration, WHEA Configuration, CPU Configuration, North Bridge Configuration, South Bridge Configuration, USB Configuration, ME Subsystem, Clock Generator Configuration, Storage Configuration, Super IO Configuration, Serial Port Console Redirection, Voltage Control and Instant Flash.



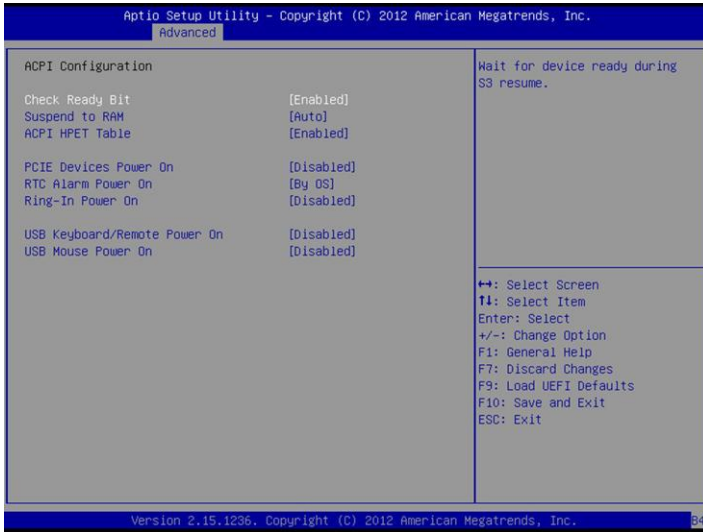
Setting wrong values in this section may cause the system to malfunction.

## 3.4.1 Easy RAID Installer



Easy RAID Installer can help you to copy the RAID driver from a support CD to your USB storage device. After copying the RAID driver to your USB storage device, please change “SATA Mode” to “RAID”, then you can start installing the OS in RAID mode.

## 3.4.2 ACPI Configuration



### Check Ready Bit

Use this item to enable or disable the feature Check Ready Bit.

### Suspend to RAM

Use this item to select whether to auto-detect or disable the Suspend-to-RAM feature. Selecting [Auto] will enable this feature if the 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.

### RTC Alarm Power On

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

### Ring-In Power On

Use this item to enable or disable Ring-In signals to turn on the system from the power-soft-off mode.

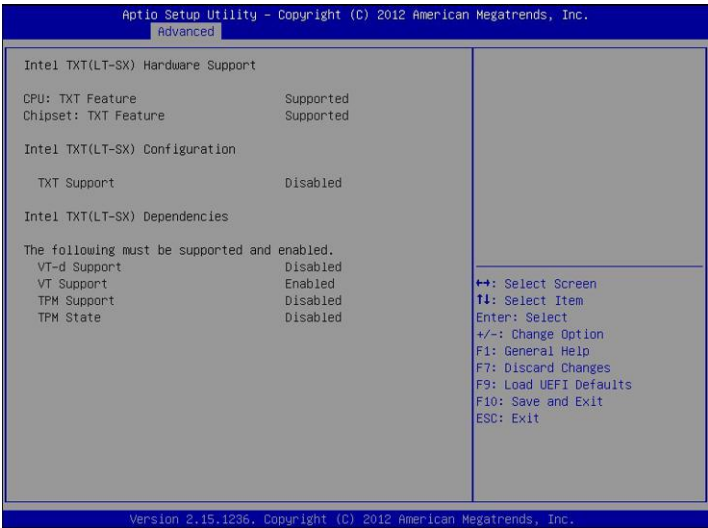
### USB Keyboard/Remote Power On

Use this item to enable or disable USB Keyboard/Remote to turn on the system from the power-soft-off mode.

### USB Mouse Power On

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

## 3.4.3 Intel TXT(LT-SX) Configuration

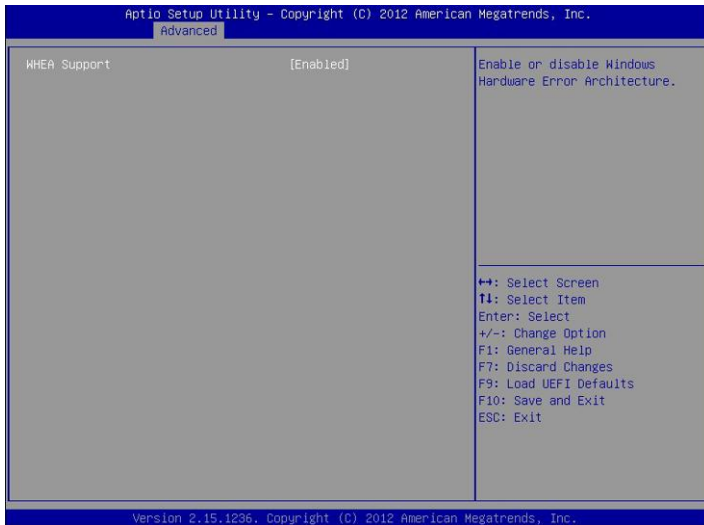


### Intel Trusted Execution Technology (TXT) Hardware Support



Please install a Trusted Platform Module (TPM) on the motherboard to enable the Intel TXT(LT-SX) Configuration.

### 3.4.4 WHEA Configuration



#### WHEA Support

Use this option to enable or disable Windows Hardware Error Architecture. The default value is [Enabled].

### 3.4.5 CPU Configuration



#### CPU\_BSP1 Information

Display information regarding the primary processor (BootStrap Processor).

#### Intel Hyper Threading Technology

Intel Hyper Threading Technology allows multiple threads to run on each core, so that the overall performance on threaded software is improved.

#### Active Processor Cores

Select the number of cores to enable in each processor package.

#### Limit CPUID Maximum

This function allows you to limit CPUID maximum value. (It is set as Disabled for Windows® XP.)

#### No-Execute Memory Protection

Processors with No-Execution Memory Protection Technology may prevent certain classes of malicious buffer overflow attacks.

#### Hardware Prefetcher

Automatically prefetch data and code for the processor. Enable for better performance.

## Adjacent Cache Line Prefetch

Automatically prefetch the subsequent cache line while retrieving the currently requested cache line. Enable for better performance.

## DCU Streamer Prefetcher

If enabled, the DCU (data cache unit) Streamer Prefetcher prefetches the next L1 Data line based upon multiple loads in same cache line. It is recommended to enable this option to enhance data processing capacity.

## DCU IP Prefetcher

If enabled, the DCU (data cache unit) IP (Instruction Pointer) Prefetcher predicts what memory addresses are going to be used by the program and delivers that data just in time.

## Intel Virtualization Technology

Intel Virtualization Technology allows a platform to run multiple operating systems and applications in independent partitions, so that one computer system can function as multiple virtual systems.

## PPIN Support

Use this item to enable or disable the PPIN support.

## CPU Power Management Configuration

### Power Technology

Use this item to enable the power management features.

### Energy Performance

Use this item to configure energy performance.

### Factory Long Duration Power Limit

Use this item to configure the factory long duration power limit.

### Long Duration Power Limit

Use this item to configure long duration power limit in watts. If 0 is selected, the option will turn to [Auto].

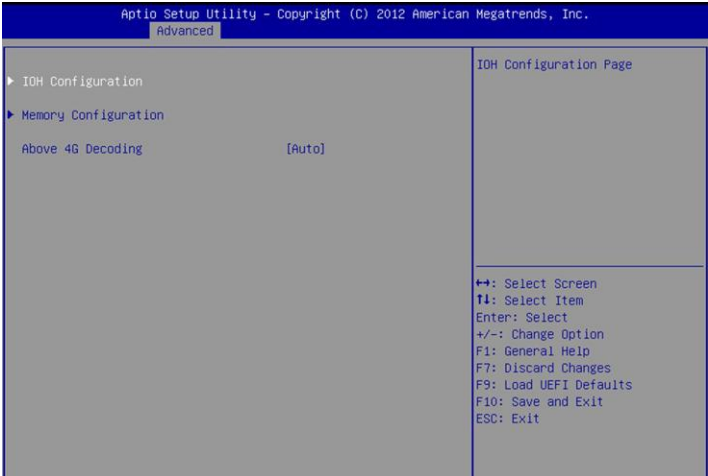
### Long Duration Maintained

Use this item to configure time window which the long duration power is maintained. If 0 is selected, the option will turn to [Auto].

## Short Duration Power Limited

Use this item to configure short duration power limit in watts. If 0 is selected, the option will turn to [Auto].

## 3.4.6 North Bridge Configuration



## IOH Configuration

### Intel(R) VT-d

Use this item to enable or disable Intel(R) Virtualization Technology for Directed I/O. The default value is [Disabled].

### Intel(R) I/OAT

Use this to enable or disable Intel® I/O Acceleration Technology.

## Primary Graphics Adapter

If a PCI Express graphics card is installed on the motherboard, you may use this option to select PCI Express or Onboard as the primary graphics adapter.

### Onboard VGA

Use this to enable or disable the Onboard VGA function. The default value is [Auto].

*\*This item is not available when the Primary Graphic Adapter is set to [Onboard].*

## PCIE 1 & PCIE 2 Link Width

This allows you to select PCIE 1 & PCIE 2 Link Width. The default value is [Gen2].

## PCIE 1 & PCIE 2 Link Speed

This allows you to select PCIE1 & PCIE2 Link Speed. The default value is [Auto].

## PCIE 3 & PCIE 4 Link Width

This allows you to select PCIE 3 & PCIE 4 Link Width. The default value is [Gen2].

## PCIE 3 & PCIE 4 Link Speed

This allows you to select PCIE3 & PCIE4 Link Speed. The default value is [Auto].

## PCIE 5 & PCIE 6 Link Width

This allows you to select PCIE 5 & PCIE 6 Link Width. The default value is [Gen2].

## PCIE 5 & PCIE 6 Link Speed

This allows you to select PCIE5 & PCIE6 Link Speed. The default value is [Auto].

## Memory Configuration

### Memory Mode

Select the mode for memory initialization.

- [Independent]: Independent channel mode.
- [Mirroring]: The memory subsystem writes identical data to two channels simultaneously. Identical memory modules should be installed in the two channels closest to the processor.
- [Lock Step]: The two channels closest to the processor are combined to form a single channel. Memory modules must be identical in size, speed, and technology in corresponding slots.
- [Sparing]: This mode occurs when on-demand inactive memory is automatically activated by the system to temporarily replace failed memory until a service action can be performed.

### ECC Support

Use this item to enable or disable DDR ECC support.

### DRAM RAPL BWLIMIT

This item sets the limits on the average power consumption and the bandwidth of a DRAM module.

## Perform and DFX Devices

This item can set the Perform and DFX devices hidden or unhidden.

## DRAM RAPL(Running Average Power Limit ) Mode

RAPL (Running Average Power Limit ) provides mechanisms to enforce power consumption limits on supported processors. The default is [DRAM RAPL Mode 1].

## DRAM Frequency

If [Auto] is selected, the motherboard will detect the memory module(s) inserted and assigns appropriate frequency automatically.

## Channel Interleaving

It allows you to enable Channel Memory Interleaving. The default value is [Auto].

## Rank Interleaving

It allows you to select a rank memory interleaving method. The default value is [Auto].

## Patrol Scrub

Patrol Scrub is a background activity initiated by the processor to seek out and fix memory errors. The default value is [Enabled].

## Demand Scrub

Fix the error when the CPU or I/O issues a demand-read command, and the read data from memory turns out to be a correctable error. The default value is [Disabled].

## Data Scrambling

Enable this feature to ensure data security and integrity.

## Thermal Throttling

Use this automatic memory throttling feature to reduce power consumption. The default value is [CLTT] (Closed Loop Thermal Throttling).

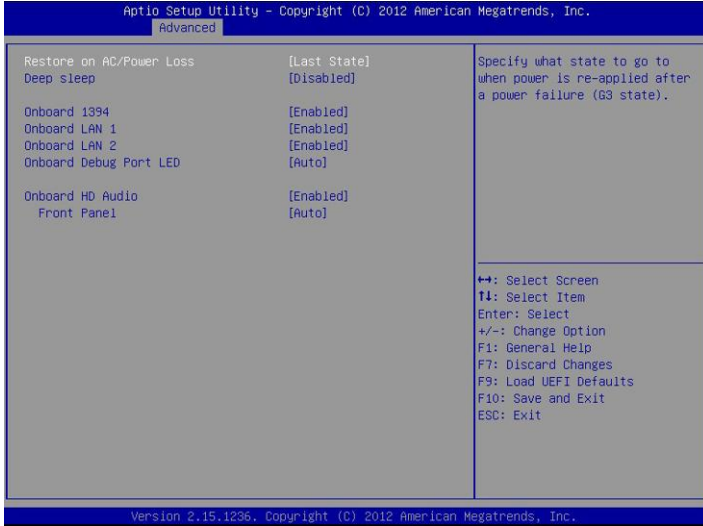
## DIMM Information

Display DIMM information.

## Above 4G Decoding

Use this option to enable or disable 64bit capable devices to be decoded in above 4G address space (only if system supports 64bit PCI decoding).

### 3.4.7 South Bridge Configuration



#### Restore on AC/Power Loss

This allows you to set the power state after an unexpected AC/power loss. If [Power Off] is selected, the AC/power remains off when the power recovers. If [Power On] is selected, the AC/power resumes and the system starts to boot up when the power recovers. If [Last State] is selected, the AC/power resumes or remains off when the power recovers, depending on the last state when an unexpected AC/power loss occurs.

#### Deep Sleep

Mobile platforms support Deep S4/S5 in DC only and desktop platforms support Deep S4/S5 in AC only. The default value is [Disabled].

#### Onboard 1394

Use this item to enable and disable the onboard 1394 controller.

#### Onboard LAN1

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

#### Onboard LAN2

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

## Onboard Debug Port LED

Use this to enable or disable the Onboard Debug Port LED. The default value is [Auto].

## Onboard HD Audio

Select [Enabled], [Disabled] or [Auto] for the onboard HD Audio feature. If you select [Enabled], the onboard HD Audio will be disabled when PCI Sound Card is plugged.

## Front Panel

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

### 3.4.8 USB Configuration



#### USB 3.0 Controller

Use this item to enable or disable the use of USB controller. The default value is [Enabled].

#### USB 2.0 Controller

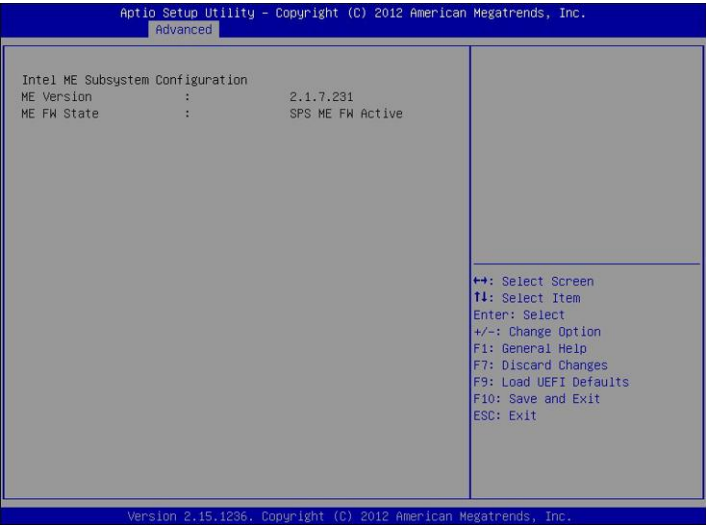
Use this item to enable or disable the use of USB controller. The default value is [Enabled].

#### Legacy USB Support

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

| Option   | Description                                                                                                                                                                              |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Enabled  | Enables support for legacy USB.                                                                                                                                                          |
| Disabled | USB devices are not allowed to use under legacy OS and UEFI setup when [Disabled] is selected. If you have USB compatibility issues, it is recommended to select [Disabled] to enter OS. |

### 3.4.9 ME Subsystem



ME Subsystem screen displays the Intel ME Subsystem Configuration information, such as ME Version and ME FW State.

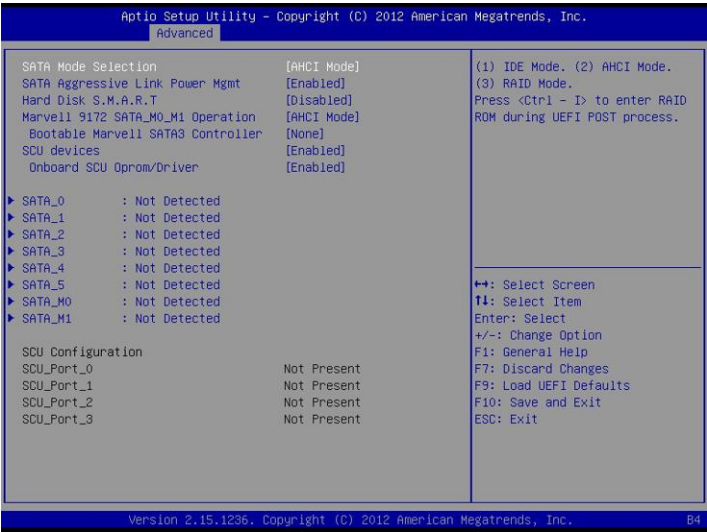
### 3.4.10 Clock Generator Configuration



#### Spread Spectrum

Use this item to enable or disable the spread spectrum feature. The default value is [Disabled].

### 3.4.11 Storage Configuration



#### SATA Mode Selection

Use this to select SATA mode. Configuration options: [Disabled], [IDE Mode], [AHCI Mode] and [RAID Mode]. The default value is [AHCI Mode].



AHCI (Advanced Host Controller Interface) supports NCQ and other new features that will improve SATA disk performance but IDE mode does not have these advantages.

#### 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].

#### Marvell 9172 SATA\_M0\_M1 Operation

This item is for eSATA ports. Use this to select Marvell SATA operation mode. Configuration options: [Disabled], [IDE Mode], [AHCI Mode], [RAID Mode] and [Disabled]. The default value is [AHCI Mode].

## Bootable Marvell SATA3 Controller

Use this to enable or disable Onboard Marvell SATA3 Option ROM. If Option ROM is disabled, you cannot use the SATA devices connected to the Marvell SATA3 controller as Boot Device.

## SCU Devices

Use this to enable or disable SCU devices.

## Onboard SCU Oprom/Driver

Use this to enable or disable LSI SAS Option ROM. If Option ROM is disabled, you cannot use the SATA devices connected to the LSI SAS controller as Boot Device.

Depending on how many SATA ports you have, you will see SATA\_x (x means number) listed on the screen, with its status indicated as SATA device [(Model Name)] or [Not Detected].

Enter either one of the options will see the followings:

## SATA\_X Hot Plug

Use this item to enable or disable Hot Plug for the designated port.

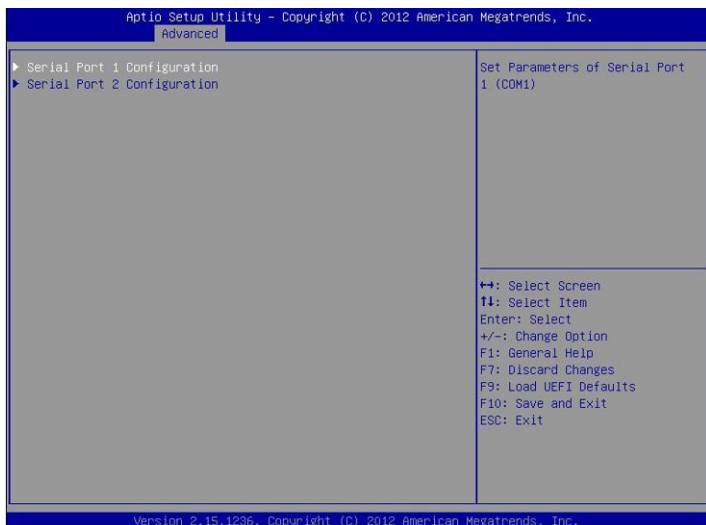
## External SATA\_X

Use this item to enable SATA safe removal notifications. Please note that the SATA device will be downgraded to SATA2.



*We recommend to use IntelC602 SATA ports for your bootable devices. This will minimize your boot time and get the best performance. But if you still want to boot from the LSI controller or Marvell SATA3 controller, you can enable these from the UEFI.*

## 3.4.12 Super IO Configuration



### Serial Port 1 Configuration

Use this item to configure the onboard serial port 1.

Select and enter the "Serial Port 1 Configuration" and you will see the followings:

#### **Serial Port**

Use this item to enable or disable the onboard serial port.

#### **Change Settings**

Use this item to select an optimal setting for Super IO device.

### Serial Port 2 Configuration

Use this item to configure the onboard serial port 2.

Select and enter the "Serial Port 2 Configuration" and you will see the followings:

#### **Serial Port**

Use this item to enable or disable the onboard serial port.

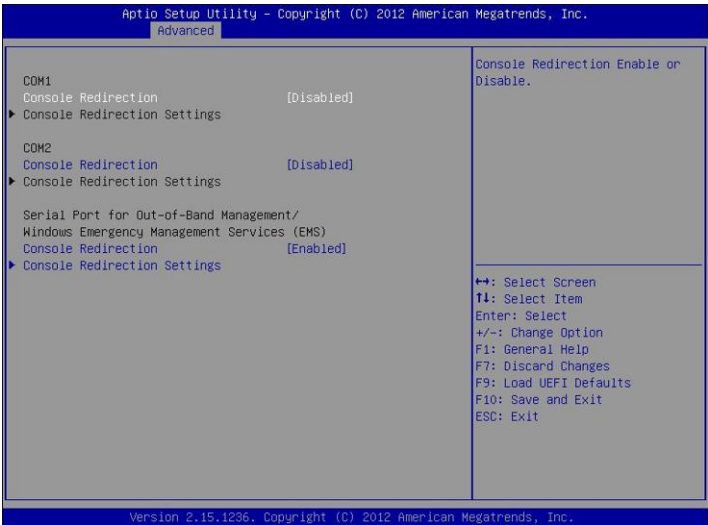
#### **Serial Port Mode**

Use this item to select Serial Over LAN or COM mode.

#### **Change Settings**

Use this item to select an optimal setting for Super IO device.

### 3.4.13 Serial Port Console Redirection



#### Console Redirection

Use this option to enable or disable Console Redirection. If this item is set to Enabled, you can select a COM Port to be used for Console Redirection.

#### Console Redirection Settings

Use this option to configure Console Redirection Settings, and specify how your computer and the host computer to which you are connected exchange information.

#### Out-of-Band-Mgmt (Management) Port

Use this item to select the port to be used for out-of-band management. The options include [COM1] and [SOL].

#### Terminal Type

Use this item to select the preferred terminal emulation type for out-of-band management. It is recommended to select [VT-UTF8].

| Option  | Description                                                     |
|---------|-----------------------------------------------------------------|
| VT100   | ASCII character set                                             |
| VT100+  | Extended VT100 that supports color and function keys            |
| VT-UTF8 | UTF8 encoding is used to map Unicode chars onto 1 or more bytes |
| ANSI    | Extended ASCII character set                                    |

### **Bits Per Second**

Use this item to select the serial port transmission speed. The speed used in the host computer and the client computer must be the same. Long or noisy lines may require lower transmission speed. The options include [9600], [19200], [57600] and [115200].

### **Data Bits**

Use this item to set the data transmission size. The options include [7] and [8] (Bits).

### **Parity**

Use this item to select the parity bit. The options include [None], [Even], [Odd], [Mark] and [Space].

### **Stop Bits**

The item indicates the end of a serial data packet. The standard setting is [1] Stop Bit. Select [2] Stop Bits for slower devices.

### **Flow Control**

Use this item to set the flow control to prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a "stop" signal can be sent to stop the data flow. Once the buffers are empty, a "start" signal can be sent to restart the flow. Hardware flow uses two wires to send start/stop signals. The options include [None], [Hardware RTS/CTS], and [Software Xon/Xoff].

### **VT-UTF8 Combo Key Support**

Use this item to enable or disable the VT-UTF8 Combo Key Support for ANSI/VT100 terminals.

### **Recorder Mode**

Use this item to enable or disable Recorder Mode to capture terminal data and send it as text messages.

### **Resolution 100x31**

Use this item to enable or disable extended terminal resolution support.

### **Legacy OS Redirection Resolution**

Use this item to select the number of rows and columns used in legacy OS redirection.

### **Putty Keypad**

Use this item to select Function Key and Keypad on Putty.

### **Redirection After BIOS POST**

If the [LoadBooster] is selected, legacy console redirection is disabled before booting to legacy OS. If [Always Enabled] is selected, legacy console redirection is enabled for legacy OS. The default value is [Always Enabled].

### 3.4.14 Voltage Control



#### CPU Load-Line Calibration

CPU Load-Line Calibration helps prevent CPU voltage droop when the system is under heavy load.

#### CPU Core Voltage

Use this to select CPU Core Voltage. The default value is [Auto].

#### VCCSA Voltage

Use this to select VCCSA Voltage. The default value is [Auto].

#### DRAM Voltage

Use this to select DRAM Voltage. The default value is [Auto].

#### PLL Voltage

Use this to select PLL Voltage. The default value is [Auto].

#### VTT Voltage

Use this to select VTT Voltage. The default value is [Auto].

#### PCH Voltage

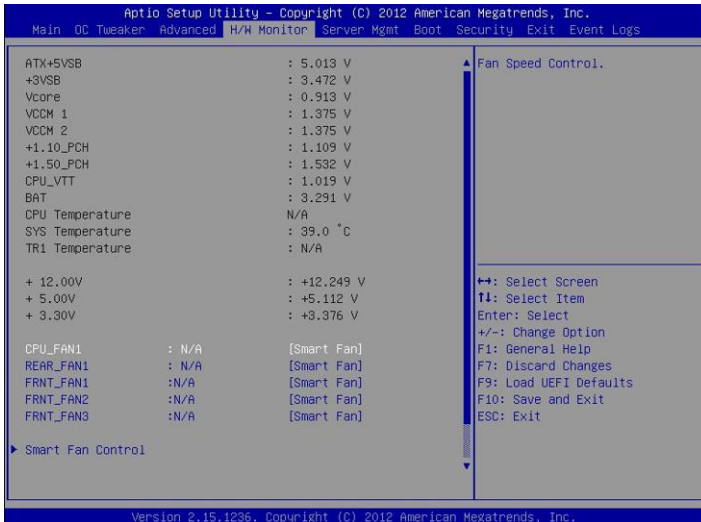
Use this to select PCH Voltage. The default value is [Auto].

### 3.4.15 Instant Flash

Instant Flash is a UEFI flash utility embedded in Flash ROM. This convenient UEFI update tool allows you to update system UEFI without entering operating systems first like MS-DOS or Windows. Just save the new UEFI file to your USB flash drive, floppy disk or hard drive and launch this tool, then you can update your UEFI only in a few clicks without preparing an additional floppy diskette or other complicated flash utility. Please be noted that the USB flash drive or hard drive must use FAT32/16/12 file system. If you execute Instant Flash utility, the utility will show the UEFI files and their respective information. Select the proper UEFI file to update your UEFI, and reboot your system after the UEFI update process is completed.

### 3.5 H/W Monitor Screen (Hardware Health Event Monitoring)

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\_FAN 1

This allows you to set the CPU fan 1's speed. The default value is [Smart Fan].

#### REAR\_FAN 1

This allows you to set the rear fan 1's speed. The default value is [Smart Fan].

#### FRNT\_FAN 1

This allows you to set the front fan 1's speed. The default value is [Smart Fan].

#### FRNT\_FAN 2

This allows you to set the front fan 2's speed. The default value is [Smart Fan].

#### FRNT\_FAN 3

This allows you to set the front fan 3's speed. The default value is [Smart Fan].

## Smart Fan Control

This allows you to set the Smart fan's level speed.

### **Smart Fan Duty Control**

Smart Fan Duty x (x means 1 to 11 stage)

This allows you to set duty cycle for each stage.

### **Smart Fan Temp Control**

Smart Fan Temp x (x means 1 to 11 stage)

This allows you to set temperature for each stage.

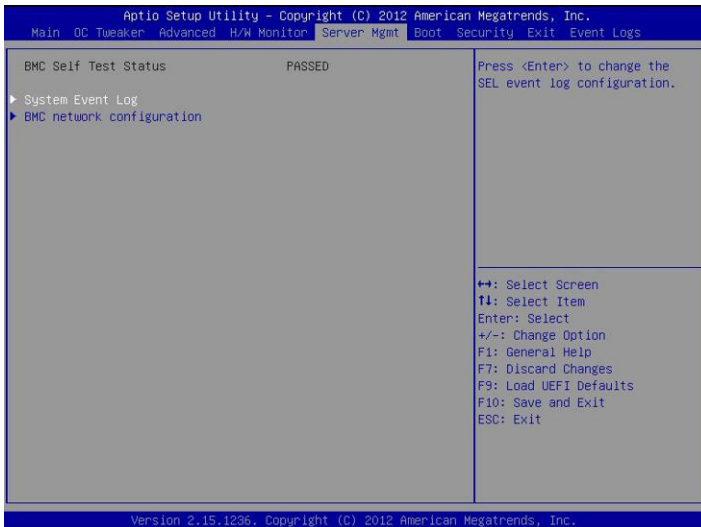
## Watch Dog Timer

This allows you to enable or disable the Watch Dog Timer. The default value is [Disabled].

## Case Open Feature

This allows you to enable or disable the Case Open Feature. The default value is [Enabled].

### 3.6 Server Mgmt (Server Management)



#### System Event Log

Enter to configure System Event Logging features during boot.

#### BMC Network Configuration

Enter to configure BMC Network parameters.

#### Configuration Address Source

Select to configure BMC network parameters statically or dynamically (by BIOS or BMC). Configuration options: [Unspecified], [Static] or [Dynamic].

**Unspecified:** BMC network parameters is configured by BMC itself.

**Static:** Manually enter the IP Address, Subnet Mask and Gateway Address in the BIOS for BMC LAN channel configuration.

**Dynamic:** IP address, Subnet Mask and Gateway Address are automatically assigned by the network's DHCP server.

To configure BMC network parameters using the BIOS setup, select either [Static] or [Dynamic] option.

To configure BMC network parameters using the BMC web interface, select [Unspecified] option.



When [Dynamic] or [Static] is selected, do NOT modify the BMC network settings on the IPMI web page.

## 3.7 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 Option Priorities-

#### Boot Option #1

Use this item to set the system boot order.

#### 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.

#### PCI ROM Priority

Use this item to adjust PCI ROM Priority. The default value is [LegacyROM]

#### Full Screen Logo

Use this item to enable or disable OEM Logo. The default value is [Enabled].

## AddOn ROM Display

Use this option to adjust AddOn ROM Display. If you enable the option “Full Screen Logo” but you want to see the AddOn ROM information when the system boots, please select [Enabled]. Configuration options: [Enabled] and [Disabled]. The default value is [Enabled].

## Fast Boot

Use this item to minimize your computer's boot time.

## Boot Failure Guard

Use this item to enable or disable the feature of Boot Failure Guard

## Boot Failure Guard Count

Use this item to configure Boot Failure Guard Count.

## Boot From Onboard LAN

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

## CSM Parameters

Use this option to configure the parameters of OpROM execution, boot options filter, etc.

## Boot Option Filter

Use this option to control what devices system can boot to. Configuration options: [UEFI and Legacy], [Legacy only] and [UEFI only].

## 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.

## 3.8 Security Screen

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



### 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

Use this item to enable or disable support for Windows 8 Secure Boot.

### 3.9 Exit Screen



#### Save Changes and Exit

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

#### Discard Changes and Exit

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

#### Discard Changes

When you select this option, the following message “Discard changes?” will pop-out. Select [Yes] to discard all changes.

#### Load UEFI Defaults

Load UEFI default values for all the setup questions. F9 key can be used for this operation.

### 3.10 Event Logs



#### Change Smbios Event Log Settings

This allows you to configure the Smbios Event Log Settings.

When entering the item, you will see the followings:

#### Smbios Event Log

Use this item to enable or disable all features of the SMBIOS Event Logging during system boot.

#### Erasing Event Log

The options include [No], [Yes, Next reset] and [Yes, Every reset]. If Yes is selected, all logged events will be erased.

#### When Log is Full

Use this item to choose options for reactions to a full Smbios Event Log. The options include [Do Nothing] and [Erase Immediately].

#### MECI (Multiple Event Count Increment)

Use this item to enter the increment value for the multiple event counter. The valid range is from 1 to 33.

#### METW (Multiple Event Time Window)

Use this item to specify the number of minutes which must pass between duplicate log

entries which utilize a multiple-event counter. The value ranges from 0 to 99 minutes.

## View Smbios Event Log

This allows you to view the Smbios Event Log records.



*All values changed here do not take effect until computer is restarted.*

## BMC Mac Backup Tool

Use this to restore BMC Mac from the backup.

## System Event Log

Enter to configure System Event Logging features during boot.

## BMC Network Configuration

Enter to configure BMC Network parameters.

## Configuration Address Source

Select to configure BMC network parameters statically or dynamically (by BIOS or BMC).  
Configuration options: [Unspecified], [Static] or [Dynamic].

**Unspecified:** BMC network parameters are configured by BMC itself.

**Static:** Manually enter the IP Address, Subnet Mask and Gateway Address in the BIOS for BMC LAN channel configuration.

**Dynamic:** IP address, Subnet Mask and Gateway Address are automatically assigned by the network's DHCP server.

To configure BMC network parameters using the BIOS setup, select either [Static] or [Dynamic] option.

To configure BMC network parameters using the BMC web interface, select [Unspecified] option.



*When [Dynamic] or [Static] is selected, do NOT modify the BMC network settings on the IPMI web page.*

# Chapter 4 Software Support

## 4.1 Install Operating System

This motherboard supports various Microsoft® Windows® 7 / 8 / 8.1 / Server 2008 / 2008 R2 / Linux compliant. Because motherboard settings and hardware options vary, use the setup procedures in this chapter for general reference only. Refer to your OS documentation for more information.

## 4.2 Support CD Information

The Support CD that came with the motherboard contains necessary drivers and useful utilities that enhance the motherboard's features.

### 4.2.1 Running The Support CD

To begin using the support CD, insert the CD into your CD-ROM drive. The CD automatically displays the Main Menu if "AUTORUN" is enabled in your computer. If the Main Menu does not appear automatically, locate and double click on the file "ASRSetup.exe" from the root folder in the Support CD to display the menu.

#### 4.2.2 Drivers Menu

The Drivers Menu shows the available device's drivers if the system detects installed devices. Please install the necessary drivers to activate the devices.

#### 4.2.3 Utilities Menu

The Utilities Menu shows the application softwares that the motherboard supports. Click on a specific item then follow the installation wizard to install it.

#### 4.2.4 Contact Information

If you need to contact ASRock Rack or want to know more about ASRock Rack, welcome to visit ASRock Rack's website at <http://www.ASRockRack.com>; or you may contact your dealer for further information.

# Chapter 5 Troubleshooting

## 5.1 Troubleshooting Procedures

Follow the procedures below to troubleshoot your system.



*Always unplug the power cord before adding, removing or changing any hardware components. Failure to do so may cause physical injuries to you and damages to motherboard components.*

1. Disconnect the power cable and check whether the PWR LED is off.
2. Unplug all cables, connectors and remove all add-on cards from the motherboard.  
Make sure that the jumpers are set to default settings.
3. Confirm that there are no short circuits between the motherboard and the chassis.
4. Install a CPU and fan on the motherboard, then connect the chassis speaker and power LED.

### **If there is no power...**

1. Confirm that there are no short circuits between the motherboard and the chassis.
2. Make sure that the jumpers are set to default settings.
3. Check the settings of the 115V/230V switch on the power supply.
4. Verify if the battery on the motherboard provides ~3VDC. Install a new battery if it does not.

### **If there is no video...**

1. Try replugging the monitor cables and power cord.
2. Check for memory errors.

### **If there are memory errors...**

1. Verify that the DIMM modules are properly seated in the slots.
2. Use recommended DDR3 1600/1333/1066 non ECC, unbuffered DIMMs.
3. If you have installed more than one DIMM modules, they should be identical with the same brand, speed, size and chip-type.
4. Try inserting different DIMM modules into different slots to identify faulty ones.
5. Check the settings of the 115V/230V switch on the power supply.

### **Unable to save system setup configurations...**

1. Verify if the battery on the motherboard provides ~3VDC. Install a new battery if it does not.
2. Confirm whether your power supply provides adequate and stable power.

### **Other problems...**

1. Try searching keywords related to your problem on ASRock Rack's FAQ page:  
<http://www.asrockrack.com/support>

## 5.2 Technical Support Procedures

If you have tried the troubleshooting procedures mentioned above and the problems are still unsolved, please contact ASRock Rack's technical support with the following information:

1. Your contact information
2. Model name, BIOS version and problem type.
3. System configuration.
4. Problem description.

You may contact ASRock Rack's technical support at:  
<http://www.asrockrack.com/support/tsd.asp>

## 5.3 Returning Merchandise for Service

For warranty service, the receipt or a copy of your invoice marked with the date of purchase is required. By calling your vendor or going to our RMA website (<http://www.asrock.com/support/index.asp?cat=RMA>) you may obtain a Returned Merchandise Authorization (RMA) number.

The RMA number should be displayed on the outside of the shipping carton which is mailed prepaid or hand-carried when you return the motherboard to the manufacturer. Shipping and handling charges will be applied for all orders that must be mailed when service is complete.

This warranty does not cover damages incurred in shipping or from failure due to alteration, misuse, abuse or improper maintenance of products.

Contact your distributor first for any product related problems during the warranty period.