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Industry Standard, Flexible Architecture

GREEN

Less Heat, Less Power Consumption

STABLE

Robust Design, Quality Parts

Stable and
Reliable Solution

Server/Workstation

Motherboard

FH-C612NM

User Manual

English

Version 1.0
Published November 2015

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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"

ASRock Rack's Website: 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; or you may contact your dealer for further information.

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Contents

Chapter 1 Introduction

Thank you for purchasing ASRock Rack ***FH-C612NM*** 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

If you require technical support related to this motherboard, please visit our website for specific information about the model you are using.
http://www.asrockrack.com/support/

1.1 Package Contents

- ASRock Rack FH-C612NM Motherboard
  (SSI EEB Form Factor: 12.0-in x 13.0-in, 30.5 cm x 33.0 cm)
- 4 x SATA3 Cables (50cm)
- 2 x SATA3 Cables (60cm)
- Support CD
- User Manual

Note: If an IO shield is needed, please contact our sales representatives for a 3D file (IO shield made by customer) or to place an order.

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

English

1.2 Specifications

FH-C612NM	
MB Physical Status	
Form Factor	SSI EEB
Dimension	12" x 13" (30.5 cm x 33.0 cm)
Processor System	
CPU	Intel® Xeon processor E5-2600/4600 v3 series
Socket	Dual Socket LGA 2011 R3
Chipset	Intel® C612
System Memory	
Capacity	16 DIMM slots
Type	- Quad Channel memory technology - Supports 2133/1866 LR/R/ECC NVDIMM
Voltage	1.2V
DIMM Sizes	RDIMM: 32GB, 16GB, 8GB, 4GB LRDIMM: 64GB, 32GB
Expansion Slot	
PCIe 3.0 x 16	2 slots
NGFF	1, M key PCIe x4(CPU1) and SATA NGFF SATA3(shared with PCH SATA1)
Mezzanine 1	PCIex8(CPU1) with NCSI
Mezzanine 2	PCIex8(CPU2)
Mini PCIe	M.2, Mini PCIe from PCH
Storage	
SATA Controller	Intel C612: 10x SATA3, 2 pcs 4 port SFF-8087 CONN (8 ports), 2x SATA 7p (SATA1 shared with M.2), support RAID 0, 1, 5, 10
Ethernet	
Interface	N/A
LAN	N/A
Management	
BMC Controller	ASPEED AST2400
IPMI Dedicated GLAN	1 x Realtek RTL8211E for dedicated management GLAN
Features	Watch Dog
Graphics	
Controller	ASPEED AST2400
VRAM	DDR3 2Gb
Rear Panel I/O	
VGA Port	1 x D-Sub
USB 3.0 Port	2

LAN Port	- 1 (IPMI mg) Lan port (RJ45) - LAN Ports with LED (ACT/LINK LED and SPEED LED)
Serial Port	1 (COM1)
UID	1
Internal Connector	
Front Panel Header	1 (includes Power button, Reset button, Power LED, HDD activity LED)
Auxiliary Panel Header	1 (includes Locator /LED, LAN LED, System event LED, Case Open)
Front VGA Header	1
TPM Header	1
IPMB Header	1
Buzzer	1
Fan Header	6x Front system Fans, 2x CPU Fans
ATX Power	1x (24-pin) + 2x (8-pin)
USB 3.0 Header	1 x 19-pin header for 2x USB 3.0 Ports (to front panel), ESD and over-current protected
USB 2.0 Header	1 x 9pin header, ESD and over-current protected
Chassis Intrusion	1 x 2pin header, connect to SIO and PCH (included in Aux_ panel)
System Event LED	1 x 2pin Header for front system event LED (included in Aux_panel)
ME Security Override	1 x 2 pin header (Flash Descriptor Security Override) (PCH)
System Configuration	1 x 3pin header for System Configuration (PCH GPIO connected)
SPI Connector	2, support Dual BIOS
Type A USB 3.0	1
IPMB Header	1 (BMC)
SMBus Connector	2, for BMC I2C bus
PMBus Connector	1, for PSU
Onboard LED	
Standby Power LED	1
Port 80 LED	1
Fan Failed LED	8
System BIOS	
BIOS Type	64Mb AMI UEFI Legal BIOS
BIOS Features	- Plug and Play (PnP) - ACPI 2.0 Compliance Wake Up Events - SMBIOS 2.8 Support - ASRock Rack Instant Flash

Hardware Monitor	
Temperature	- CPU Temperature Sensing - SystemTemperature Sensing - CPU VR1 Temperature Sensing - CPU VR2 Temperature Sensing - MB Inlet Temperature Sensing - MB outlet Temperature Sensing
Fan	- CPU/Rear/Front Fan Tachometer - CPU Quiet Fan (Allow CPU Fan Speed Auto-Adjust by CPU Temperature) - CPU/Rear/Front Fan Multi-Speed Control
Voltage	Voltage Monitoring: +12V, +5V, +3.3V, CPU Vcore, DRAM, 1.05V_PCH, +BAT, 3VSB, 5VSB
Support OS	
OS	Microsoft® Windows® - Server 2008 R2 SP1 (64 bit) - Server 2012 (64 bit) - Server 2012 R2 (64 bit) Linux® - CentOS 6.6 (32 / 64 bit) / 7. 0 (64 bit) (only supports AHCI mode) - SUSE Enterprise Linux Server 11 SP3 (32 / 64 bit) / 12 (64 bit) - FreeBSD 10.1 (32 / 64 bit) - Fedora Core 22 (64 bit) - Ubuntu 14.04/14.10 (64 bit) -RedHat Enterprise Linux Server 6.6 (32 / 64 bit) / 7.0 (64 bit) Virtual: - VMWare ESXi 5.5/ ESXi 6.0 * Please refer to our website for the latest OS support list.
Environment	
Temperature	Operation temperature: 10°C ~ 35°C / Non operation temperature: -40°C ~ 70°C

NOTE: Please refer to our website for the latest specifications.

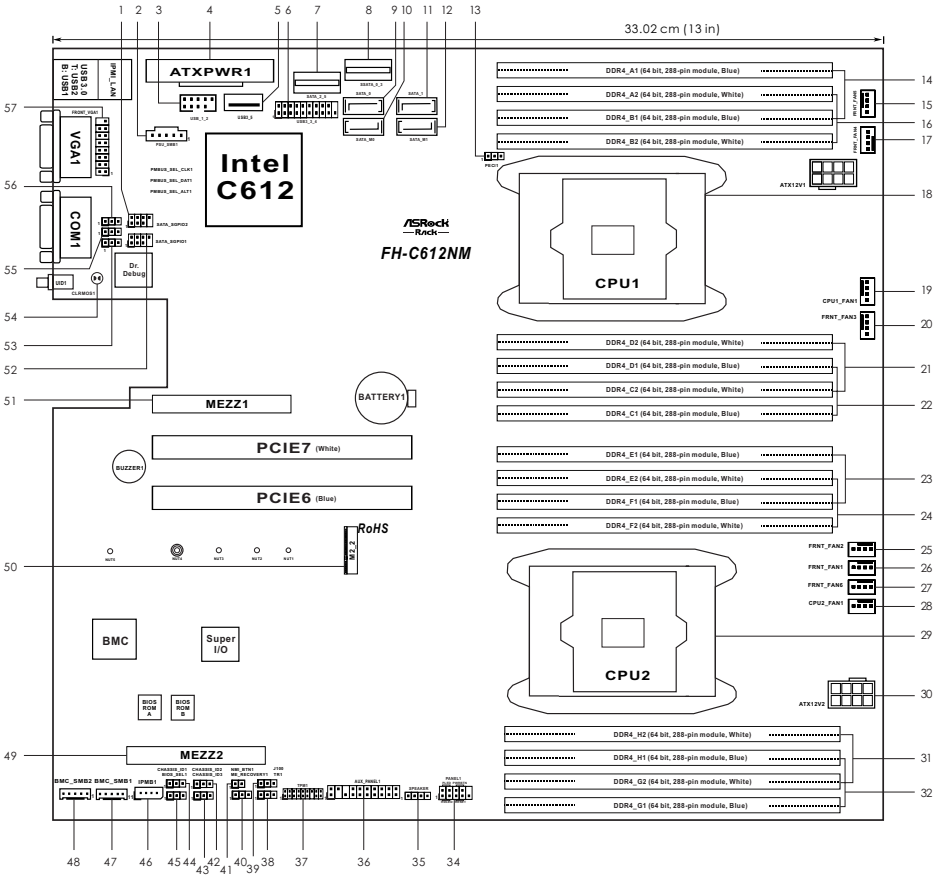
This motherboard supports Wake from on Board LAN. To use this function, please make sure that the "Wake on Magic Packet from power off state" is enabled in Device Manager > Intel® Ethernet Connection > Power Management. And the "PCI Devices Power On" is enabled in UEFI SETUP UTILITY > Advanced > ACPI 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 Rack 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®. 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.

1.4 Motherboard Layout

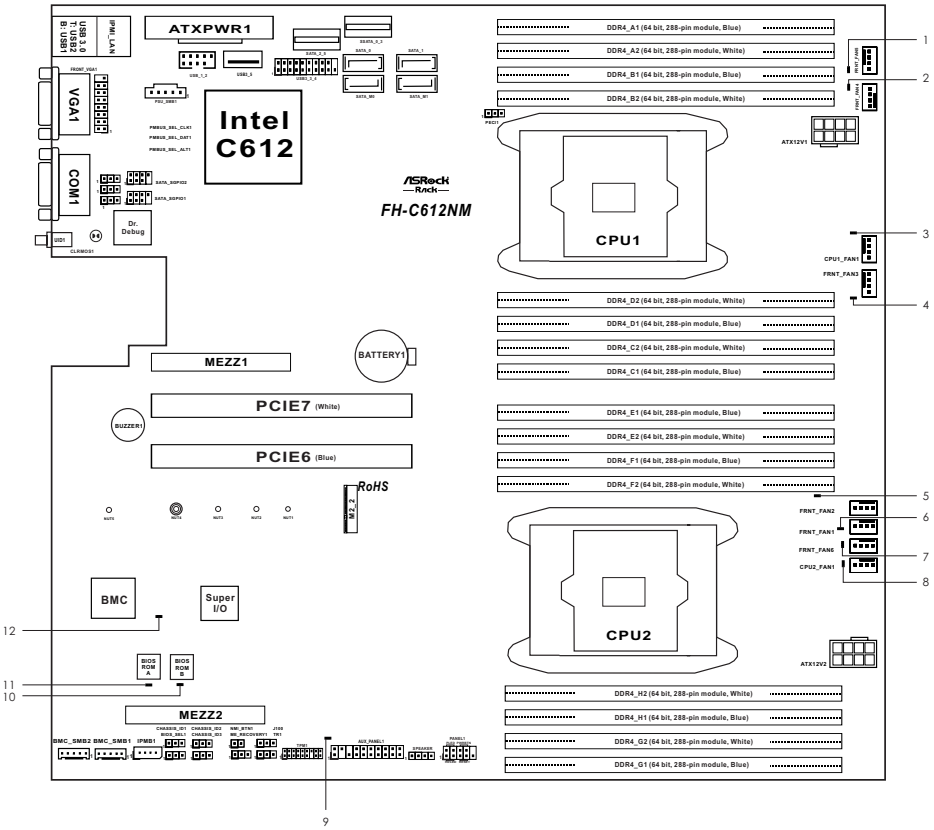


No.	Description
1	SATA SGPIO Connector (SATA_SGPIO2)
2	LAN LED Connector (LED_LAN34)PSU SMBus (PSU_SMB1)
3	USB 2.0 Header (USB_1_2)
4	ATX Power Connector (ATXPWR1)
5	Vertical Type A USB 3.0 (USB3_5)
6	USB 3.0 Header (USB3_3_4)
7	Mini-SAS Connector (SATA_2_5)
8	Mini-SAS Connector (SSATA_0_3)
9	SATA3 Connector (SATA_0)
10	SATA3 Connector (SATA_M0)
11	SATA3 Connector (SATA_1)
12	SATA3 Connector (SATA_M1)
13	CPU PECI Mode Jumper (PECI1)
14	2 x 288-pin DDR4 DIMM Slots (DDR4_A1, DDR4_B1, Blue)
15	Front Fan Connector (FRNT_FAN5)
16	2 x 288-pin DDR4 DIMM Slots (DDR4_A2, DDR4_B2, White)
17	Front Fan Connector (FRNT_FAN4)
18	ATX 12V Power Connector (ATX12V1)
19	LGA 2011 CPU Socket R3 (Narrow ILM) (CPU1)
20	CPU1 Fan Connector (CPU1_FAN1)
21	Front Fan Connector (FRNT_FAN3)
22	2 x 288-pin DDR4 DIMM Slots (DDR4_C2, DDR4_D2, White)
23	2 x 288-pin DDR4 DIMM Slots (DDR4_C1, DDR4_D1, Blue)
24	2 x 288-pin DDR4 DIMM Slots (DDR4_E1, DDR4_F1, Blue)
25	2 x 288-pin DDR4 DIMM Slots (DDR4_E2, DDR4_F2, White)
26	Front Fan Connector (FRNT_FAN2)
27	Front Fan Connector (FRNT_FAN1)
28	Front Fan Connector (FRNT_FAN6)
29	CPU2 Fan Connector (CPU2_FAN1)
30	LGA 2011 CPU Socket R3 (Narrow ILM) (CPU2)
31	ATX 12V Power Connector (ATX12V2)
32	2 x 288-pin DDR4 DIMM Slots (DDR4_H2, DDR4_G2, White)
33	2 x 288-pin DDR4 DIMM Slots (DDR4_H1, DDR4_G1, Blue)

No.	Description
34	System Panel Header (PANEL1)
35	Speaker Header (SPEAKER1)
36	Auxiliary Panel Header (AUX_PANEL1)
37	TPM Header (TPM1)
38	Thermal Sensor Header (TR1)
39	Descriptor Security Override Jumper (J100)
40	ME Recovery Jumper (ME_RECOVERY1)
41	Non Maskable Interrupt Button (NMI_BTN1)
42	Chassis ID2 Jumper (CHASSIS_ID2)
43	Chassis ID3 Jumper (CHASSIS_ID3)
44	Chassis ID1 Jumper (CHASSIS_ID1)
45	BIOS Selection Jumper (BIOS_SEL1)
46	Intelligent Platform Management Bus header (IPMB1)
47	BMC SMBus Header 1 (BMC_SMB1)
48	BMC SMBus Header 2 (BMC_SMB2)
49	Mezzanine Slot 2 (MEZZ2)
50	M.2 Slot (M2_2)
51	Mezzanine Slot 1 (MEZZ1)
52	SATA SGPIO Connector 1 (SATA_SGPIO1)
53	PMBUS Mode Jumper (PMBUS_SEL_ALT1)
54	Clear CMOS Pad (CLRMOS1)
55	PMBUS Mode Jumper (PMBUS_SEL_DAT1)
56	PMBUS Mode Jumper (PMBUS_SEL_CLK1)

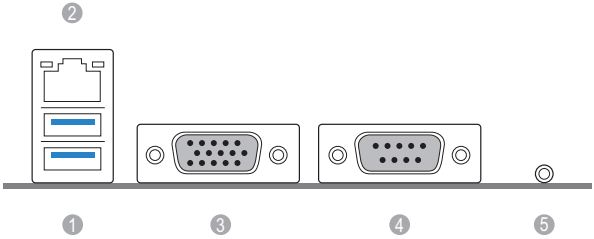
**For DIMM installation and configuration instructions, please see p.28 (Installation of Memory Modules (DIMM)) for more details.*

1.5 Onboard LED Indicators



No.	Item	Status	Description
1	FAN_LED5	Amber	FRNT_FAN5 failed
2	FAN_LED4	Amber	FRNT_FAN4 failed
3	FAN_LED7	Amber	CPU1_FAN1 failed
4	FAN_LED3	Amber	FRNT_FAN3 failed
5	FAN_LED2	Amber	FRNT_FAN2 failed
6	FAN_LED1	Amber	FRNT_FAN1 failed
7	FAN_LED6	Amber	FRNT_FAN6 failed
8	FAN_LED8	Amber	CPU2_FAN1 failed
9	SB_PWR1	Green	STB PWR ready
10	BIOS_B_LED	Amber	BU1_B is in operation
11	BIOS_A_LED	Amber	BU1_A is in operation
12	BMC_LED1	Green	BMC heartbeat LED

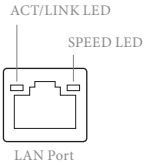
1.6 I/O Panel



No.	Description	No.	Description
1	USB 3.0 Ports (USB3_1_2)	4	Serial Port (COM1)
2	LAN RJ-45 Port (IPMI_LAN1)*	5	UID Switch (UID)
3	VGA Port (VGA1)		

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.

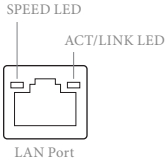


Dedicated IPMI LAN Port LED Indications

Activity / Link LED		Speed LED	
Status	Description	Status	Description
Off	No Link	Off	10M bps connection or no link
Blinking Yellow	Data Activity	Yellow	100M bps connection
On	Link	Green	1G bps connection

English

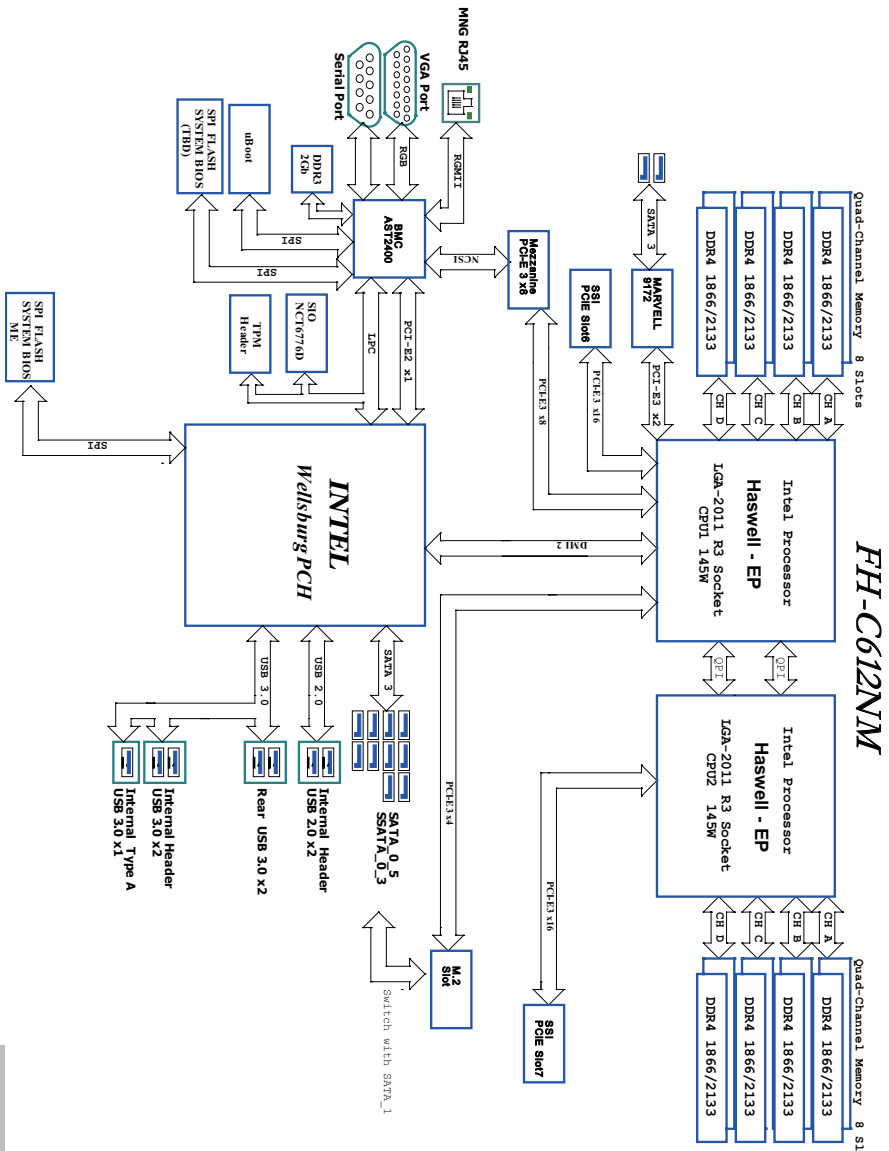
**There are two LEDs on each LAN port. Please refer to the table below for the LAN port LED indications.



LAN Port (LAN1, LAN2) LED Indications

Speed LED		Activity / Link LED	
Status	Description	Status	Description
Off	10Mbps connection or no link	Off	No link
Yellow	100Mbps connection	Blinking Green	Data Activity
Green	1Gbps connection	On	Link

1.7 Block Diagram



Chapter 2 Installation

This is a SSI EEB form factor (12" x 13", 30.5 cm x 33.0 cm) motherboard. Before you install the motherboard, study the configuration of your chassis to ensure that the motherboard fits into it.

FH-C612NM is a dual socket motherboard that supports Intel® Xeon E5-2600/4600 v3 series processors. Please install a primary processor (BootStrap Processor) into "CPU1" socket and then install a non-Primary Processor (Application Processors) into "CPU2" socket. *For a single CPU, please install it into "CPU1" socket (framed by a square).

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.

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.

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

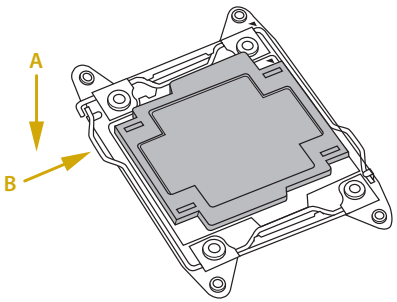
1. *Before you insert the 2011-3-Pin CPU into the socket, please check if the PnP cap is on the socket, if the CPU surface is unclean, or if there are any bent pins in the socket. Do not force to insert the CPU into the socket if above situation is found. Otherwise, the CPU will be seriously damaged.*
2. *Unplug all power cables before installing the CPU.*

CAUTION:

Please note that C612 platform is only compatible with the LGA 2011-3 socket, which is incompatible with the LGA 2011 socket.

Socket Type: Narrow ILM Socket

1



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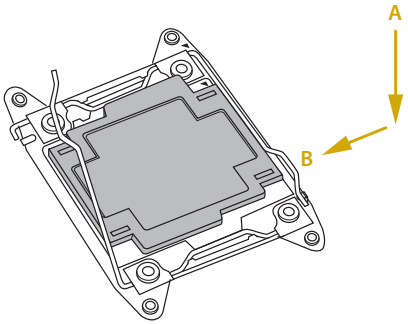
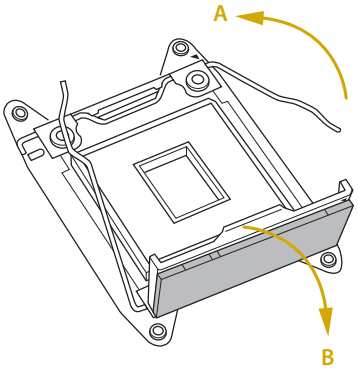


English

3



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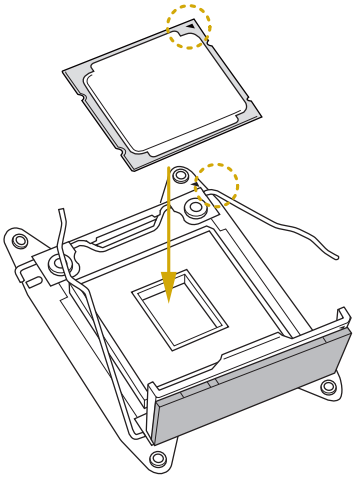

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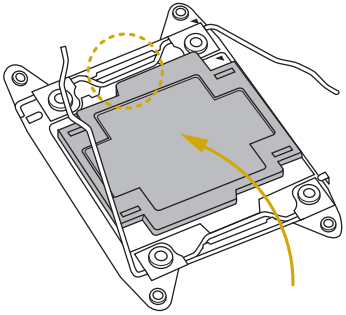

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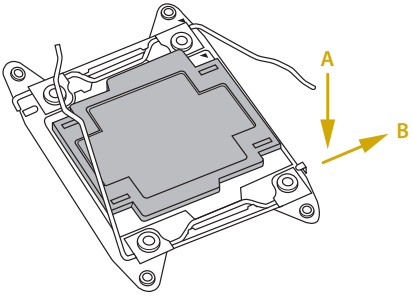

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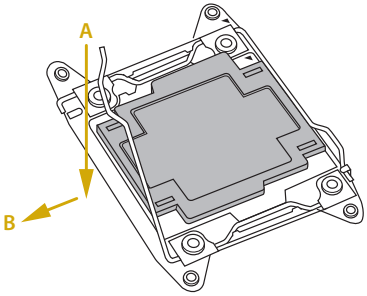
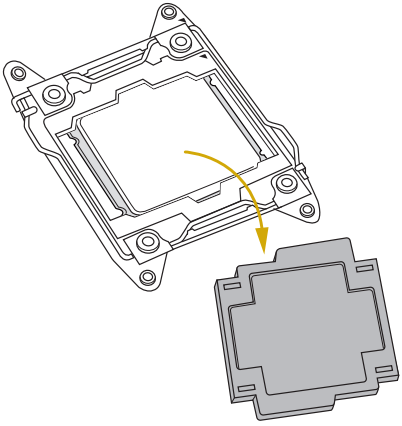


8

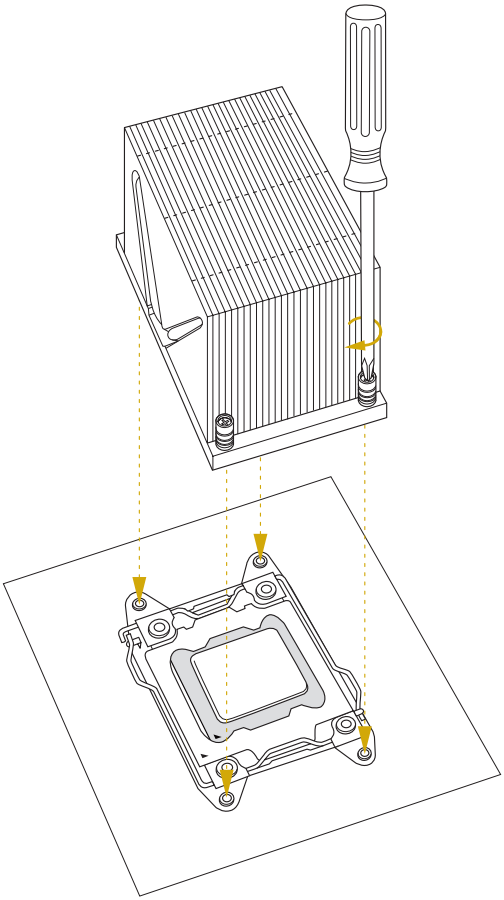


The cover must be placed if returning the motherboard for after service.

2.4 Installing the CPU Fan and Heatsink

Before you installed the heatsink, you need to spray thermal interface material between the CPU and the heatsink to improve heat dissipation.

1



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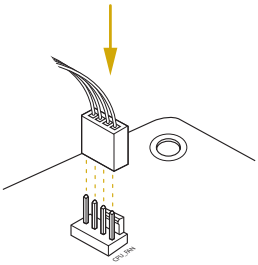
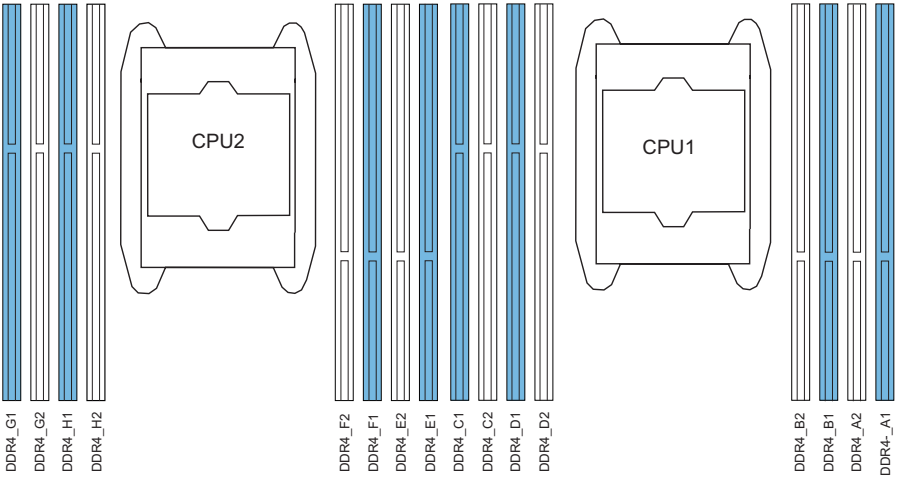


2.5 Installation of Memory Modules (DIMM)

This motherboard provides sixteen 288-pin DDR4 (Double Data Rate 4) DIMM slots in two groups, and supports Dual Channel Memory Technology.

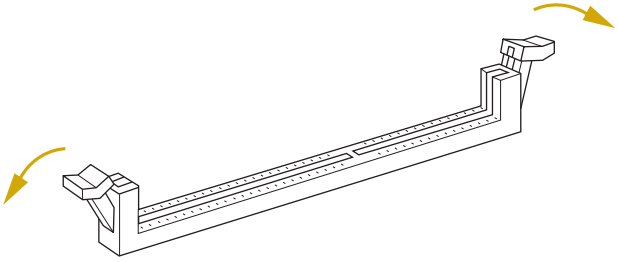
Capacity	CPU1	CPU2
256GB / 512GB	DDR4_A1, B1, C1, D1 (Blue)	DDR4_E1, F1, G1, H1 (Blue)
	DDR4_A2, B2, C2, D2 (White)	DDR4_E2, F2, G2, H2 (White)



1. *It is not allowed to install a DDR, DDR2 or DDR3 memory module into a DDR4 slot; otherwise, this motherboard and DIMM may be damaged.*
2. *For dual channel configuration, you always need to install identical (the same brand, speed, size and chip-type) DDR4 DIMM pairs.*
3. *It is unable to activate Dual Channel Memory Technology with only one or three memory module installed.*
4. *Some DDR4 1GB double-sided DIMMs with 16 chips may not work on this motherboard. It is not recommended to install them on this motherboard.*

English

1



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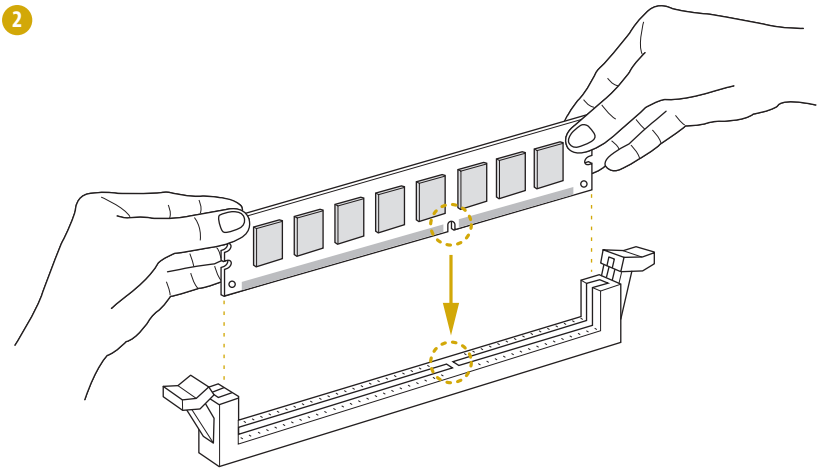

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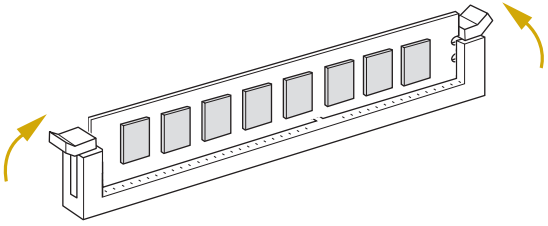


The DIMM only fits in one correct orientation. It will cause permanent damage to the motherboard and the DIMM if you force the DIMM into the slot at incorrect orientation.

Recommended Memory Configurations

A single memory module should be installed in the BLUE socket.

If you install only one CPU (CPU1) on the motherboard, make sure to install DIMMs into DDR4_A, DDR4_B, DDR4_C, or DDR4_D slot(s).

Memory can speed up to 2133 MHz for 1 DIMM per channel. For two DIMMs per channel, memory speed should be 1866MHz.

1 CPU Configuration

	CPU1							
	A1	A2	B1	B2	C1	C2	D1	D2
1 DIMM	#							
2 DIMMS	#		#					
4 DIMMS	#		#		#		#	
8 DIMMS	#	#	#	#	#	#	#	#

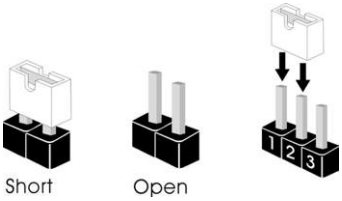
2 CPU Configuration

	CPU1							
	A1	A2	B1	B2	C1	C2	D1	D2
1 DIMM	#							
2 DIMMS	#							
4 DIMMS	#		#					
8 DIMMS	#		#		#		#	
16 DIMMS	#	#	#	#	#	#	#	#

	CPU2							
	E1	E2	F1	F2	G1	G2	H1	H2
1 DIMM								
2 DIMMS	#							
4 DIMMS	#		#					
8 DIMMS	#		#		#		#	
16 DIMMS	#	#	#	#	#	#	#	#

2.6 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. 40)	1_2 Normal Mode (Default)	2_3 ME Recovery Mode
PMBUS Mode Jumper (3-pin PMBUS_SEL_CLK1) (see p.7, No. 56) (3-pin PMBUS_SEL_DAT1) (see p.7, No. 55) (3-pin PMBUS_SEL_ALT1) (see p.7, No. 53)	1_2 PMBus connected to BMC (Default)	2_3 PMBus connected to PCH
Descriptor Security Override Jumper (3-pin J100) (see p.7, No. 39)	1_2 Descriptor Security Override	2_3 No Override (Default)
CPU PECI Mode Jumper (3-pin PECI1) (see p.7, No. 13)	1_2 CPU PECI connected to PCH	2_3 CPU PECI connected to BMC (Default)

English

Chassis ID1 Jumper (3-pin CHASSIS_ID1) (see p.7, No. 44) Chassis ID2 Jumper (3-pin CHASSIS_ID2) (see p.7, No. 42) Chassis ID3 Jumper (3-pin CHASSIS_ID3) (see p.7, No. 43)	   Board Level SKU	   For 1U4 system
Chassis ID1 Jumper (3-pin CHASSIS_ID1) (see p.7, No. 44) Chassis ID2 Jumper (3-pin CHASSIS_ID2) (see p.7, No. 42) Chassis ID3 Jumper (3-pin CHASSIS_ID3) (see p.7, No. 43)	   For 2U8 system	   For 1U8 system (Default)
Chassis ID1 Jumper (3-pin CHASSIS_ID1) (see p.7, No. 44) Chassis ID2 Jumper (3-pin CHASSIS_ID2) (see p.7, No. 42) Chassis ID3 Jumper (3-pin CHASSIS_ID3) (see p.7, No. 43)	   For 2U12 system	   Reserved for system level use
Chassis ID1 Jumper (3-pin CHASSIS_ID1) (see p.7, No. 44) Chassis ID2 Jumper (3-pin CHASSIS_ID2) (see p.7, No. 42) Chassis ID3 Jumper (3-pin CHASSIS_ID3) (see p.7, No. 43)	   Reserved for system level use	   Reserved for system level use

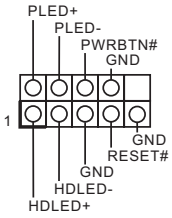
BIOS Selection Jumper (3-pin BIOS_SEL1) (see p.7, No. 45)	 BIOS 1 (BU1_A) (default)	 BIOS 2 (BU1_B)

This motherboard has two BIOS onboard, a main BIOS (BU1_A) and a backup BIOS (BU1_B), which enhances protection for the safety and stability of your system. Normally, the system works on the main BIOS. However, if the main BIOS is corrupted or damaged, please use a jumper cap to short pin2 and pin3, then the backup BIOS will take over on the next system boot. After that, then use "Secure Backup UEFI" in BIOS setup utility to copy the BIOS file to the main BIOS to ensure normal system operation. For the sake of system safety, users cannot update the backup BIOS manually. Users may refer to the BIOS LED (BIOS_A_LED or BIOS_B_LED) to identify which BIOS is activated currently.

2.7 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. 34)



Connect the power switch, reset switch and system status indicator on the chassis to this header according to the pin assignments. Particularly 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.

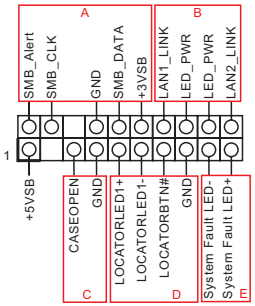
RESET (Reset Switch):
Connect to the reset switch on the chassis front panel. Press the reset switch to restart the computer if the computer freezes and fails to perform a normal restart.

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 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. 36)



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.

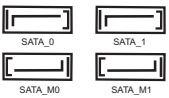
B. Internet status indicator (2-pin LAN1_LED, LAN2_LED)
These two 2-pin headers allow you to use the Gigabit internet indicator cable to connect to the LAN status indicator. When this indicator flickers, it means that the internet is properly connected.

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 (4-pin LOCATOR)
This header is for the locator switch and LED on the front panel.

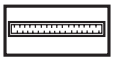
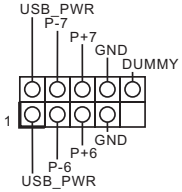
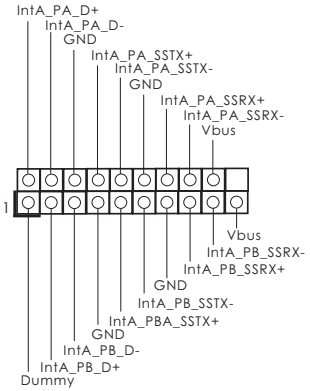
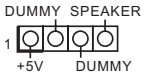
E. System Fault LED (2-pin LOCATOR)
This header is for the Fault LED on the system.

Serial ATA3 Connectors
(SATA_0)
(see p.7, No. 9)
(SATA_1)
(see p.7, No. 11)
(SATA_M0)
(see p.7, No. 10)
(SATA_M1)
(see p.7, No. 12)

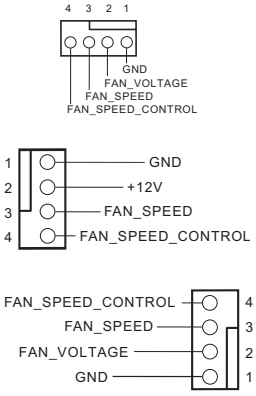


These four SATA3 connectors support SATA data cables for internal storage devices with up to 6.0 Gb/s data transfer rate.

English

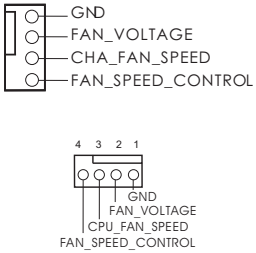
mini SAS Connector (SATA_2_5) (see p.7, No. 7) (SSATA_0_3) (see p.7, No. 8)		This connector supports MiniSAS-to-SATA or MiniSAS-to-MiniSAS data cables for internal storage devices with up to 6.0 Gb/s data transfer rate. Each connector is used to connect to four HDDs.
USB 2.0 Header (9-pin USB_1_2) (see p.7, No. 3)		There is one USB 2.0 header on this motherboard. Each USB 2.0 header can support two ports.
USB 3.0 Connector (USB3_5) (see p.7, No. 5)		
USB 3.0 Header (19-pin USB3_3_4) (see p.7, No. 6)		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.
Chassis Speaker Header (4-pin SPEAKER1) (see p.7, No. 35)		Please connect the chassis speaker to this header.

Front Fan Connectors
(4-pin FRNT_FAN1)
(see p.7, No. 27)
(4-pin FRNT_FAN2)
(see p.7, No. 26)
(4-pin FRNT_FAN3)
(see p.7, No. 21)
(4-pin FRNT_FAN4)
(see p.7, No. 17)
(4-pin FRNT_FAN5)
(see p.7, No. 15)
(4-pin FRNT_FAN6)
(see p.7, No. 28)



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

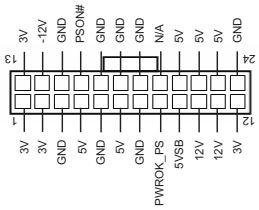
CPU Fan Connectors
(4-pin CPU1_FAN1)
(see p.7, No. 20)
(4-pin CPU2_FAN1)
(see p.7, No. 29)



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

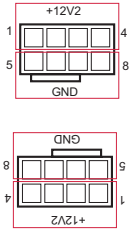
**For more details, please refer to the Cooler QVL list on the ASRock Rack website.*

ATX Power Connector
(24-pin ATXPWR1)
(see p.7, No. 4)



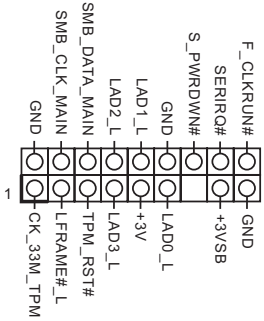
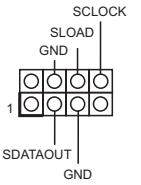
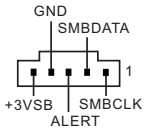
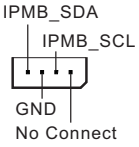
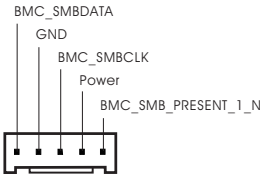
This motherboard provides a 24-pin ATX power connector. To use a 20-pin ATX power supply, please plug it along Pin 1 and Pin 13.

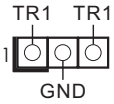
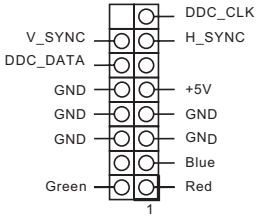
ATX 12V Power Connectors
(8-pin ATX12V1)
(see p.7, No. 18)
(8-pin ATX12V2)
(see p.7, No. 31)



This motherboard provides two 8-pin ATX 12V power connectors.

English

TPM Header (17-pin TPM1) (see p.7, No. 37)		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. 52) (7-pin SATA_SGPIO2) (see p.7, No. 1)		These headers support Serial Link interface for onboard SATA connections.
PSU SMBus (PSU_SMB1) (see p.7, No. 2)		PSU SMBus monitors the status of the power supply, fan and system temperature.
Intelligent Platform Management Bus header (4-pin IPMB1) (see p.7, No. 46)		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.
Baseboard Management Controller SMBus Headers (5-pin BMC_SMB1) (see p.7, No. 47) (5-pin BMC_SMB2) (see p.7, No. 48)		These headers are used for the SM BUS devices.

Thermal Sensor Header (3-pin TR1) (see p.7, No. 38)		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.
Front VGA Header (15-pin FRONT_VGA1) (see p.7, No. 57)		Please connect either end of VGA_2X8 cable to VGA header.
Clear CMOS Pad (CLRMOS1) (See p.7, No. 54)		CLRMOS1 allows you to clear the data in CMOS. To clear CMOS, take out the CMOS battery and short the Clear CMOS Pad.

2.8 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
00	Please check if the CPU is installed correctly and then clear CMOS.
0d	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.
01 - 54 (except 0d), 5A- 60	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.
55	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.
61 - 91	Chipset initialization error. Please press reset or clear CMOS.
92 - 99	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.
A0 - A7	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.
b0	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.
b4	Problem related to USB devices. Please try removing all USB devices.
b7	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.
d6	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.
d7	The Keyboard and mouse could not be recognized. Please try re-installing the keyboard and mouse.
d8	Invalid Password.
FF	Please check if the CPU is installed correctly and then clear CMOS.

2.9 Unit Identification purpose LED/Switch

With the UID button, You are able to locate the server you're working on from behind a rack of servers.

Unit Identification purpose LED/Switch (UID)		When the UID button on the front or rear panel is pressed, the front/rear UID blue LED indicator will be truned on. Press the UID button again to turn off the indicator.

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

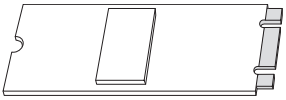
Select the adapter you want to be the primary adapter and click the **Set Primary** button.

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.

2.12 M.2_SSD (NGFF) Module Installation Guide

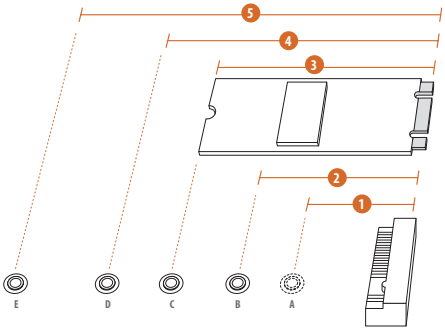
The M.2, also known as the Next Generation Form Factor (NGFF), is a small size and versatile card edge connector that aims to replace mPCIe and mSATA. The M.2_SSD (NGFF) Socket 3 can accommodate either a M.2 SATA3 6.0 Gb/s module or a M.2 PCI Express module up to Gen3 x4 (32 Gb/s).

Installing the M.2_SSD (NGFF) Module



Step 1

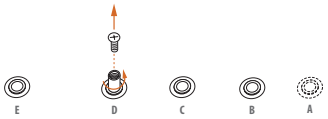
Prepare a M.2_SSD (NGFF) module and the screw.

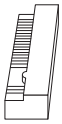


Step 2

Depending on the PCB type and length of your M.2_SSD (NGFF) module, find the corresponding nut location to be used.

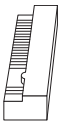
No.	1	2	3	4	5
Nut Location	A	B	C	D	E
PCB Length	3cm	4.2cm	6cm	8cm	11cm
Module Type	Type2230	Type 2242	Type2260	Type 2280	Type 22110





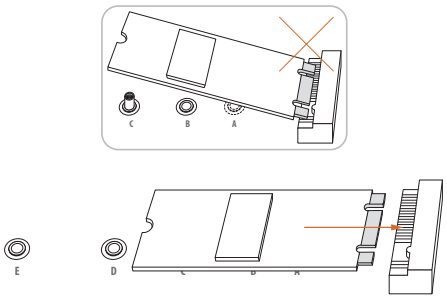
Step 3

Move the standoff based on the module type and length.
The standoff is placed at the nut location D by default. Skip Step 3 and 4 and go straight to Step 5 if you are going to use the default nut. Otherwise, release the standoff by hand.



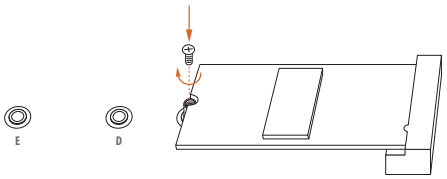
Step 4

Peel off the yellow protective film on the nut to be used. Hand tighten the standoff into the desired nut location on the motherboard.



Step 5

Align and gently insert the M.2 (NGFF) SSD module into the M.2 slot. Please be aware that the M.2 (NGFF) SSD module only fits in one orientation.



Step 6

Tighten the screw with a screwdriver to secure the module into place. Please do not overtighten the screw as this might damage the module.

For the latest updates of M.2_SSD (NFGG) module support list, please visit our website for details: http://www.asrockrack.com

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
Advanced	To set up the advanced UEFI features
IntelRCSetup	For Intel CPU and chipset settings
Server Mgmt	To manage the server
Security	To set up the security features
Boot	To set up the default system device to locate and load the Operating System
Event Logs	For event log configuration
Exit	To exit the current screen or the UEFI SETUP UTILITY

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.

English

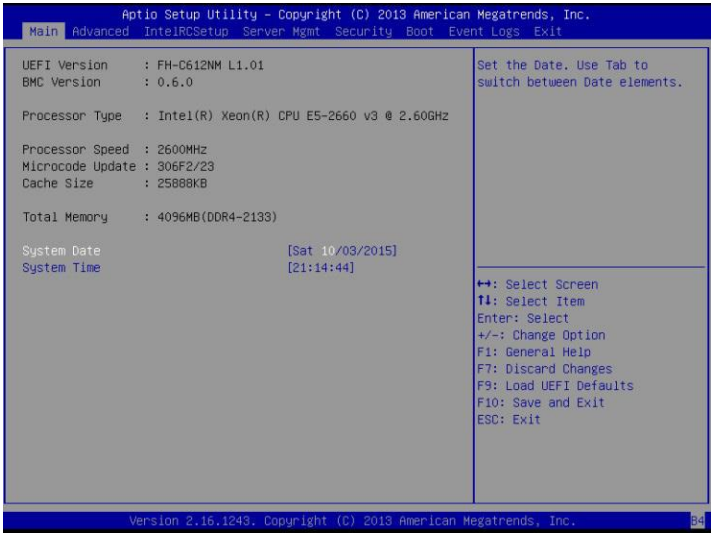
3.1.2 Navigation Keys

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

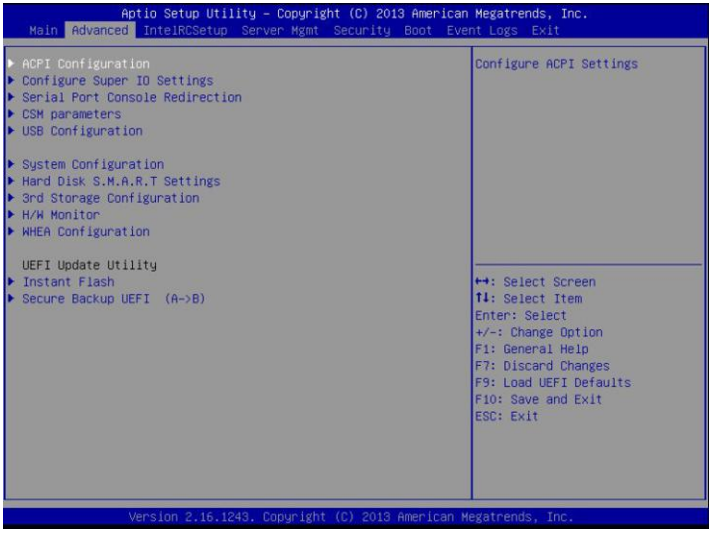
3.2 Main Screen

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.



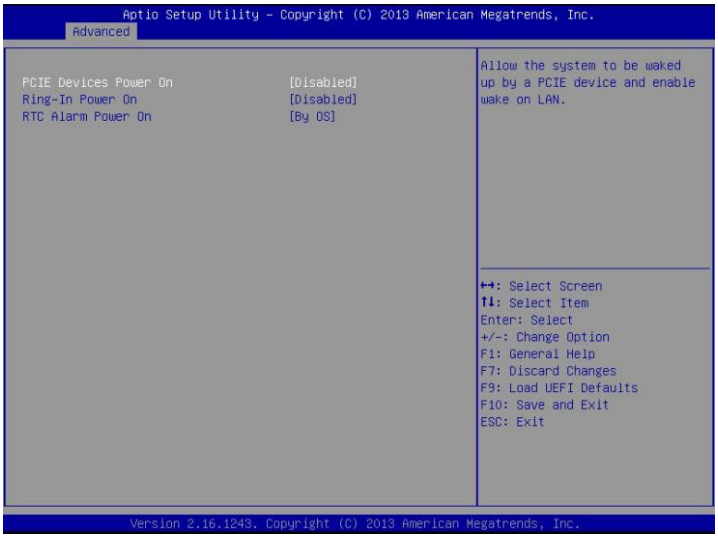
3.3 Advanced Screen

In this section, you may set the configurations for the following items: ACPI Configuration, Configure Super IO Settings, Serial Port Console Redirection, CSM Parameters, USB Configuration, System Configuration, Hard Disk S.M.A.R.T Settings, 3rd Storage Configuration, H/W Monitor, WHEA Configuration, Instant Flash and Secure Backup UEFI (A->B).



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

3.3.1 ACPI Configuration



PCIE Devices Power On

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

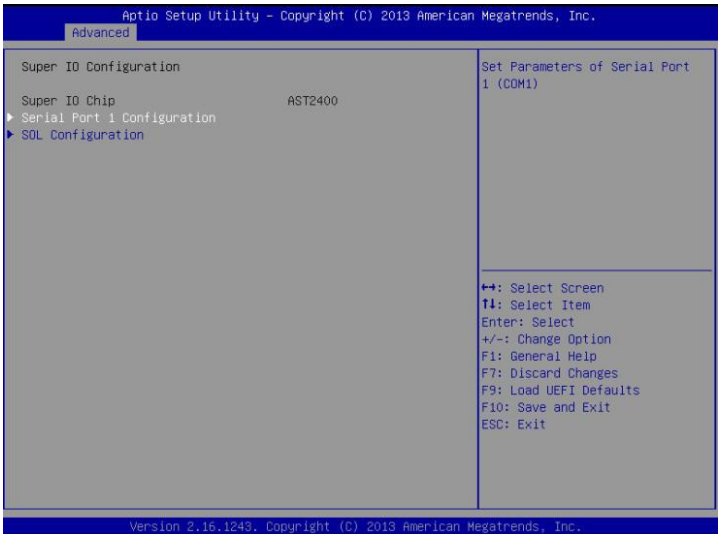
Ring-In Power On

Use this item to enable or disable Ring-In signals 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.

3.3.2 Configure Super IO Settings



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.

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

SOL Configuration

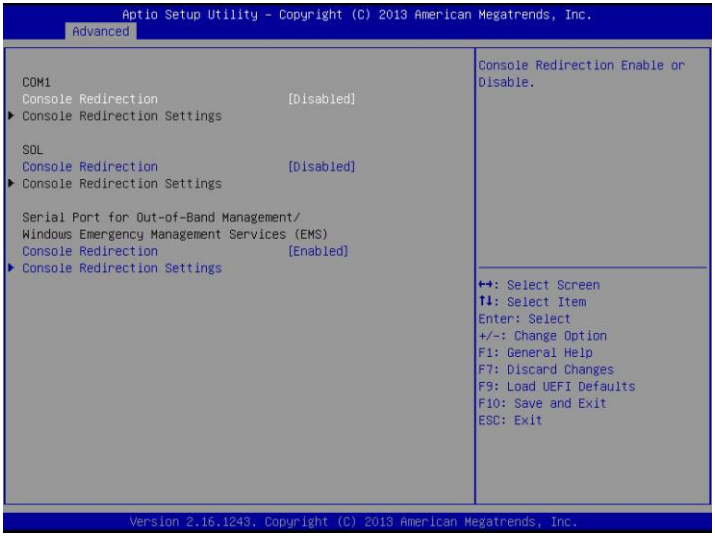
Use this item to set parameters of SOL.

Select and enter the "SOL Configuration" and you will see the followings:

SOL
Use this item to enable or disable the SOL port.

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

3.3.3 Serial Port Console Redirection



COM1 / SOL

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.

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], [115200] and [38400].

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] and [Hardware RTS/CTS].

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 [BootLoader] 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].

Serial Port for Out-of-Band Management/Windows Emergency Management Services (EMS)

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 Port

Use this item to select the Out-of-Band Mgmt Port.

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].

Flow Control

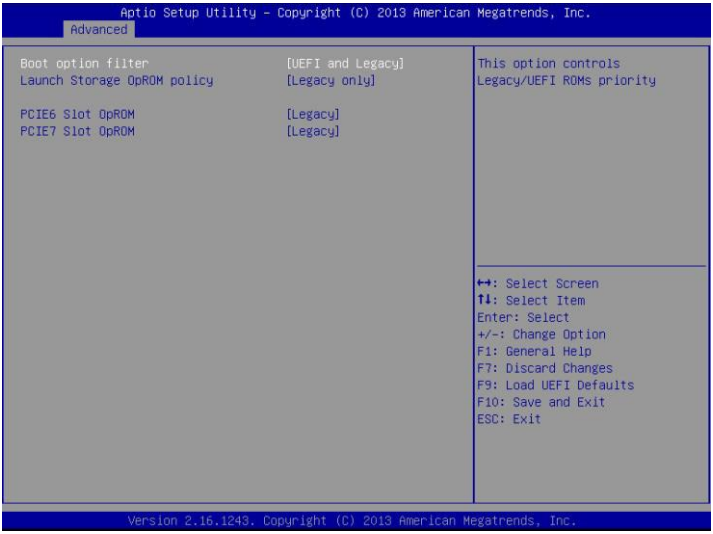
Use this item to set the flow control to prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a "stop" signal can be sent to stop the data flow. Once the buffers are empty, a "start" signal can be sent to restart the flow. Hardware flow uses two wires to send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

Data Bits

Parity

Stop Bits

3.3.4 CSM Parameters



Boot Option Filter

This option controls Legacy/UEFI ROMs priority.

Launch Storage OpROM Policy

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

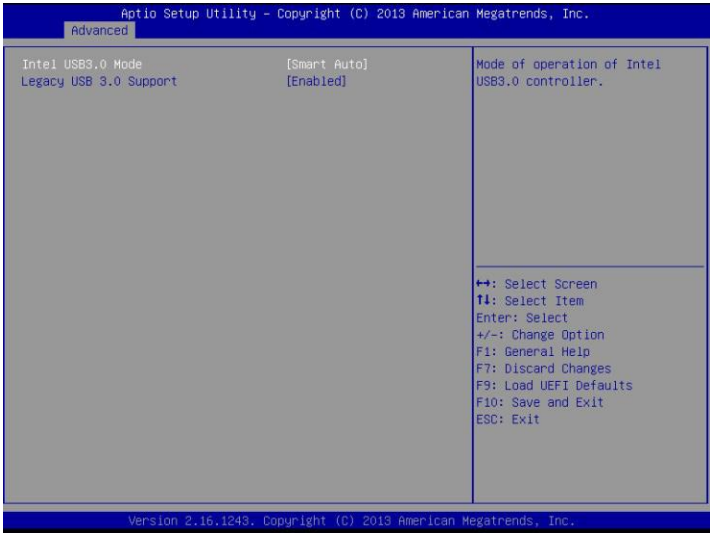
PCIE6 Slot OpROM

Use this item to select PCIE6 Slot Storage and Network Option ROM Legacy/UEFI policy. (Video Option ROM policy cannot be selected in this item.)

PCIE7 Slot OpROM

Use this item to select PCIE7 Slot Storage and Network Option ROM Legacy/UEFI policy. (Video Option ROM policy cannot be selected in this item.)

3.3.5 USB Configuration



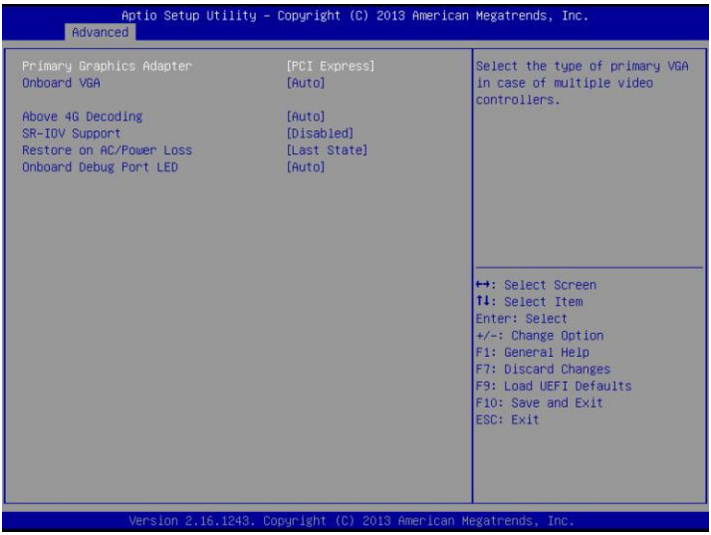
Intel USB3.0 Mode

Use this item to select the mode of operation of Intel USB 3.0 controller. Configuration options: [Enabled], [Disabled], [Auto] and [Smart Auto]. If [Auto] is selected, all USB ports work as USB3.0 after boot to OS. If [Smart Auto] is selected, all USB ports work as USB3.0 after boot to OS and work as USB2.0 in deep sleep stages.

Legacy USB 3.0 Support

Use this option to enable or disable legacy support for USB devices. The default value is [Enabled].

3.3.6 System Configuration



Primary Graphics Adapter

Use this item to select the type and primary VGA in case of multiple video contorllers.

Onboard VGA

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

Above 4G Decoding

Enable or disable 64bit capable Devices to be decoded in Above 4G Address Space (only if the system supports 64 bit PCI decoding).

SR-IOV Support

If system has SR-IOV capable PCIe Devices, this option Enables or Disables Single Root IO Virtualization Support.

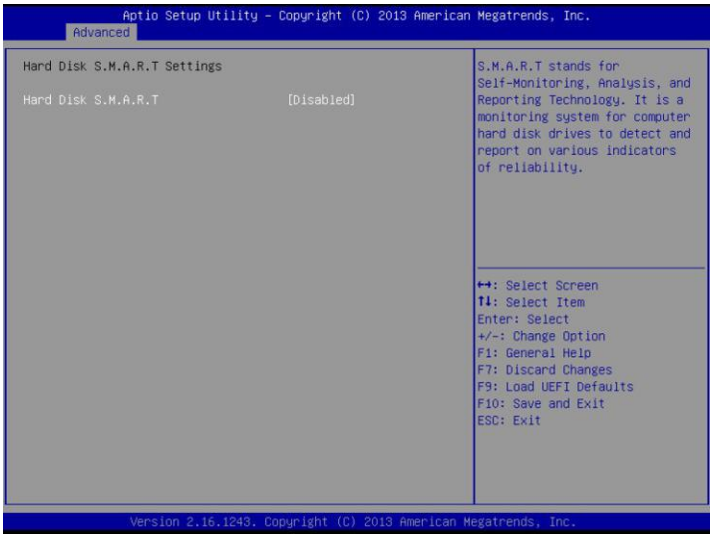
Restore on AC/Power Loss

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, it will recover to the state before AC/power loss.

Onboard Debug Port LED

Enable or disable the onboard Dr. Debug LED.

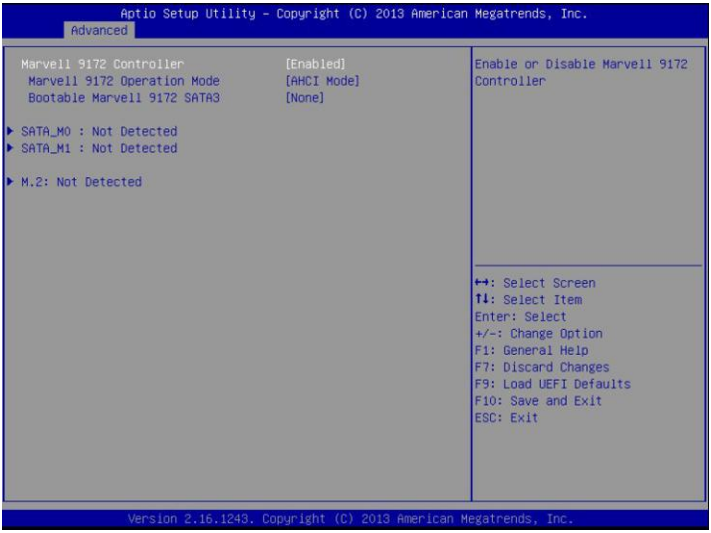
3.3.7 Hard Disk S.M.A.R.T Settings



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

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

3.3.8 3rd Storage Configuration



In this section, you may set the configurations or see the information of the connected 3rd storage device.

Marvell 9172 Controller

Enable or disable Marvell 9172 Controller.

Marvell 9172 Operation Mode

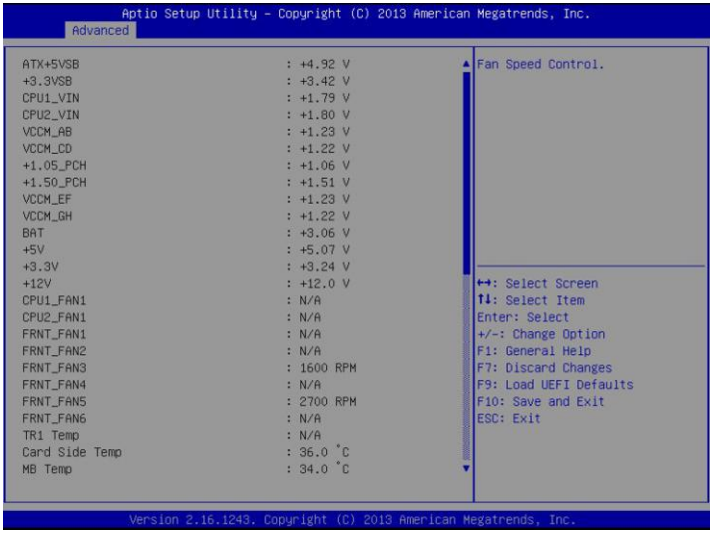
This item is for M_SATA ports. Use this to select Marvell SATA operation mode. Configuration options: [IDE Mode] and [AHCI Mode] . The default value is [AHCI Mode].

Bootable Marvell 9172 SATA3

We recommend to use Intel SATA ports (Port 0~5) for your bootable devices. This will minimize your boot time and get the best performance. If you still want to boot from Marvell SATA3 controller, please set this item to Yes.

3.3.9 H/W Monitor

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.



CPU1_FAN1

This allows you to set the CPU1 fan1's speed. The default value is [Smart Fan].

CPU2_FAN1

This allows you to set the CPU2 fan1'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].

FRNT_FAN 4

This allows you to set the front fan 4's speed. The default value is [Smart Fan].

FRNT_FAN 5

This allows you to set the front fan 5's speed. The default value is [Smart Fan].

FRNT_FAN 6

This allows you to set the front fan 6's speed. The default value is [Smart Fan].

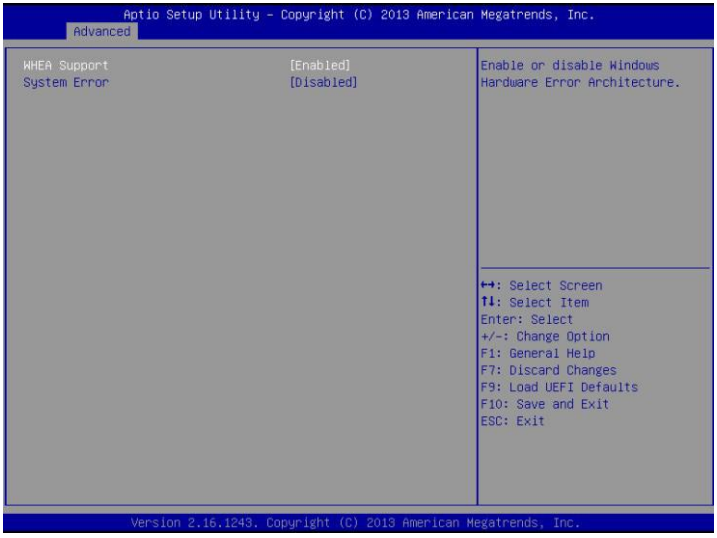
Smart Fan Control

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.

3.3.10 WHEA Configuration



WHEA Support

Use this item to enable or disable Windows Hardware Error Architecture.

System Error

Use this item to enable or disable System Error feature. When it is set to [Enabled], you can configure Memory Error and PCIE Error log features.

3.3.11 Instant Flash

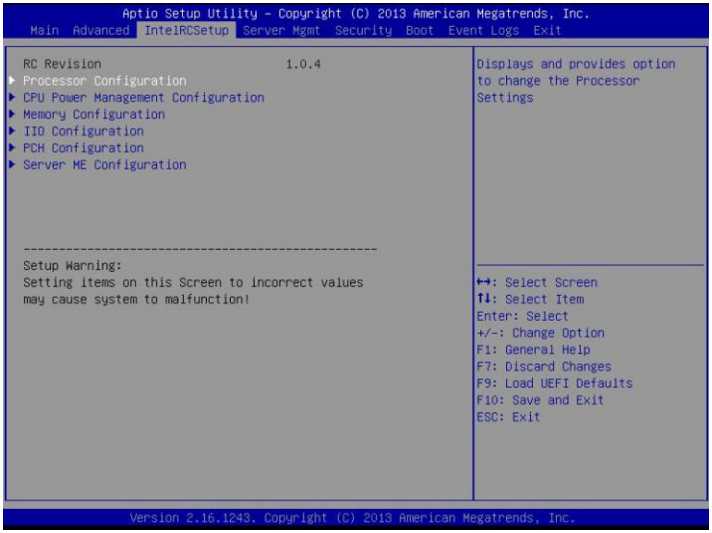
Instant Flash is a UEFI flash utility embedded in Flash ROM. This convenient UEFI update tool allows you to update system UEFI without entering operating systems first like MS-DOS or Windows®. Just save the new UEFI file to your USB flash drive, floppy disk or hard drive and launch this tool, then you 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.

3.3.12 Secure Backup UEFI (A -> B)

Whenever one of the ROM images are outdated or corrupted, switch to the other flash ROM and execute Secure Backup UEFI to duplicate the current working ROM image to the secondary flash ROM.

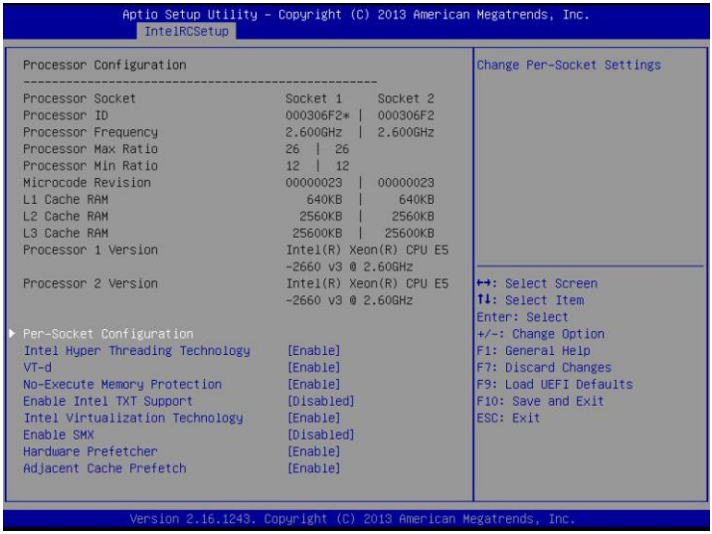
3.4 IntelRCSetup

In this section, you may set the configurations for the following items: Processor Configuration, CPU Power Management Configuration, Memory Configuration, IIO Configuration, PCH Configuration and Server ME Configuration.



English

3.4.1 Processor Configuration



Per-Socket Configuration

Change Per-Socket Settings.

CPU Socket 1 Configuration

Active Processor Cores

Enter the number of cores to be enabled. 0 means all cores. 14 cores are available.

CPU Socket 2 Configuration

Active Processor Cores

Enter the number of cores to be enabled. 0 means all cores. 14 cores are available.

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.

VT-d

Intel® Virtualization Technology for Directed I/O helps your virtual machine monitor better utilize hardware by improving application compatibility and reliability, and providing additional levels of manageability, security, isolation, and I/O performance.

No-Execute Memory Protection

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

Enable Intel TXT Support

Enable Intel Trusted Execution Technology configuration. Please disable "EX DFX Features" when TXT is enabled.

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.

Enable SMX

Use this item to enable Safer Mode Extensions.

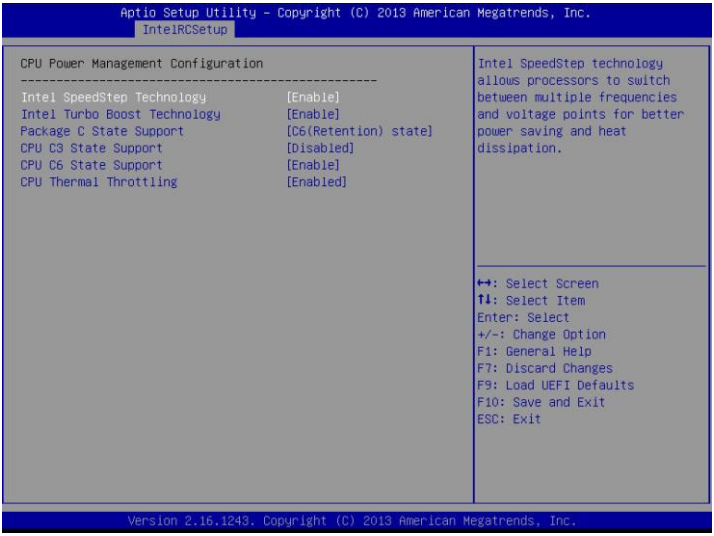
Hardware Prefetcher

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

Adjacent Cache Prefetch

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

3.4.2 CPU Power Management Configuration



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].

Package C State Support

Enable CPU, PCIe, Memory, Graphics C State Support for power saving.

CPU C3 State Support

Enable C3 sleep state for lower power consumption.

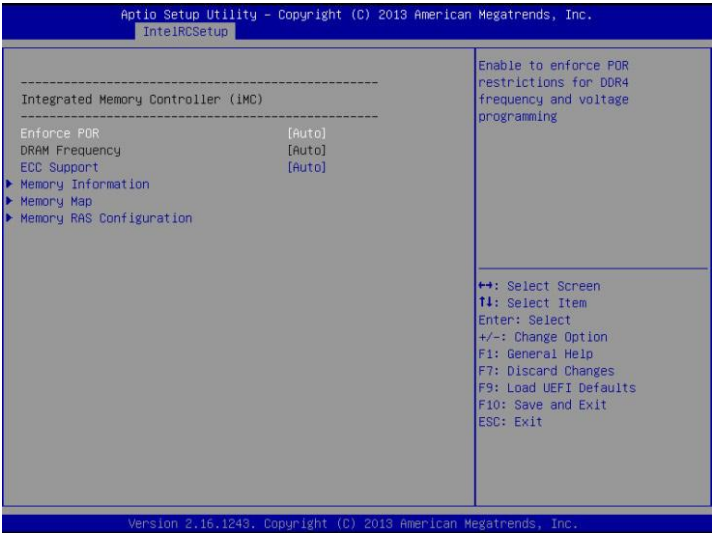
CPU C6 State Support

Enable C6 deep sleep state for lower power consumption.

CPU Thermal Throttling

Enable CPU internal thermal control mechanisms to keep the CPU from overheating.

3.4.3 Memory Configuration



Enforce POR

Enable to enforce POR restrictions for DDR4 frequency and voltage programming.

DRAM Frequency

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

ECC Support

Use this item to enable or disable DDR ECC Support.

Memory Information

Displays memory topology with DIMM population information.

Memory Map

Set memory mapping settings.

Channel Interleaving
Select to configure Channel Interleaving settings.

Rank Interleaving
Select to configure Rank Interleaving settings.

Memory RAS Configuration

Displays and provides option to change the Memory Ras Settings.

RAS Mode
Enable or disable RAS modes. Enabling Sparing and Mirroring is not supported. If enabled, Sparing will be selected.

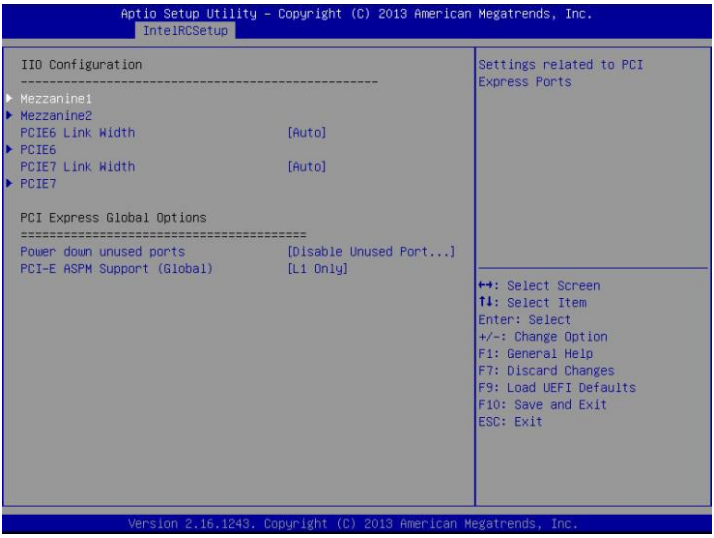
Correctable Error Threshold
Correctable Error Threshold (1-32767) used for sparing, tagging, and leaky bucket.

Patrol Scrub
Use this item to enable or disable Patrol Scrub.

Demand Scrub
Use this item to enable or disable Demand Scrub.

Device Tagging
Use this item to enable or disable Device Tagging.

3.4.4 IIO Configuration



Mezzanine1

This allows you to configure the settings related to PCI Express ports.

Mezzanine2

This allows you to configure the settings related to PCI Express ports.

PCIE 6 Link Width

This allows you to select PCIE 6 port Link Width. The default value is [Auto].

PCIE 6

This allows you to configure the settings related to PCI Express ports.

PCIE 7 Link Width

This allows you to select PCIE 7 port Link Width. The default value is [Auto].

PCIE 7

This allows you to configure the settings related to PCI Express ports.

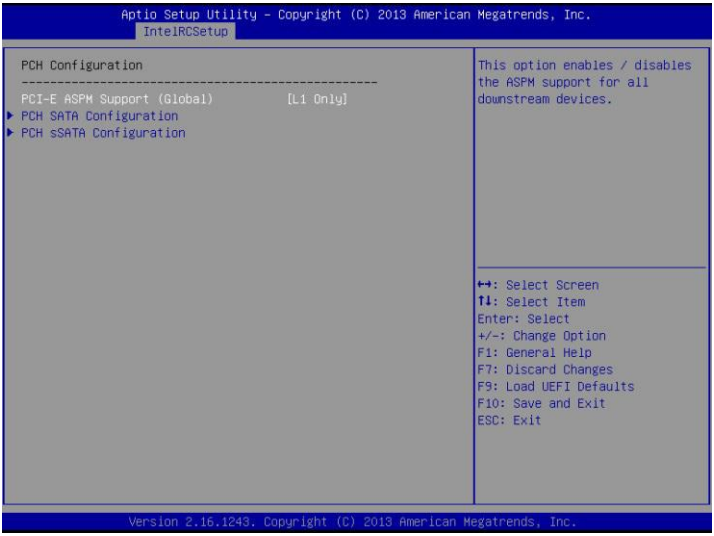
Power Down Unused Ports

Use this item to enable or disable Power Down Unused Ports.

PCI-E ASPM Support

This option enables or disables the ASPM support for all downstream devices.

3.4.5 PCH Configuration



PCI-E ASPM Support

This option enables or disables the ASPM support for all downstream devices.

PCH SATA Configuration

SATA devices and settings

SATA Controller

Use this item to enable or disable SATA Controller.

SATA/M.2_SATA Mode Selection

Identify the SATA port is connected to Solid State Drive or Hard Disk Drive. Press <Ctrl+I> to enter RAID ROM during UEFI POST process.

Support Aggressive Link Power Mgmt

Use this item to enable or disable SALP.

SATA Port 0 / 1 / 2 / 3 / 4 / 5

Hot Plug

Designates this port as Hot Plugglable.

Spin Up Device

If enabled for any of ports, Staggered Spin Up will be performed and only the drives which have this option enabled will spin up at boot. Otherwise all drives spin up at boot.

SATA Rx Setting

Adjust SATA DTLE DATA Values (0-15).

SATA Device Type

Identify the SATA port connected to Solid State Drive or Hard Disk Drive.

PCH sSATA Configuration

sSATA devices and settings

sSATA Controller

Use this item to enable or disable SATA Controller.

sSATA Mode Selection

Identify the SATA port is connected to Solid State Drive or Hard Disk Drive. Press <Ctrl+I> to enter RAID ROM during UEFI POST process.

sSATA Aggressive Link Power Mgmt

Use this item to enable or disable SALP.

sSATA Port 0 / 1 / 2 / 3

Hot Plug

Designates this port as Hot Plugglable.

Spin Up Device

If enabled for any of ports, Staggered Spin Up will be performed and only the drives which have this option enabled will spin up at boot. Otherwise all drives spin up at boot.

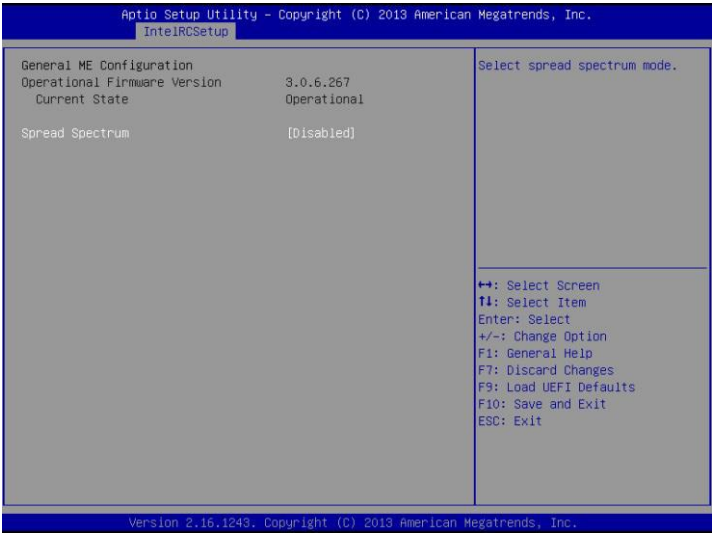
sSATA Rx Setting

Adjust sSATA DTLE DATA Values (0-15).

sSATA Device Type

Identify the SATA port connected to Solid State Drive or Hard Disk Drive.

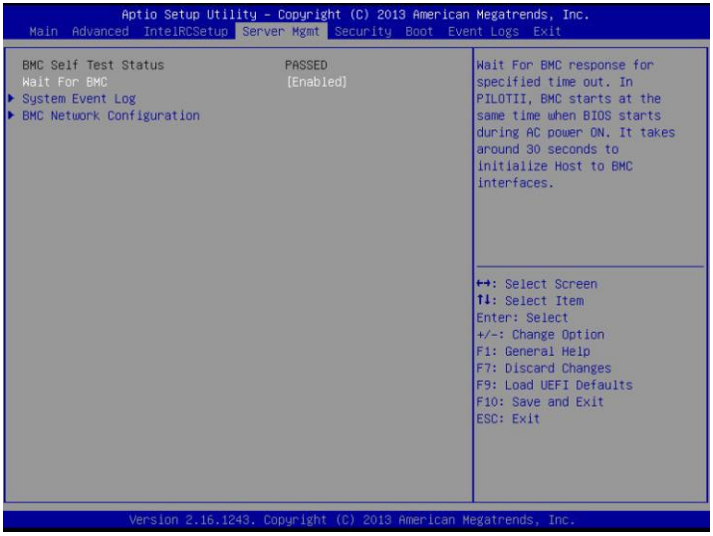
3.4.6 Server ME Configuration



Spread Spectrum

Use this item to select spread specturm mode.

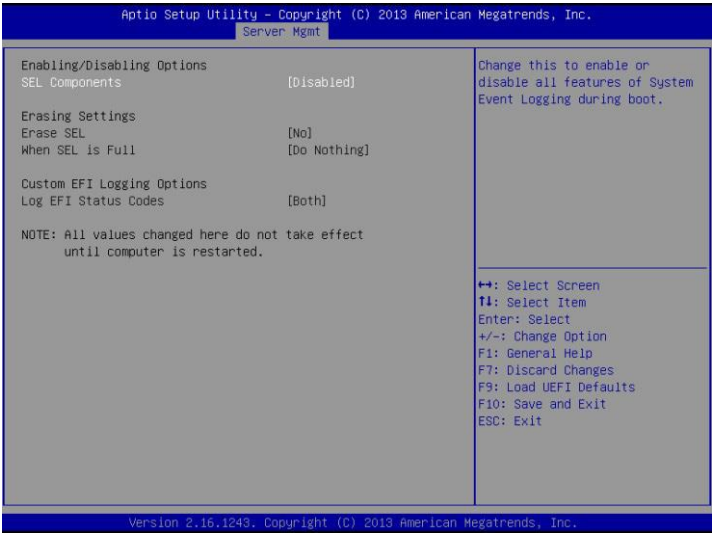
3.5 Server Mgmt



Wait For BMC

Wait For BMC response for specified time out. In PILOTII, BMC starts at the same time when BIOS starts during AC power ON. It takes around 30 seconds to initialize Host to BMC interfaces.

3.5.1 System Event Log



SEL Components

Change this to enable ro disable all features of System Event Logging during boot.

Erase SEL

Use this to choose options for earsing SEL.

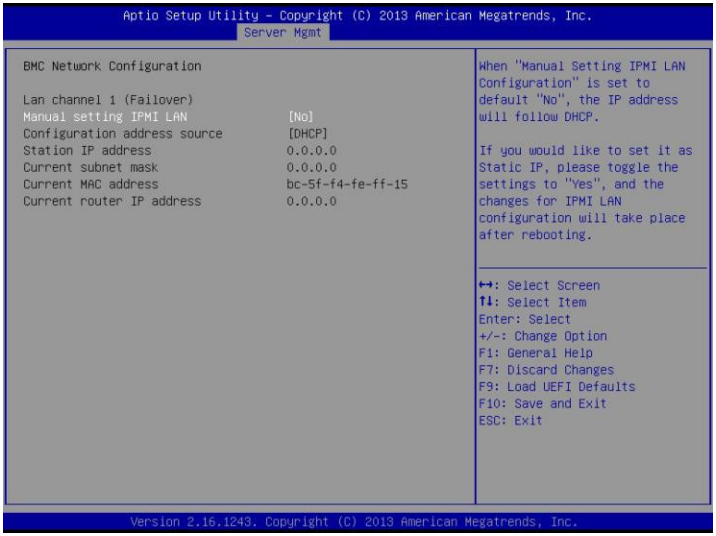
When SEL is Full

Use this to choose options for reactions to a full SEL.

Log EFI Status Codes

Use this item to disable the logging of EFI Status Codes or log only error code or only progress or both.

3.5.2 BMC Network Configuration



Lan Channel 1 (Failover)

Manual Setting IPMI LAN

If [No] is selected, the IP address is assigned by DHCP. If you prefer using a static IP address, toggle to [Yes], and the changes take effect after the system reboots. The default value is [No].

Configuration Address Source

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

Static: Manually enter the IP Address, Subnet Mask and Gateway Address in the BIOS for BMC LAN channel configuration.
DHCP: IP address, Subnet Mask and Gateway Address are automatically assigned by the network's DHCP server.

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

The default login information for the IPMI web interface is:
Username: admin
Password: admin

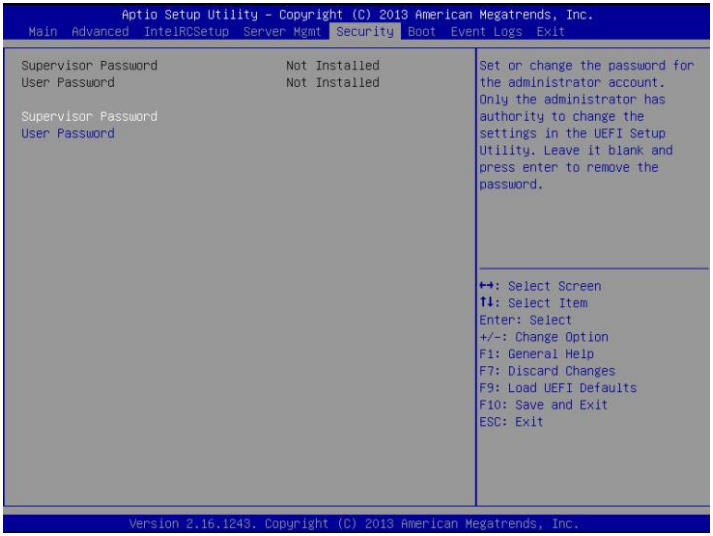
For more instructions on how to set up remote control environment and use the IPMI management platform, please refer to the IPMI Configuration User Guide or go to the Support website at: http://www.asrockrack.com/support/ipmi.asp

BMC Mac Backup Tool

Use this to restore BMC Mac from the backup.

3.6 Security

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

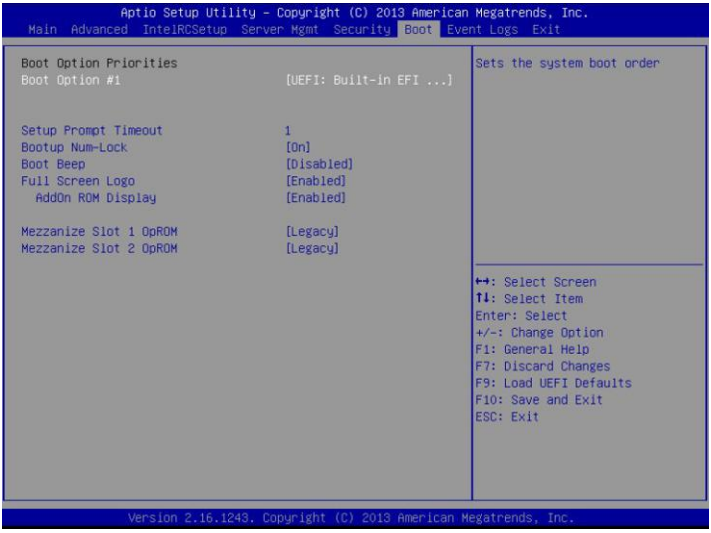
Set or change the password for the administrator account. Only the administrator has authority to change the settings in the UEFI Setup Utility. Leave it blank and press enter to remove the password.

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.

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 #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. 65535(0XFFFF) means indefinite waiting.

Bootup Num-Lock

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

Boot Beep

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

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].

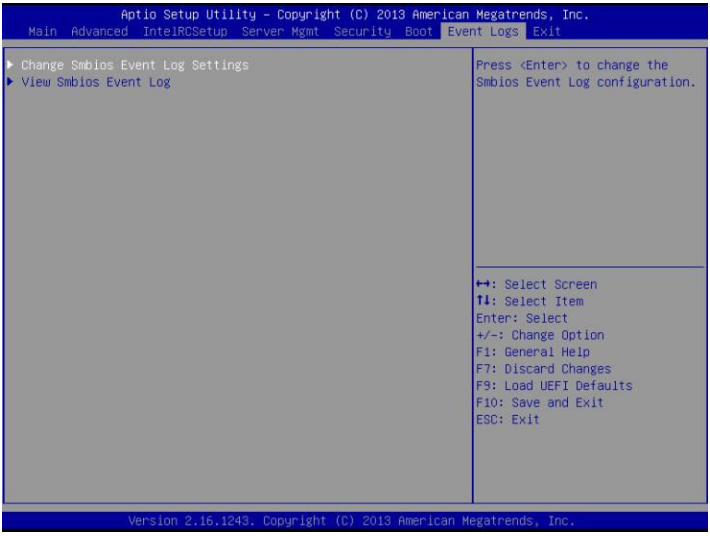
Mezzanine Slot 1 OpROM

Use this item to select Mezzanine Slot 1 Storage and Network Option ROM policy. (Video Option ROM policy cannot be selected in this item.)

Mezzanine Slot 2 OpROM

Use this item to select Mezzanine Slot 2 Storage and Network Option ROM policy. (Video Option ROM policy cannot be selected in this item.)

3.8 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.

Erase 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 255.

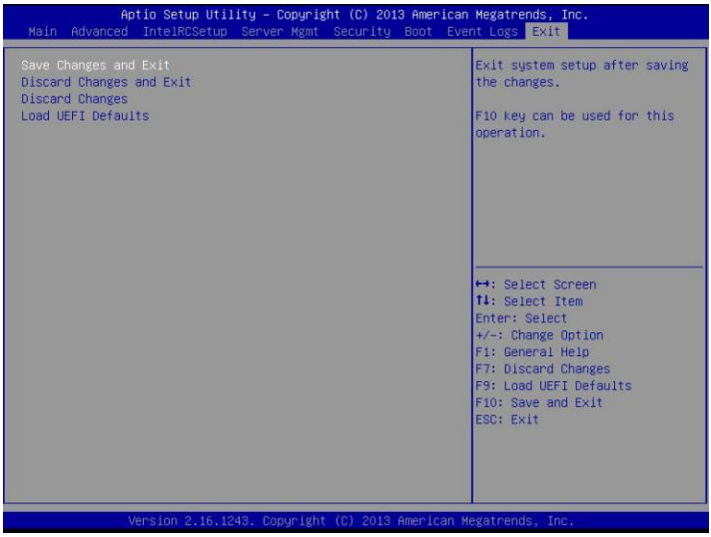
METW (Multiple Event Time Window)
Use this item to specify the number of minutes which must pass between duplicate log entries which utilize a multiple-event counter. The value ranges from 0 to 99 minutes.

View Smbios Event Log

Press <Enter> to view the Smbios Event Log records.

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

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. Press <F10> key or 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. Press <ESC> key or 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. Press <F7> key or 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.

Chapter 4 Software Support

4.1 Install Operating System

This motherboard supports various Microsoft® Windows® Server 2008 R2 SP1 / 2012 / 2012 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.

**Please download the Intel® SATA Floppy Image driver from the ASRock Rack's website (www.asrockrack.com) to your USB drive or simply install the SATA driver from the Support CD while installing OS in SATA RAID mode.*

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 DDR4 2133 R-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 adaquate 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://event.asrockrack.com/tsd.asp) 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.

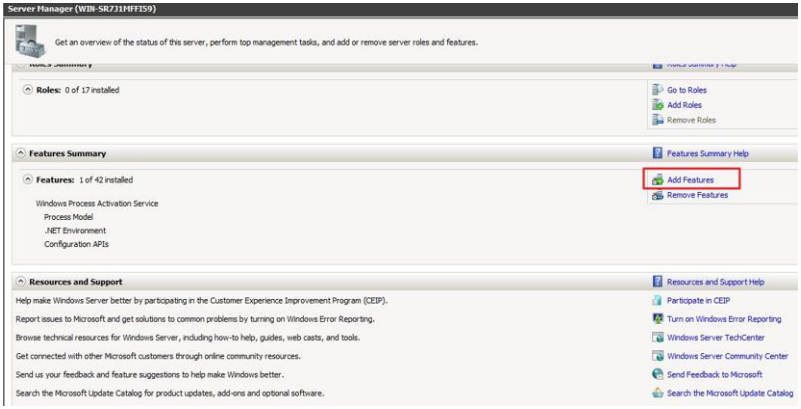
Chapter 6: Net Framework Installation Guide

To let Intel® RSTe works properly, it is required to install Net Framework. Please follow the steps below to enable ".Net Framework" feature on Microsoft® Windows® Server 2008 R2.

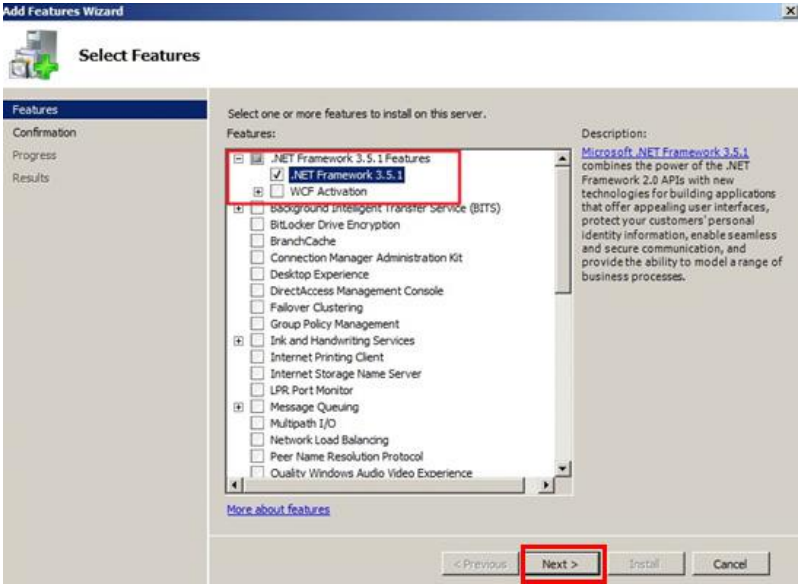
6.1 Installing .Net Framework 3.5.1 (For Server 2008 R2)

1. Double-click the Server Manager icon in the Windows system tray.

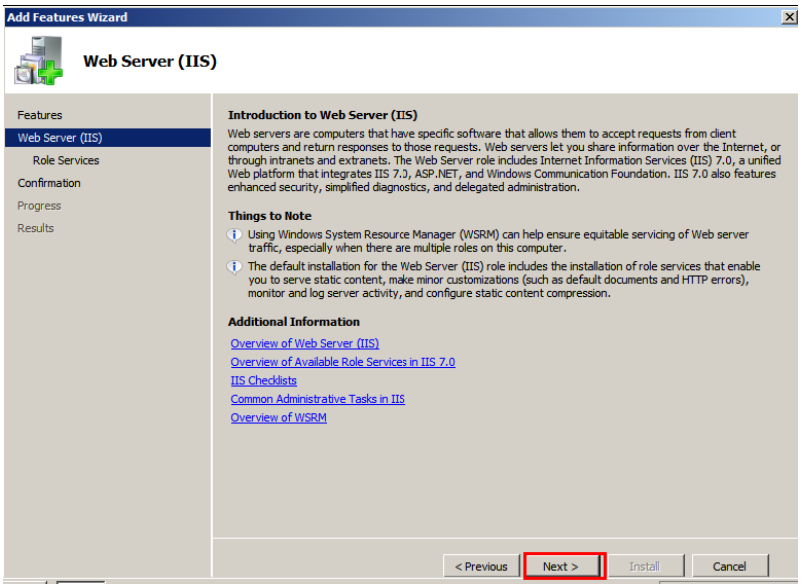
2. Click Add Features in the right hand pane.



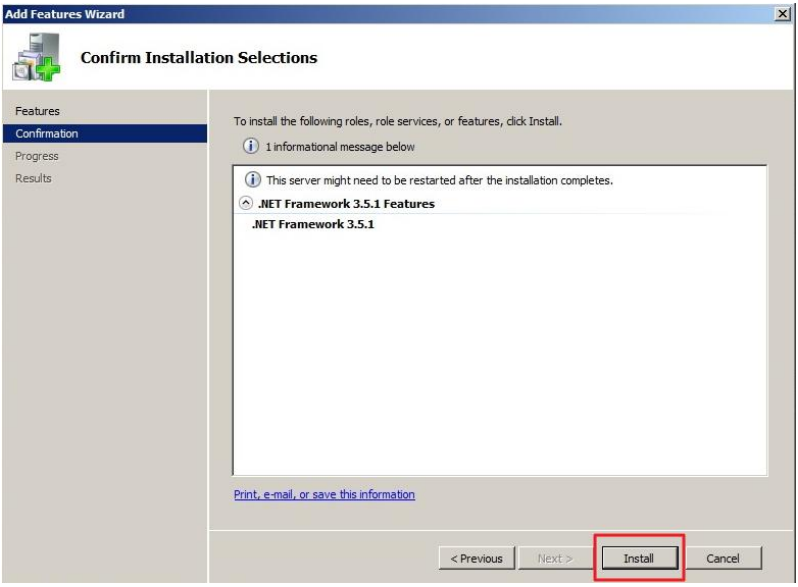
3. Check the box next to .Net Framework 3.5.1 and then click **Next.**



4. Click **Next** to continue.



5. Click **Install** to start installing .Net Framework 3.5.1.



6. After the installation completes, click **Close.**