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Server/Workstation
Motherboard

EP2C622D24LM2

User Manual

English



Version 1.0

Published November 2020

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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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“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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Chapter 1 Introduction

Thank you for purchasing ASRock Rack **EP2C622D24LM2** 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 EP2C622D24LM2 Motherboard
(L shape Form Factor: 16.7-in x 17-in, 42.4 cm x 43.2 cm)
- Quick Installation Guide
- 2 x Screws for M.2 Sockets



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

1.2 Specifications

EP2C622D24LM2	
MB Physical Status	
Form Factor	L shape
Dimension	16.7" x 17"(42.4 cm x 43.2 cm)
Processor System	
CPU	Intel® Xeon® Scalable Processor
Socket	Dual Socket P, LGA3647
Chipset	Intel® C622
System Memory	
Capacity	24 x 288-pin DDR4 DIMM slots
Type	- 6 Channels memory technology - Supports DDR4 2933/2666/2400/2133 R DIMM/LR DIMM
DIMM Size	- RDIMM:32GB, 16GB, 8GB, 4GB - LRDIMM:64GB, 32GB
Voltage	1.2V
Expansion Slot	
PCIe 3.0 x16	2 (Slot1:x16 from CPU1, Slot 2 : x16 from CPU2)
PCIe 3.0 x8	1 (Slot 3 from CPU2)
OCUlink for U.2	N/A
Mezzanine	OCF A/B/C for CPU1 and Storage A/B for CPU2
Storage	
SATA Controller	Intel® C622: 14 SATA3(including 2x M.2 ports or 2x SATA DOM)
Additional Storage Controller	N/A
Slimline for U.2	1 x8 from CPU2 (support QAT2 by cable to PCH miniSAS HD)
Ethernet	
Interface	N/A
LAN controller	N/A
Management	
BMC Controller	ASPEED AST2500
IPMI Dedicated GLAN	1 x Realtek RTL8211E for dedicated management GLAN
Features	- Watch Dog - NMI
Graphics	
Controller	ASPEED AST2500
VRAM	DDR4 16MB

Rear Panel I/O	
VGA Port	1 (D-sub)
USB 3.2 Gen1 Port	2
LAN Port	- 1 x RJ45 Dedicated IPMI LAN port - LAN Ports with LED (ACT/LINK LED and SPEED LED)
UID Button/LED	1
Serial Port	1 (COM1)
Internal Connector	
Auxiliary Panel Header	1 (includes chassis intrusion , location button & LED , front LAN LED)
SATA DOM	2
SATA Port	12 from MiniSAS HD connector
TPM Header	1
SMB Header	3
IPMB Header	1
Fan Header	6 x System Fans (6-pin)
GPU Power	2 (8-pin)
HDD Backplane Power	2 (8-pin)
Type A USB 3.2 Gen1 Port	1
Internal VGA Header	1
USB 3.2 Gen1 Header	1 (supports 2 USB 3.2 Gen1 ports)
USB 2.0 Header	1 (supports 2 USB 2.0 ports)
M.2	2 (2230 / 2242 / 2260 / 2280, support PCIE (x2) or SATA3 M.2)
System BIOS	
BIOS Type	256Mb 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 - System Temperature Sensing - Card Side Temperature Sensing
Fan	- CPU/Front Fan Tachometer - CPU Quiet Fan (Allow Chassis Fan Speed Auto-Adjust by CPU Temperature) - CPU/Front Fan Multi-Speed Control
Voltage	Voltage Monitoring: +12V, +5V, +3V, BAT, 1.8V_PCH, 1.05V_PCH, PVNN_PCH, VCCM_ABC, VCCM_DEF, VCCM_GHI, VCCM_JKL, CPU1_VCORE, CPU2_VCORE, +5VSB, +3VSB

Support OS	
OS	Microsoft® Windows® - Server 2012 R2 (64 bit) - Server 2016 (64 bit) - Server 2019 (64 bit) Linux® - Red Hat Enterprise Linux Server 6.8 (64 bit) / 7.4 (64 bit) - CentOS 6.8 (64 bit) / 7.4 (64 bit) - SUSE Enterprise Linux Server 11 SP4 (64 bit) / 12 SP3 (64 bit) - FreeBSD 11.2 (64 bit) - Ubuntu 16.04 (64 bit) / 15.10 (64 bit) Virtual - VMWare® ESXi 6.5 u1 - Citrix XenServer 7.5 - Microsoft hyper-V Server 2016 <i>*On Ubuntu 16.04 (64bit) system, Intel® Raid mode only supports UEFI BOOT.</i> <i>*Please refer to our website for the latest OS support list.</i>
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.

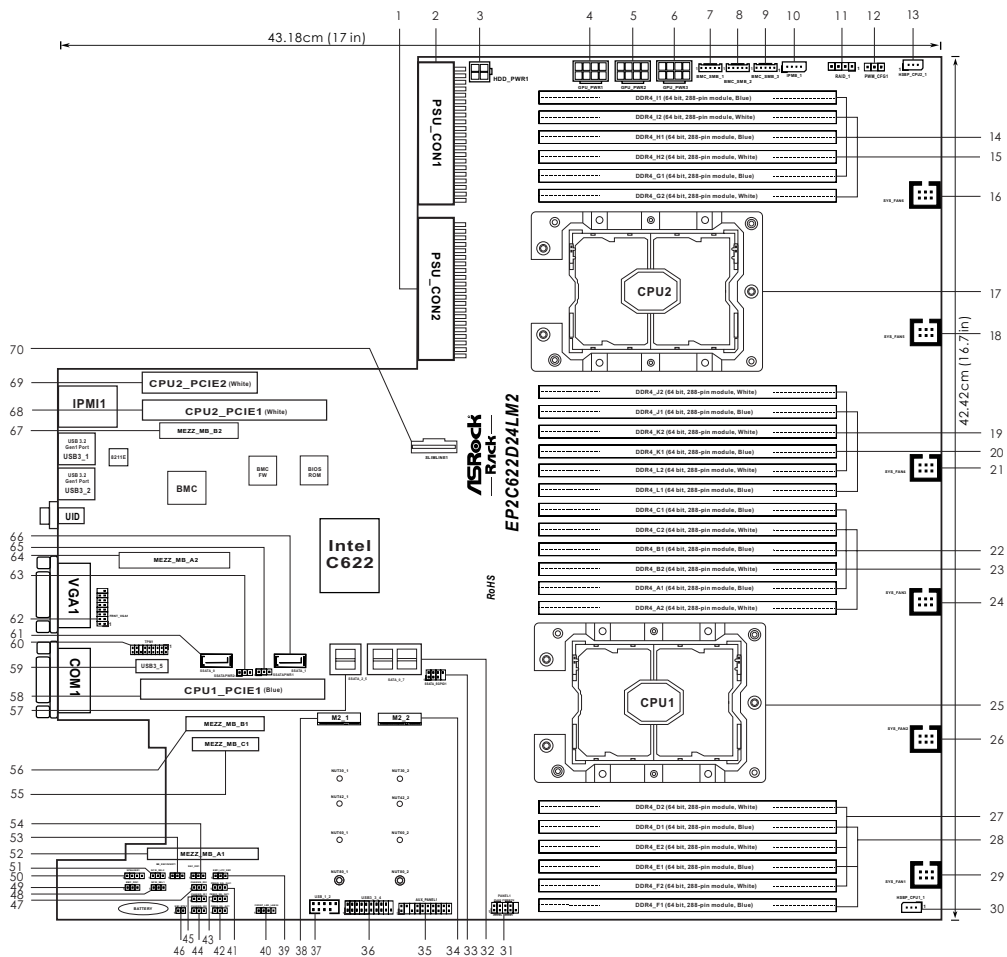


If you install Intel® LAN utility or Marvell SATA utility, this motherboard may fail Windows® Hardware Quality Lab (WHQL) certification tests. If you install the drivers only, it will pass the WHQL tests.

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	PSU Connector 2 (PSU_CON2)
2	PSU Connector 1 (PSU_CON1)
3	HDD Backplane (Rear) Power Connector (HDD_PWR1)
4	GPU Power Connector (GPU_PWR1)
5	GPU Power Connector (GPU_PWR2)
6	HDD Backplane (Front) Power Connector (GPU_PWR3)
7	BMC SMBus Header 1 (BMC_SMB_1)
8	BMC SMBus Header 2 (BMC_SMB_2)
9	BMC SMBus Header 3 (BMC_SMB_3)
10	Intelligent Platform Management Bus Header (IPMB_1)
11	Virtual RAID On CPU Header (RAID_1)
12	PWM Configuration Header (PWM_CFG1)
13	Backplane PCI Express Hot-Plug Connector (HSBP_CPU2_1)
14	3 x 288-pin DDR4 DIMM Slots (DDR4_G1, DDR_H1, DDR4_I1, Blue)*
15	3 x 288-pin DDR4 DIMM Slots (DDR4_G2, DDR_H2, DDR4_I2, White)*
16	System Fan Connector (SYS_FAN6)
17	CPU Socket 2 LGA-3647 (Socket P) (CPU2)
18	System Fan Connector (SYS_FAN5)
19	3 x 288-pin DDR4 DIMM Slots (DDR4_J2, DDR_K2, DDR4_L2, White)*
20	3 x 288-pin DDR4 DIMM Slots (DDR4_J1, DDR_K1, DDR4_L1, Blue)*
21	System Fan Connector (SYS_FAN4)
22	3 x 288-pin DDR4 DIMM Slots (DDR4_A1, DDR_B1, DDR4_C1, Blue)*
23	3 x 288-pin DDR4 DIMM Slots (DDR4_A2, DDR_B2, DDR4_C2, White)*
24	System Fan Connector (SYS_FAN3)
25	CPU Socket 1 LGA-3647 (Socket P) (CPU1)
26	System Fan Connector (SYS_FAN2)
27	3 x 288-pin DDR4 DIMM Slots (DDR4_D2, DDR_E2, DDR4_F2, White)*
28	3 x 288-pin DDR4 DIMM Slots (DDR4_D1, DDR_E1, DDR4_F1, Blue)*
29	System Fan Connector (SYS_FAN1)
30	Backplane PCI Express Hot-Plug Connector (HSBP_CPU1_1)
31	System Panel Header (PANEL1)
32	Mini SAS HD Connector (SATA_0_7)
33	SSATA SGPIO Connector (SSATA_SGPIO1)**

No.	Description
34	M.2 Socket (M2_2) (Type 2230/2242/2260/2280)
35	Auxiliary Panel Header (AUX_PANEL1)
36	USB 3.2 Gen1 Header (USB3_3_4)
37	USB 2.0 Header (USB_1_2)
38	M.2 Socket (M2_1) (Type 2230/2242/2260/2280)
39	ESPI / LPC Switch Jumper (ESPI_LPC_SW1)
40	Front LAN LED Header (FRONT_LED_LAN34)
41	PMBUS Mode Jumper (PMBUS_SEL_CLK1)
42	PMBUS Mode Jumper (PMBUS_SEL_ALT1)
43	PMBUS Mode Jumper (PMBUS_SEL_DAT1)
44	Chassis ID2 Jumper (CHASSIS_ID2)
45	Chassis ID1 Jumper (CHASSIS_ID1)
46	Non Maskable Interrupt Button (NMI_BTN1)
47	Chassis ID0 Jumper (CHASSIS_ID0)
48	NCSI Mode Jumper (NCSI_SEL1)
49	Enable/Disable BMC Jumper (BMC_DIS1)
50	Speaker Header (SPEAKER1)
51	NCSI Mode Jumper (NCSI_SEL2)
52	Mezzanine Card Slot (MEZZ_MB_A1)
53	ME Recovery Jumper (ME_RECOVERY1)
54	Security Override Jumper (SEC_OR1)
55	Mezzanine Card Slot (MEZZ_MB_C1)
56	Mezzanine Card Slot (MEZZ_MB_B1)
57	Mini SAS HD Connector (SSATA_2_5)**
58	PCI Express 3.0 Slot (CPU1_PCIE1)
59	Vertical Type A USB 3.2 Gen1 (USB3_5)
60	TPM Header (TPM1)
61	SATA DOM Connector (SSATA_0)**
62	Front VGA Header (FRONT_VGA1)
63	SATA DOM Power Jumper (SSATAPWR2)**
64	Mezzanine Card Slot (MEZZ_MB_A2)
65	SATA DOM Power Jumper (SSATAPWR1)**
66	SATA DOM Connector (SSATA_1)
67	Mezzanine Card Slot (MEZZ_MB_B2)

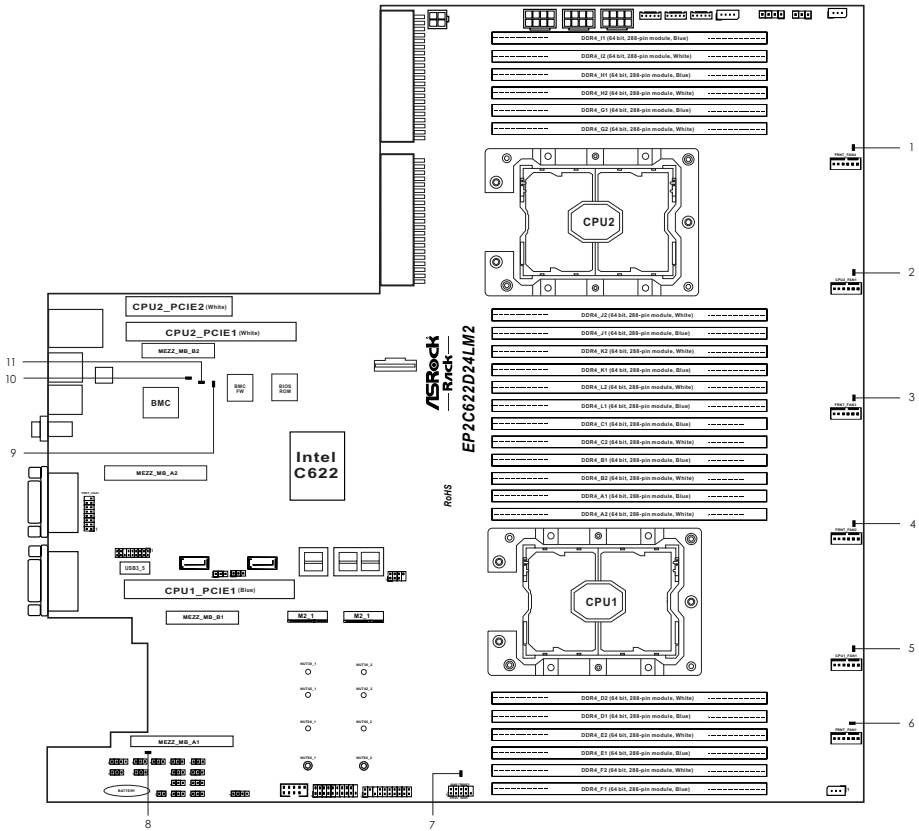
No.	Description
68	PCI Express 3.0 Slot (CPU2_PCIE1)
69	PCI Express 3.0 Slot (CPU2_PCIE2)
70	Slimline NVMe Connector (SLIMLINE1)

* For DIMM installation and configuration instructions, please see p.18 (Installation of Memory Modules (DIMM)) for more details.

** The first “S” of the “SSATA” means “secondary”. SATA is managed by the first controller. SSATA is managed by the secondary controller.

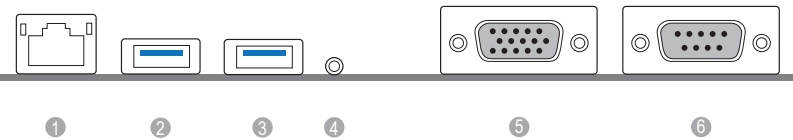
***The M.2 socket (M2_1) is shared with the SSATA_0 connector. If you install a M.2 SATA module to the M.2 Socket (M2_1), the internal SSATA_0 will not function (and vice versa). The M.2 socket (M2_2) is shared with the SSATA_1 connector. If you install a M.2 SATA module to the M.2 Socket (M2_2), the internal SSATA_1 will not function (and vice versa).

1.5 Onboard LED Indicators



No.	Item	Status	Description
1	FRNT_FAN4_LED1	Red	Front_FAN4 failed
2	CPU2_FAN1_LED1	Red	CPU2_FAN1 failed
3	FRNT_FAN3_LED1	Red	Front_FAN3 failed
4	FRNT_FAN2_LED1	Red	Front_FAN2 failed
5	CPU1_FAN1_LED1	Red	CPU1_FAN1 failed
6	FRNT_FAN1_LED1	Red	Front_FAN1 failed
7	HDD_LED	Green	HDD activity
8	SB_PWR1	Green	STB PWR ready
9	LED_CATERR1	Red	CPU CATERR error
10	SYS_LED1	Yellow	SYS EVENT
11	BLED1	Green	BMC heartbeat LED

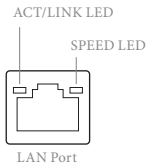
1.6 I/O Panel



No.	Description	No.	Description
1	IPMI LAN Header (IPMI1)	4	UID Switch (UID)
2	USB 3.2 Gen1 Port (USB3_1)	5	VGA Header (VGA1)
3	USB 3.2 Gen1 Port (USB3_2)	6	Serial Port (COM1)

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

1.7 Block Diagram

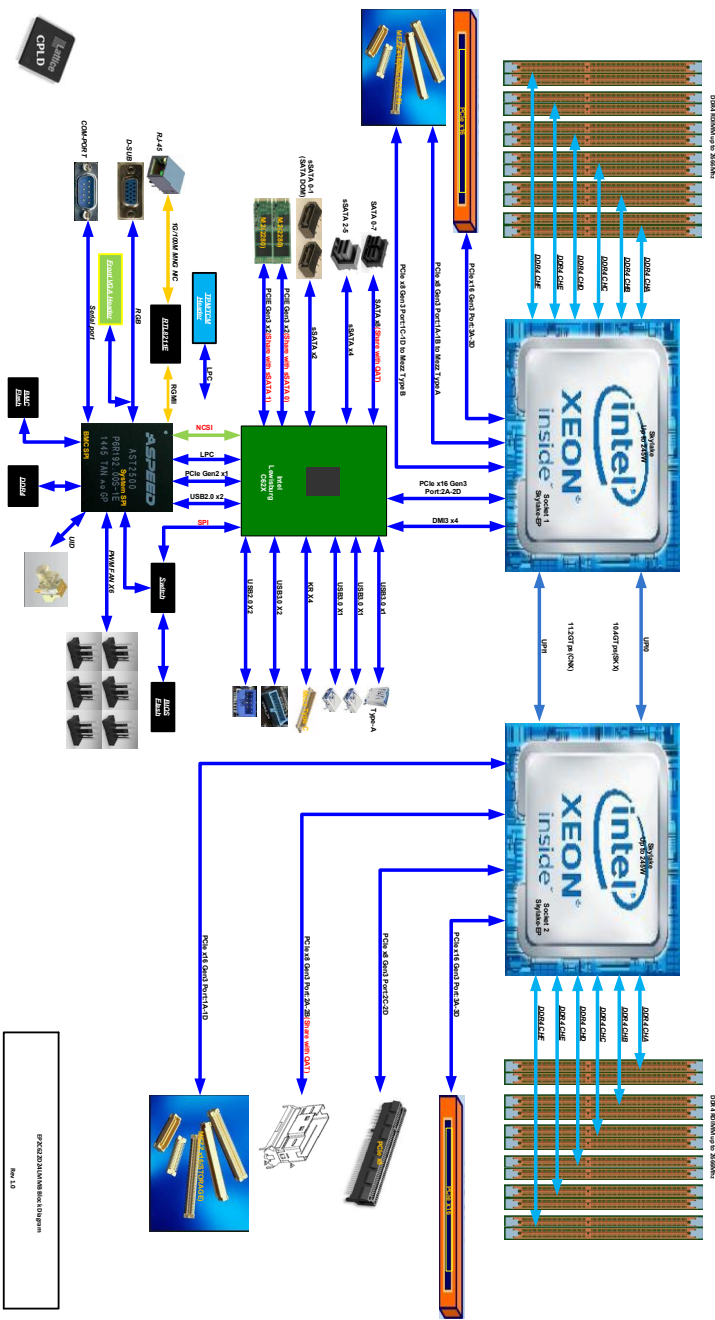


Figure 1.7: Block Diagram

Chapter 2 Installation

This is a L-shape form factor (16.7" x 17", 42.42 cm x 43.2 cm) motherboard. Before you install the motherboard, study the configuration of your chassis to ensure that the motherboard fits into it.

EP2C622/EP2C621 Series are dual socket motherboards that support Intel® Xeon® Scalable 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.



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.

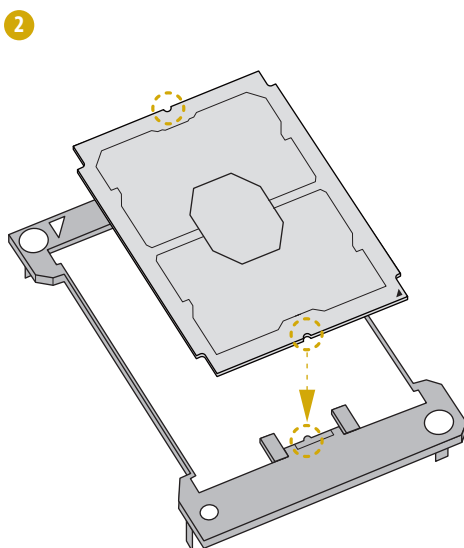
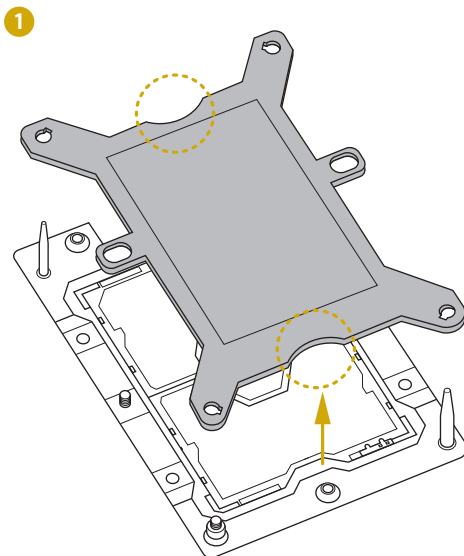


Before you install or remove any component, ensure that the power is switched off or the power cord is detached from the power supply. Failure to do so may cause severe damage to the motherboard, peripherals, and/or components.

2.3 Installing the CPU and Heatsink

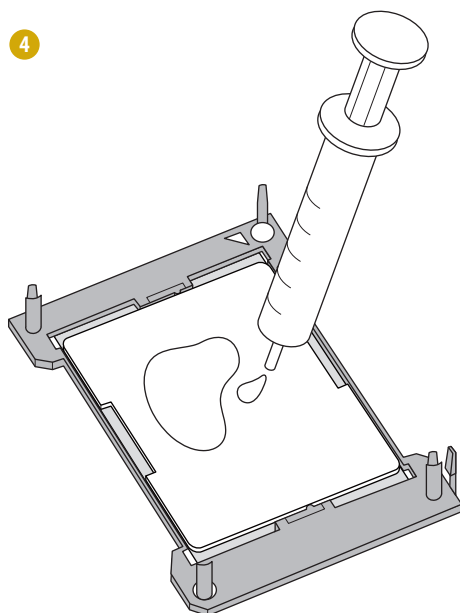
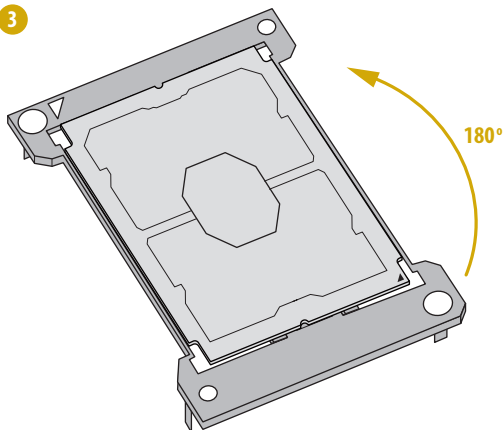


1. Before you insert the CPU into the socket, please check if the PnP cap is on the socket, if the CPU surface is unclean, or if there are any bent pins in the socket. Do not force to insert the CPU into the socket if above situation is found. Otherwise, the CPU will be seriously damaged.
2. Unplug all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

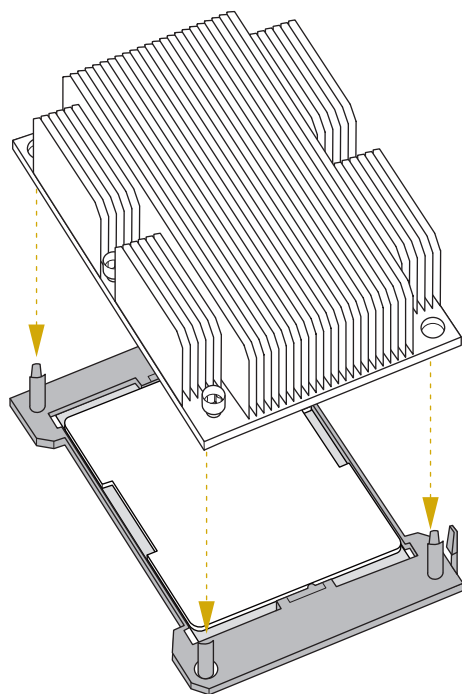


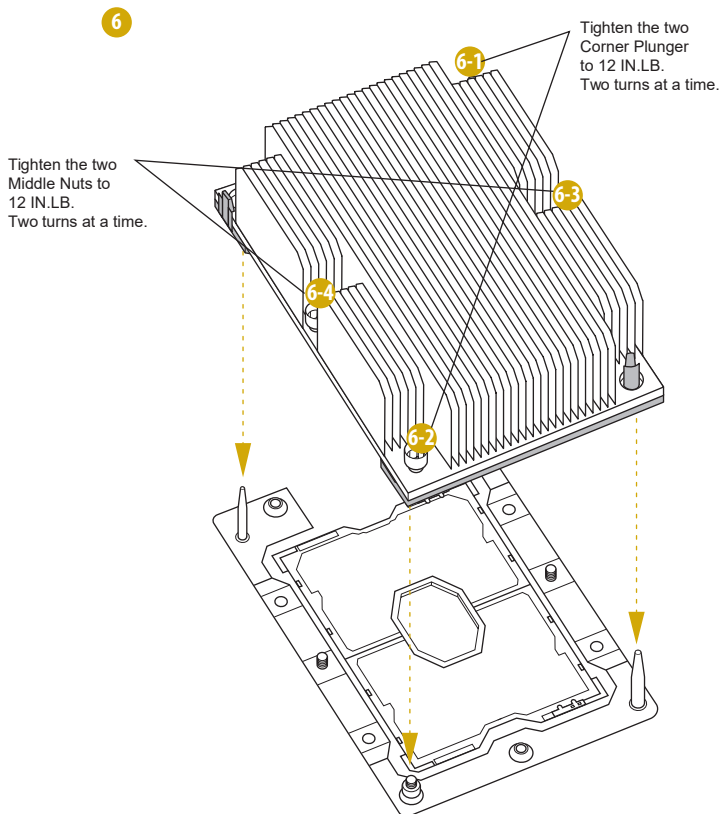


1. Before you installed the heatsink, you need to spray thermal interface material between the CPU and the heatsink to improve heat dissipation.
2. Illustration in this documentation are examples only. Heatsink or fan cooler type may differ.



5





2.4 Installation of Memory Modules (DIMM)

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

CPU1	CPU2
DDR4_A1, B1, C1, D1, E1, F1 (Blue)	DDR4_G1, H1, I1, J1, K1, L1 (Blue)
DDR4_A2, B2, C2, D2, E2, F2 (White)	DDR4_G2, H2, I2, J2, K2, L2 (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.

Recommended Memory Configurations

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

1 CPU Configurations

		DIMM(S)				
		1	2	4	8	12
CPU1	A1	#	#	#	#	#
	B1				#	#
	C1					#
	D1			#	#	#
	E1				#	#
	F1					#
	A2		#	#	#	#
	B2				#	#
	C2					#
	D2			#	#	#
	E2				#	#
	F2					#

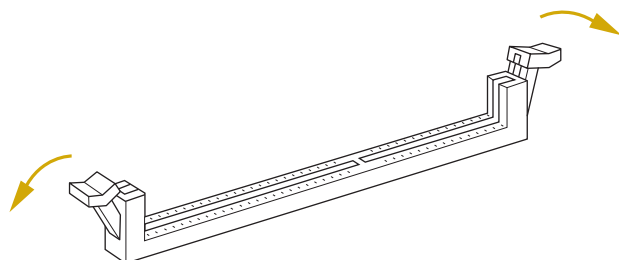
The symbol # indicates the slot is populated.

2 CPU Configurations

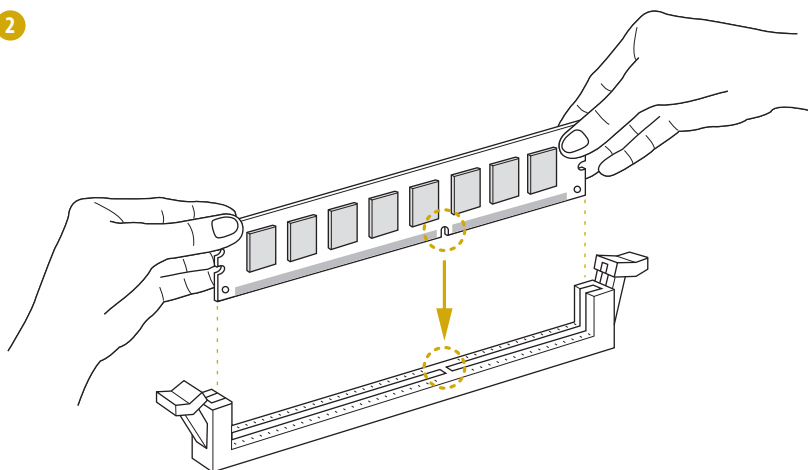
		DIMM(S)								
		1	2	4	8	12	16	16	20	24
CPU1	A1	#	#	#	#	#	#	#	#	#
	B1					#	#	#	#	#
	C1							#	#	#
	D1		#	#	#	#	#	#	#	#
	E1					#	#	#	#	#
	F1							#	#	#
	A2			#	#	#	#	#	#	#
	B2					#	#	#	#	#
	C2							#	#	#
	D2			#	#	#	#	#	#	#
	E2					#	#	#	#	#
	F2							#	#	#
CPU2	G1				#	#	#	#	#	#
	H1						#		#	#
	I1									#
	J1				#	#	#	#	#	#
	K1						#		#	#
	L1									#
	G2				#	#	#	#	#	#
	H2						#		#	#
	I2									#
	J2				#	#	#	#	#	#
	K2						#		#	#
	L2									#

The symbol # indicates the slot is populated.

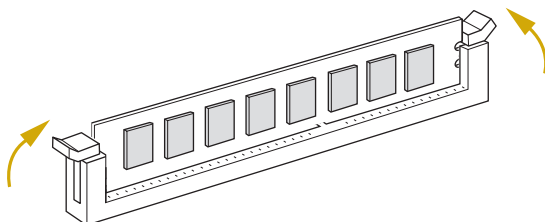
1



2



3



2.5 Expansion Slots (PCI Express Slots)

There are 3 PCI Express slots on this motherboard.

PCIe slots:

PCIE1 (PCIe 3.0 x16 slot, from CPU1) is used for PCI Express x16 lane width cards.

PCIE2 (PCIe 3.0 x16 slot, from CPU2) is used for PCI Express x16 lane width cards.

PCIE3 (PCIe 3.0 x8 slot, from CPU2) is used for PCI Express x8 lane width cards.

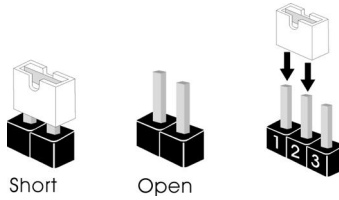
Slot	Generation	Mechanical	Electrical	Source
PCIE1	3.0	x16	x16	CPU1
PCIE2	3.0	x16	x16	CPU2
PCIE3	3.0	x8	x8	CPU2

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.

2.6 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.6, No. 53)	1_2	2_3
	Normal Mode (Default)	ME Recovery Mode
NCSI Mode Jumpers (3-pin NCSI_SEL1) (see p.6, No. 48)	1_2	1_2
(3-pin NCSI_SEL2) (see p.6, No. 51)	1_2	2_3
	N/A	NCSI is set to Mezzanine Card (Default)
NCSI Mode Jumpers (3-pin NCSI_SEL1) (see p.6, No. 48)	2_3	2_3
(3-pin NCSI_SEL2) (see p.6, No. 51)	1_2	2_3
	N/A	NCSI is set to Phy Card
Security Override Jumper (3-pin SEC_OR1) (see p.6, No. 54)	1_2	2_3
	Descriptor Security Override	Not override (Default)

PMBUS Mode Jumpers (3-pin PMBUS_SEL_CLK1) (see p.6, No. 451) (3-pin PMBUS_SEL_DAT1) (see p.6, No. 43) (3-pin PMBUS_SEL_ALT1) (see p.6, No. 42)	1_2 	2_3 
	PMBus connected to BMC (Default)	PMBus connected to PCH
SATA DOM Power Jumper (3-pin SATAPWR1) (see p.6, No. 65)	1_2 	2_3 
	SATA DOM (SSATA_1) requires 5V power supply	SATA DOM (SSATA_1) does NOT require 5V power supply (Default)
SATA DOM Power Jumper (3-pin SATAPWR2) (see p.6, No. 63)	1_2 	2_3 
	SATA DOM (SSATA_0) requires 5V power supply	SATA DOM (SSATA_0) does NOT require 5V power supply (Default)



Consult the documentation that comes with your SATA DOM and check whether or not Pin 7 requires 5V power supply.

If the connected SATA DOM requires 5V power supply, move the jumper caps placed on the SATA DOM Power Jumper (SATAPWR1 / SATAPWR2) from pins 2-3 (default) to pins 1-2.

If the connected SATA DOM does NOT require 5V power supply, connect the SATA DOM power cable to the SATA DOM power header (SATAPWR1 / SATAPWR2) and there is no need to change the default jumper setting of the SATA DOM Power Jumper (pins 2-3).

Warning! Incorrect setting of the SATA DOM Power Jumper (SATAPWR1 / SATAPWR2) may cause damage to the motherboard or your SATA DOM.

Chassis ID0 Jumper (3-pin CHASSIS_ID0) (see p.6, No. 47)		
Chassis ID1 Jumper (3-pin CHASSIS_ID1) (see p.6, No. 45)		
Chassis ID2 Jumper (3-pin CHASSIS_ID2) (see p.6, No. 44)		
	Board Level SKU (Default)	Reserved for system level use

Chassis ID0 Jumper (3-pin CHASSIS_ID0) (see p.6, No. 47)		
Chassis ID1 Jumper (3-pin CHASSIS_ID1) (see p.6, No. 45)		
Chassis ID2 Jumper (3-pin CHASSIS_ID2) (see p.6, No. 44)		
	Reserved for system level use	Reserved for system level use

Chassis ID0 Jumper (3-pin CHASSIS_ID0) (see p.6, No. 47)		
Chassis ID1 Jumper (3-pin CHASSIS_ID1) (see p.6, No. 45)		
Chassis ID2 Jumper (3-pin CHASSIS_ID2) (see p.6, No. 44)		
	Reserved for system level use	Reserved for system level use

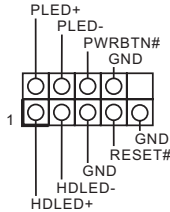
ESPI / LPC Switch Jumper (3-pin ESPI_LPC_SW1) (see p.6, No. 39)		
	ESPI	LPC (Default)

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.6, No. 31)



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):

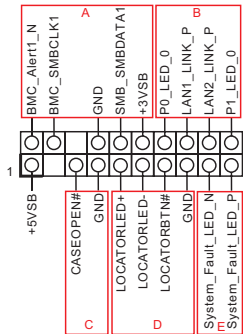
Connect to the power status indicator on the chassis front panel. The LED is on when the system is operating. The LED is off when the system is in S4 sleep state or powered off (S5).

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_PANEL1)
(see p.6, No. 35)



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



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 DOM

Connectors

(SSATA_0)

(see p.6, No. 61)

(SSATA_1)

(see p.6, No. 66)



The SATA3 DOM connector supports both a SATA DOM (Disk-On-Module) and a SATA data cable for internal storage device.

**SSATA_0 is shared with the M.2 slot (M2_1). When SSATA_0 is populated with a SATADOM module, M2_1 slot is disabled.*

**SSATA_1 is shared with the M.2 slot (M2_2). When SSATA_1 is populated with a SATADOM module, M2_2 slot is disabled.*

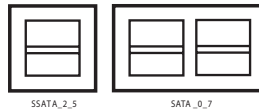
Mini SAS HD Connectors

(SATA_0_7)

(see p.6, No. 32)

(SSATA_2_5)

(see p.6, No. 57)



These Mini SAS HD connectors support SAS/SATA data cables for internal storage devices. The current SAS/SATA3 interface allows up to 12.0 Gb/s data transfer rate. For connecting SAS HDDs, please contact SAS data cable dealers.

USB 3.2 Gen1 Connector

(USB3_5)

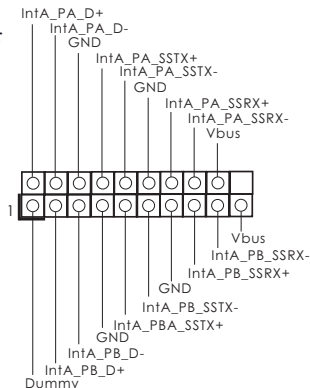
(see p.6, No. 59)



USB 3.2 Gen1 Header

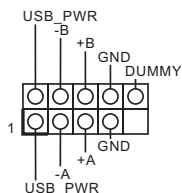
(19-pin USB3_3_4)

(see p.6, No. 36)



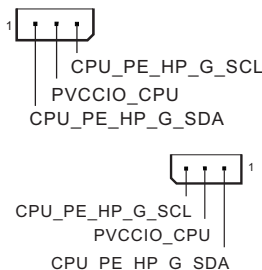
Besides two default USB 3.2 Gen1 ports on the I/O panel, there is one USB 3.2 Gen1 header on this motherboard. This USB 3.2 Gen1 header can support two USB 3.2 Gen1 ports.

USB 2.0 Header
(19-pin USB_1_2)
(see p.6, No. 37)



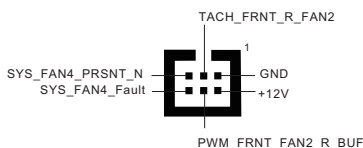
There is one USB 2.0 header on this motherboard. This USB 2.0 header can support two USB 2.0 ports.

Backplane PCI Express
Hot-Plug Connectors
(3-pin HSBP_CPU1_1)
(see p.6, No. 30)
(3-pin HSBP_CPU2_1)
(see p.6, No. 13)



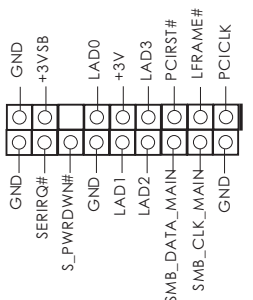
These headers are used for the hot plug feature of HDDs on the backplane.

System Fan Connectors
(6-pin SYS_FAN1)
(see p.6, No. 29)
(6-pin SYS_FAN2)
(see p.6, No. 26)
(6-pin SYS_FAN3)
(see p.6, No. 24)
(6-pin SYS_FAN4)
(see p.6, No. 21)
(6-pin SYS_FAN5)
(see p.6, No. 18)
(6-pin SYS_FAN6)
(see p.6, No. 16)



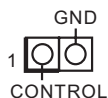
Please connect system fans to the fan connectors.

TPM Header
(17-pin TPM1)
(see p.6, No. 60)



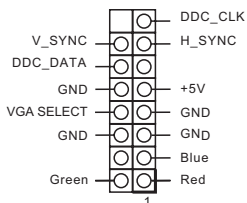
This connector supports Trusted Platform Module (TPM) system, which can securely store keys, digital certificates, passwords, and data. A TPM system also helps enhance network security, protects digital identities, and ensures platform integrity.

Non Maskable Interrupt
Button Header
(2-pin NMI_BTN1)
(see p.6, No. 66)



Please connect a NMI device to this header.

Front VGA Header
(15-pin VGA1)
(see p.6, No. 62)



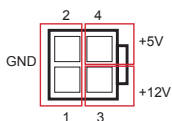
Please connect either end of VGA cable to VGA header.

HDD Backplane Power
Connector
Rear:

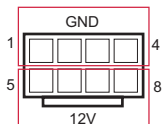
(4-pin HDD_PWR1)
(see p.6, No. 3)

Front:

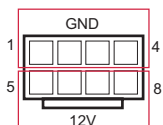
(8-pin GPU_PWR3)
(see p.6, No. 6)



Please connect a 4-pin power cable to this connector to connect a HDD.

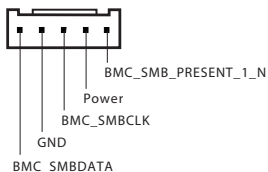


GPU Power Connectors
(8-pin GPU_PWR1)
(see p.6, No. 4)
(8-pin GPU_PWR2)
(see p.6, No. 5)



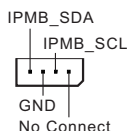
This motherboard provides three GPU power connectors.

BMC SMB Headers
(5-pin BMC_SMB_1)
(see p.6, No. 7)
(5-pin BMC_SMB_2)
(see p.6, No. 8)
(5-pin BMC_SMB_3)
(see p.6, No. 9)



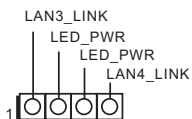
This header is used for the SM BUS devices.

Intelligent Platform
Management Bus header
(4-pin IPMB_1)
(see p.6, No. 10)



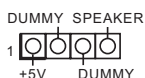
This 4-pin connector is used to provide a cabled baseboard or front panel connection for value added features and 3rd-party add-in cards, such as Emergency Management cards, that provide management features using the IPMB.

Front LAN LED Header
(FRONT_LED_LAN34)
(see p.6, No. 40)



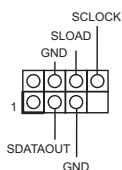
This 4-pin connector is used for the front LAN status indicator.

Chassis Speaker Header
(4-pin SPEAKER1)
(see p.6, No. 50)



Please connect the chassis speaker to this header.

Serial General Purpose
Input/Output Headers
(7-pin SSATA_SGPIO1)
(see p.6, No. 33)



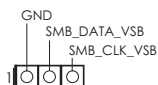
This header supports Serial Link interface for onboard SATA connections.

Slimline NVMe
Connector
(SLIMLINE1)
(see p.6, No. 70)



This connector is used for the NVME PCIE devices.

PWM Configuration
Header
(3-pin PWM_CFG1)
(see p.6, No. 12)



This header is used for PWM configurations.

Virtual RAID On CPU
Header
(4-pin RAID_1)
(see p.6, No. 11)

1
VROC RAID KEY
GND
+3VSB
GND

This connector supports Intel®
Virtual RAID on CPU and
NVME/AHCI RAID on CPU
PCIE.

With the introduction of the Intel VROC product, there are three modes of operation:

SKU	HW key required	Key features
Pass-thru	Not needed	• Pass-thru only (no RAID) • LED Management • Hot Plug Support • RAID 0 support for Intel Fultondale NVMe SSDs
Standard	VROCSTANMOD	• Pass-thru SKU features • RAID 0, 1, 10
Premium	VROCPREMMOD	• Standard SKU features • RAID 5
ISS	VROCISSDMOD	• RAID 5 Write Hole Closure

*Only Intel SSDs are supported.
*For further details on VROC, please refer to the official information released by Intel.

2.8 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
(UID1)



When the UID button on the front or rear panel is pressed, the front/rear UID blue LED indicator will be turned on. Press the UID button again to turn off the indicator.

2.9 Driver Installation Guide

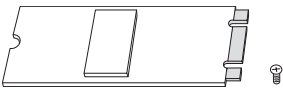
To install the drivers to your system, please insert the support CD to your optical drive first. Then, the drivers compatible to your system can be auto-detected and listed on the support CD driver page. Please follow the order from top to bottom to install those required drivers. Therefore, the drivers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

2.10 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 Gen 3 x2 (10Gb/s).

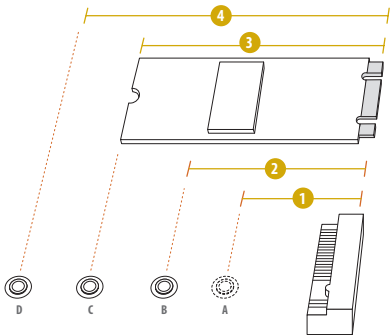
The M.2 socket (M2_1) is shared with the SSATA_0 connector. If you install a M.2 SATA module to the M.2 Socket (M2_1), the internal SSATA_0 will not function (and vice versa). The M.2 socket (M2_2) is shared with the SSATA_1 connector. If you install a M.2 SATA module to the M.2 Socket (M2_2), the internal SSATA_1 will not function (and vice versa).

Installing the M.2_SSD (NGFF) Module



Step 1

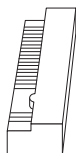
Prepare a M.2_SSD (NGFF) module and the screw.



Step 2

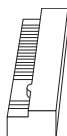
Depending on the PCB type and length of your M.2_SSD (NGFF) module, find the corresponding nut location to be used.

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



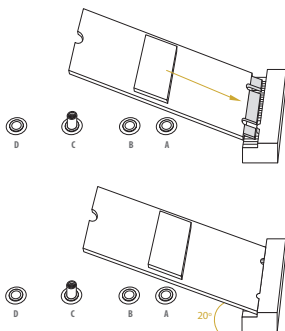
Step 3

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.



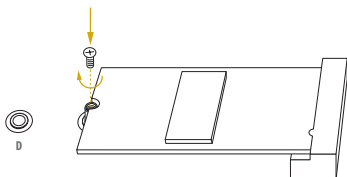
Step 4

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 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.

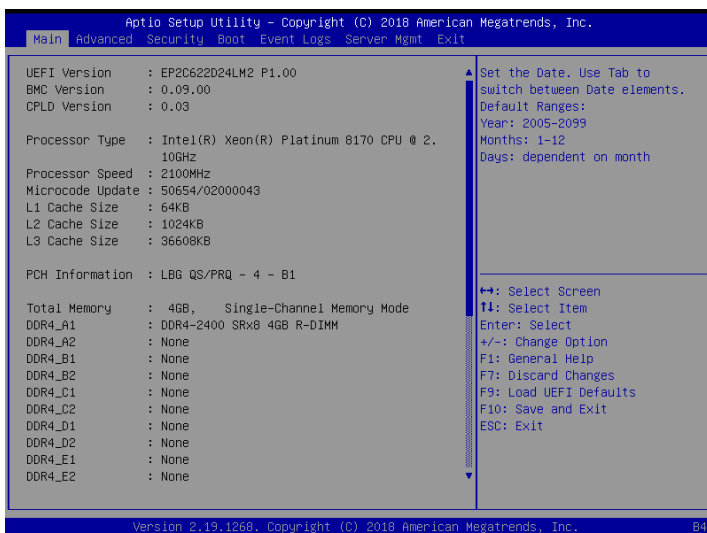
3.1.2 Navigation Keys

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

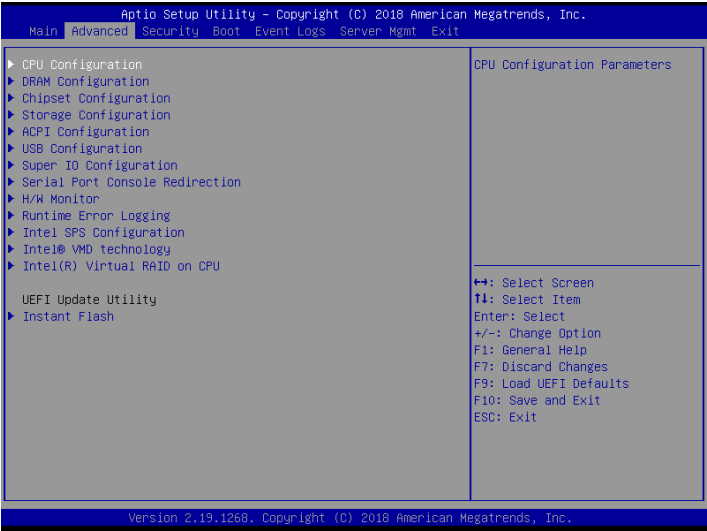
3.2 Main Screen

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.



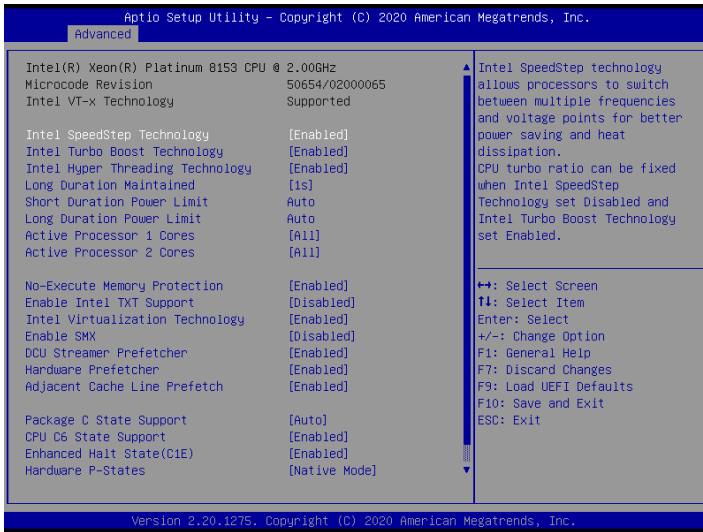
3.3 Advanced Screen

In this section, you may set the configurations for the following items: CPU Configuration, DRAM Configuration, Chipset Configuration, Storage Configuration, ACPI Configuration, USB Configuration, Super IO Configuration, Serial Port Console Redirection, H/W Monitor, Runtime Error Logging, Intel SPS Configuration, Intel(R) VMD Technology, Intel(R) Virtual RAID on CPU and Instant Flash.



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

3.3.1 CPU Configuration



Intel SpeedStep Technology

Intel SpeedStep technology allows processors to switch between multiple frequencies and voltage points for better power saving and heat dissipation. CPU turbo ratio can be fixed when Intel SpeedStep Technology set Disabled and Intel Turbo Boost Technology set Enabled.



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

Intel Turbo Boost Technology

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

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.

Long Duration Maintained

Configure the period of time until the CPU ratio is lowered when the Long Duration Power Limit is exceeded.

Short Duration Power Limit

Configure Package Power Limit 2 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.

Long Duration Power Limit

Configure Package Power Limit 1 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.

Active Processor 1 Cores

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

Active Processor 2 Cores

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

No-Execute Memory Protection

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

Enable Intel TXT Support

Enables Intel Trusted Execution Technology Configuration.

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.

DCU Streamer Prefetcher

DCU streamer prefetcher is an L1 data cache prefetcher (MSR 1A4h [2]).

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.

Package C State Support

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

CPU C6 State Support

Enable C6 deep sleep state for lower power consumption.

Enhanced Halt State(C1E)

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

Hardware P-States

Disable: Hardware chooses a P-state based on OS Request (Legacy P-States)

Native Mode: Hardware chooses a P-state based on OS guidance

Out of Band Mode: Hardware autonomously chooses a P-state (no OS guidance)

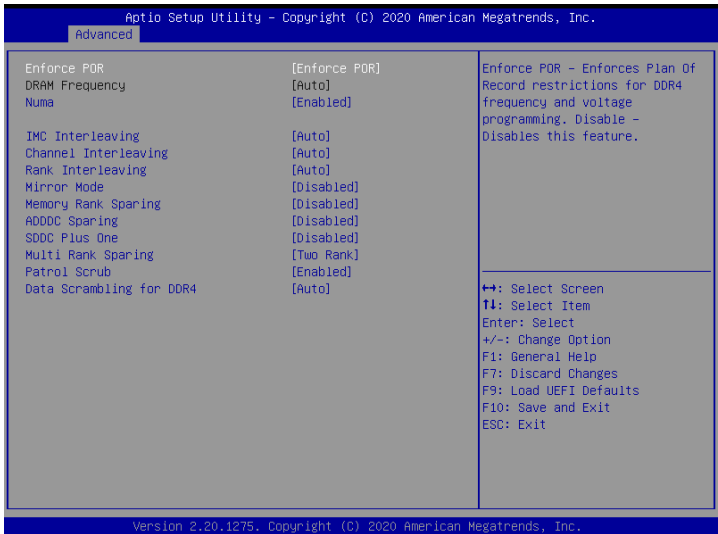
AES-NI

Use this item to enable or disable AES-NI support.

CPU Thermal Throttling

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

3.3.2 DRAM 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.

Numa

Use this item to enable or disable Non Uniform Memory Access (NUMA).

IMC Interleaving

Select IMC Interleaving settings.

Channel Interleaving

Select to configure Channel Interleaving settings.

Rank Interleaving

Select to configure Rank Interleaving settings.

Mirror Mode

Mirror Mode will set entire 1LM memory in system to be mirrored, consequently reducing the memory capacity by half. Mirror Enable will disable XPT Prefetch.

Memory Rank Sparing

Enable or disable Memory Rank Sparing.

ADDDC Sparing

Enable or disable ADDDC Sparing.

SDDC Plus One

Enable or disable Plus One. Not supported when AEP dimm present!

Multi Rank Sparing

Set Multi Rank Sparing number. Default and the maximum is 2 ranks per channel.

Patrol Scrub

Enable or disable Patrol Scrub.

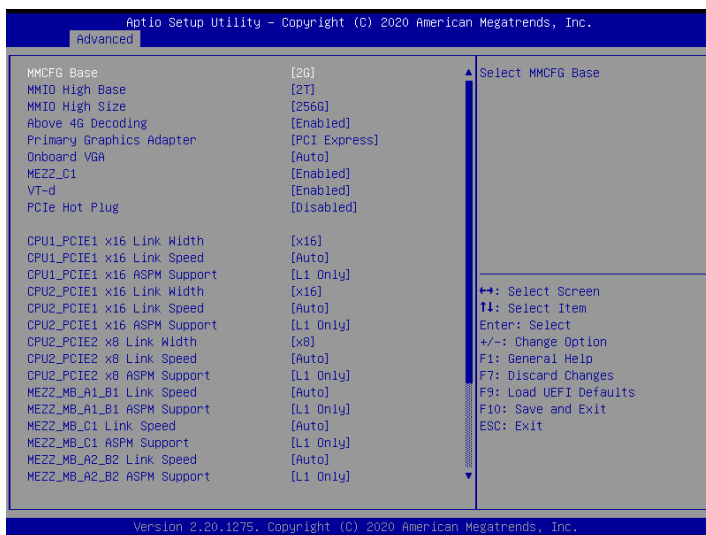
Data Scrambling for DDR4

Enable - Enables data scrambling for DDR4.

Disable - Disables the feature.

Auto - Sets it to the MRC default setting; current default is Enable.

3.3.3 Chipset Configuration



MMCFG Base

Use this item to select MMCFG Base.

MMIO High Base

Use this item to select MMIO High Base.

MMIO High Size

Use this item to select MMIO High Size.

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).

Primary Graphics Adapter

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

**If no PCI Express graphics card is installed, [Onboard VGA] is the default 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 VGA].*

MEZZ_C1

This allows you to enable or disable MEZZ Type-C.

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.

PCIe Hot Plug

Enable/Disable PCIe Hot Plug globally.

CPU1_PCIE1 x16 Link Width

This allows you to select PCIe Link Width.

CPU1_PCIE1 x16 Link Speed

This allows you to select PCIe Link Speed.

CPU1_PCIE1 x16 ASPM Support

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

CPU2_PCIE1 x16 Link Width

This allows you to select PCIe Link Width.

CPU2_PCIE1 x16 Link Speed

This allows you to select PCIe Link Speed.

CPU2_PCIE1 x16 ASPM Support

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

CPU2_PCIE2 x8 Link Width

This allows you to select PCIe Link Width.

CPU2_PCIE2 x8 Link Speed

This allows you to select PCIe Link Speed.

CPU2_PCIE2 x8 ASPM Support

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

MEZZ_MB_A1_B1 Link Speed

This allows you to select PCIe Link Speed.

MEZZ_MB_A1_B1 ASPM Support

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

MEZZ_MB_C1 Link Speed

This allows you to select PCIE Link Speed.

MEZZ_MB_C1 ASPM Support

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

MEZZ_MB_A2_B2 Link Speed

This allows you to select PCIE Link Speed.

MEZZ_MB_A2_B2 ASPM Support

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

SLIMLIN1-1 Link Speed

This allows you to select PCIE Link Speed. The default value is [Auto].

SLIMLIN1-1 ASPM Support

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

SLIMLIN1-2 Link Speed

This allows you to select PCIE Link Speed. The default value is [Auto].

SLIMLIN1-2 ASPM Support

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

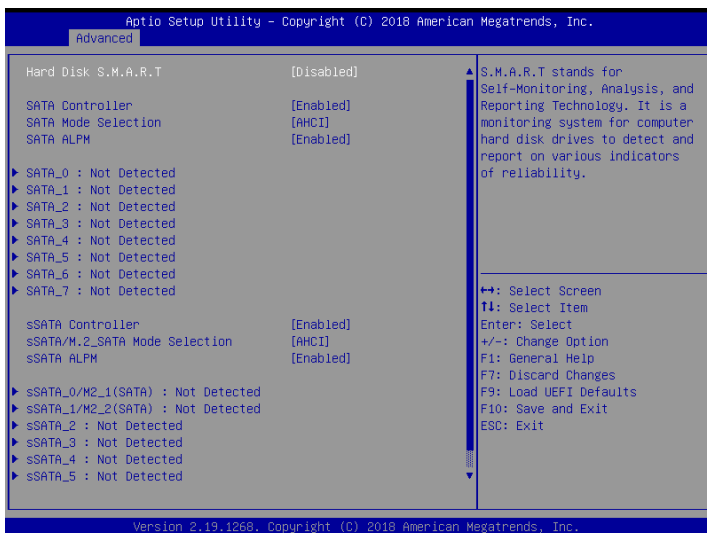
SR-IOV Support

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

Restore on AC/Power Loss

Select the power state after a power failure. If [Power Off] is selected, the power will remain off when the power recovers. If [Power On] is selected, the system will start to boot up when the power recovers.

3.3.4 Storage Configuration



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].

SATA Controller

Use this item to enable or disable SATA Controllers.

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.

SATA ALPM

Use this item to enable or disable SALP.

sSATA Controller

Use this item to enable or disable SATA Controllers.

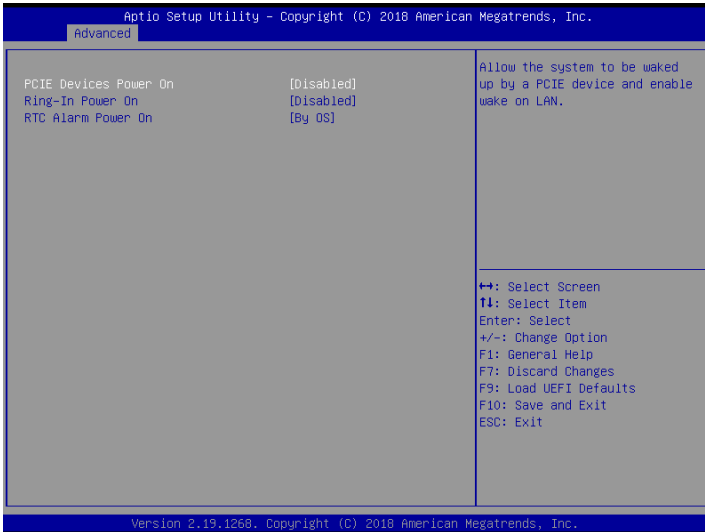
sSATA/M.2_SATA Mode Selection

Identify the sSATA/M.2_SATA port is connected to Solid State Drive or Hard Disk Drive. Press <Ctrl+I> to enter RAID ROM during UEFI POST process.

SSATA ALPM

Use this item to enable or disable SALP.

3.3.5 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.

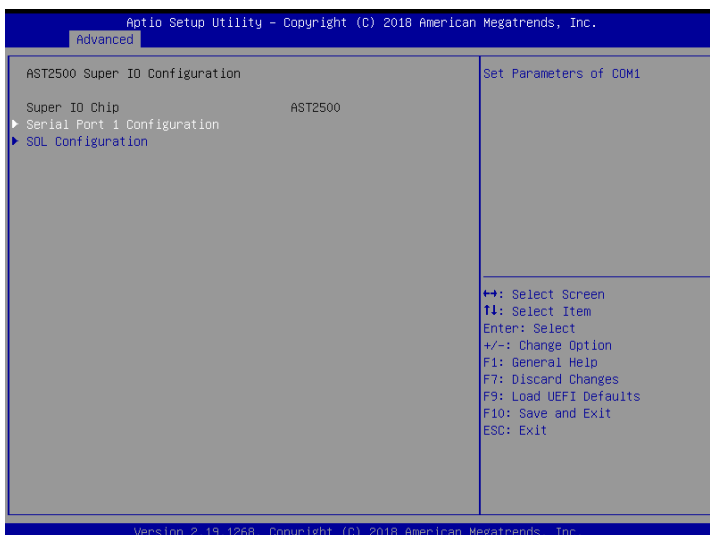
3.3.6 USB Configuration



Legacy USB Support

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

3.3.7 Super IO Configuration



Serial Port 1 Configuration

Use this item to set parameters of Serial Port 1 (COM1).

Serial Port

Use this item to enable or disable the serial port.

Change Settings

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

SOL Configuration

Use this item to set SOL configuration.

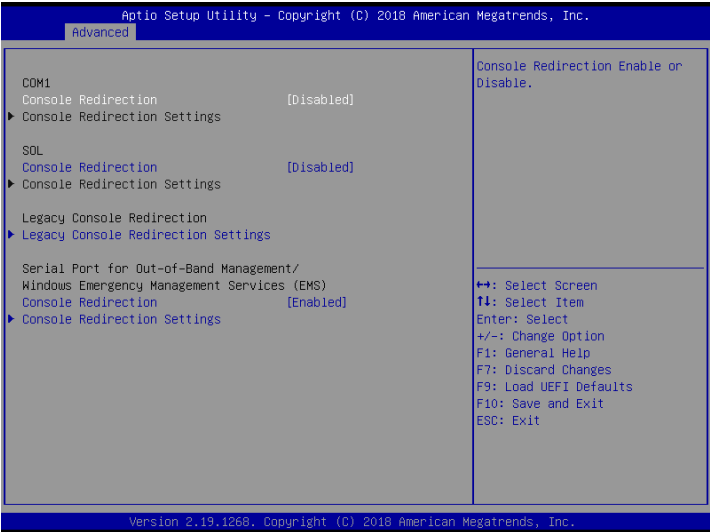
SOL Port

Use this item to enable or disable the SOL port.

Change Settings

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

3.3.8 Serial Port Console Redirection



COM1

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. Both computers should have the same or compatible settings.

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], [38400], [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] 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.

Putty Keypad

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

Legacy Console Redirection**Legacy Console Redirection Settings**

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

Legacy Serial Redirection Port

Use this item to select a COM port to display redirection of Legacy OS and Legacy OPROM Messages.

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

Microsoft Windows Emergency Management Services (EMS) allows for remote management of a Windows Server OS through a serial 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].

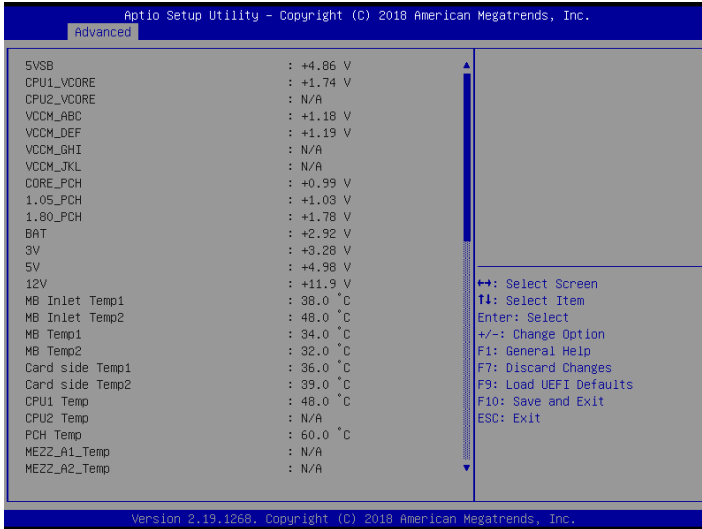
Data Bits

Parity

Stop Bits

3.3.9 H/W Monitor

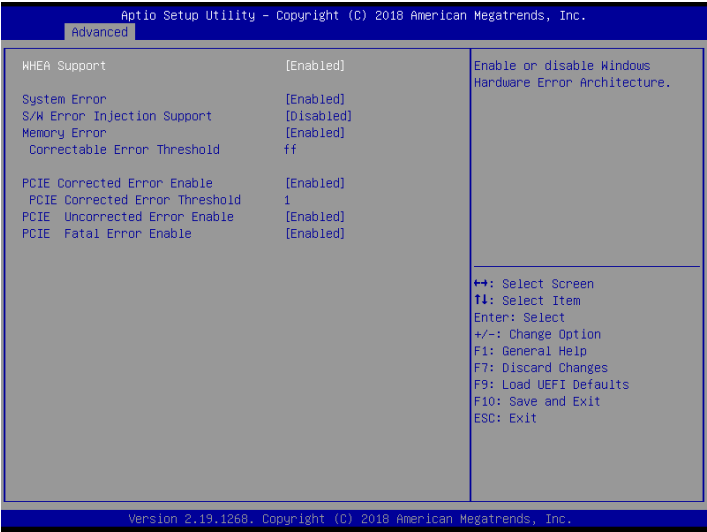
In this section, it allows you to monitor the status of the hardware on your system, including the parameters of the CPU temperature, motherboard temperature, CPU fan speed, chassis fan speed, and the critical voltage.



Watch Dog Timer

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

3.3.10 Runtime Error Logging



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.

S/W Error Injection Support

When it is set to [Enabled], S/W Error Injection is supported by unlocking MSR Ox790.

Memory Error

Memory enabling and logging setup option.

Correctable Error Threshold

Correctable Error Threshold (0 - 0x7FFF) used for sparing, tagging, and leaky bucket.

PCIE Corrected Error Enable

Use this item to enable or disable PCIE Correctable errors.

PCIE Corrected Error Threshold

PCIE Correctable Error Threshold (0x01-0xFF) used for sparing, tagging, and leaky bucket.

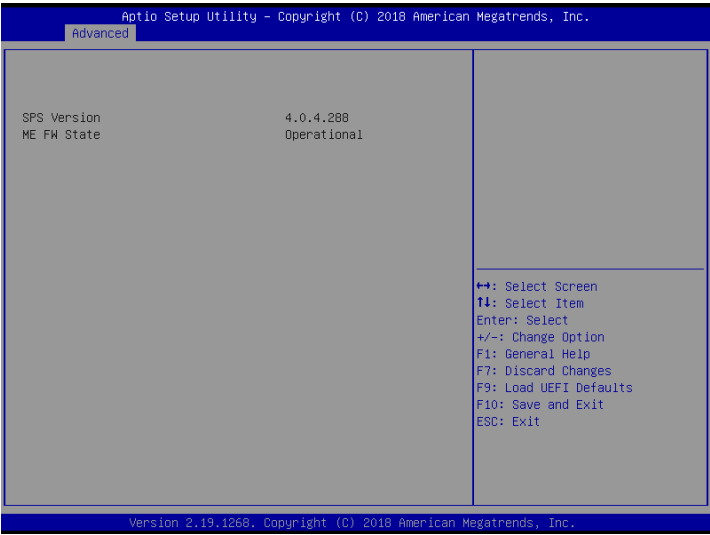
PCIE Uncorrected Error Enable

Use this item to enable or disable PCIe Uncorrectable errors.

PCIE Fatal Error Enable

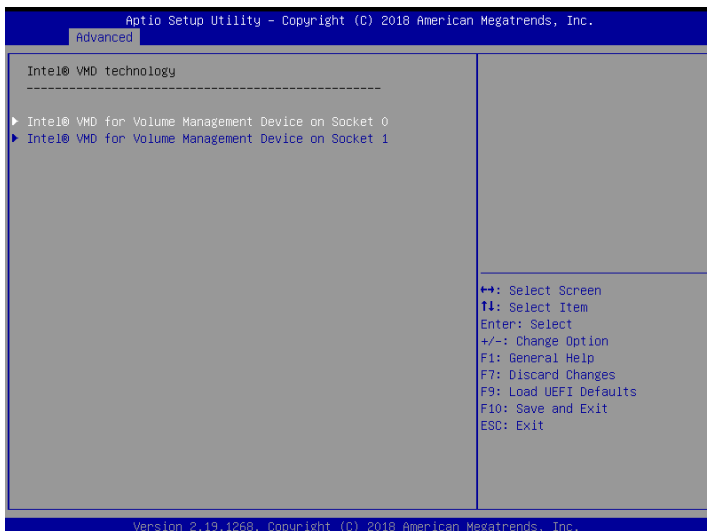
Use this item to enable or disable PCIe Ftal errors.

3.3.11 Intel SPS Configuration



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

3.3.12 Intel® VMD technology



Press <Enter> to bring up the Intel® VMD for Volume Management Device Configuration menu.

Intel® VMD for Volume Management Device on Socket0

Intel® VMD for Volume Management Device Technology

Use this item to enable or disable Intel(R) Volume Management Device Technology in this Stack.

When [Enabled], users are allowed to configure the options below.

VMD port 3A

Use this item to enable or disable Intel(R) Volume Management Device Technology on specific root port.

VMD port 3B

Use this item to enable or disable Intel(R) Volume Management Device Technology on specific root port.

VMD port 3C

Use this item to enable or disable Intel(R) Volume Management Device Technology on specific root port.

VMD port 3D

Use this item to enable or disable Intel(R) Volume Management Device Technology on specific root port.

Hot Plug Capable

Use this item to enable or disable Hot Plug for PCIe Root Ports 3A-3D.

Intel® VMD for Volume Management Device on Socket1

Intel® VMD for Volume Management Device Technology

Use this item to enable or disable Intel(R) Volume Management Device Technology in this Stack.

When [Enabled], users are allowed to configure the options below.

VMD port 2A

Use this item to enable or disable Intel(R) Volume Management Device Technology on specific root port.

VMD port 2B

Use this item to enable or disable Intel(R) Volume Management Device Technology on specific root port.

VMD port 2C

Use this item to enable or disable Intel(R) Volume Management Device Technology on specific root port.

VMD port 2D

Use this item to enable or disable Intel(R) Volume Management Device Technology on specific root port.

Hot Plug Capable

Use this item to enable or disable Hot Plug for PCIe Root Ports 2A-2D.

Intel® VMD for Volume Management Device Technology

Use this item to enable or disable Intel(R) Volume Management Device Technology in this Stack.

When [Enabled], users are allowed to configure the options below.

VMD port 3A

Use this item to enable or disable Intel(R) Volume Management Device Technology on

specific root port.

VMD port 3B

Use this item to enable or disable Intel(R) Volume Management Device Technology on specific root port.

VMD port 3C

Use this item to enable or disable Intel(R) Volume Management Device Technology on specific root port.

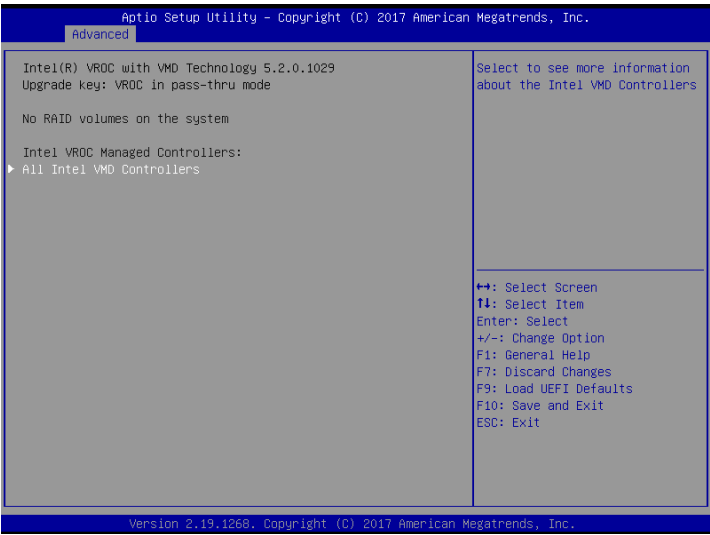
VMD port 3D

Use this item to enable or disable Intel(R) Volume Management Device Technology on specific root port.

Hot Plug Capable

Use this item to enable or disable Hot Plug for PCIe Root Ports 3A-3D.

3.3.13 Intel® Virtual RAID on CPU *(This page will show when VMD set to Enable)*

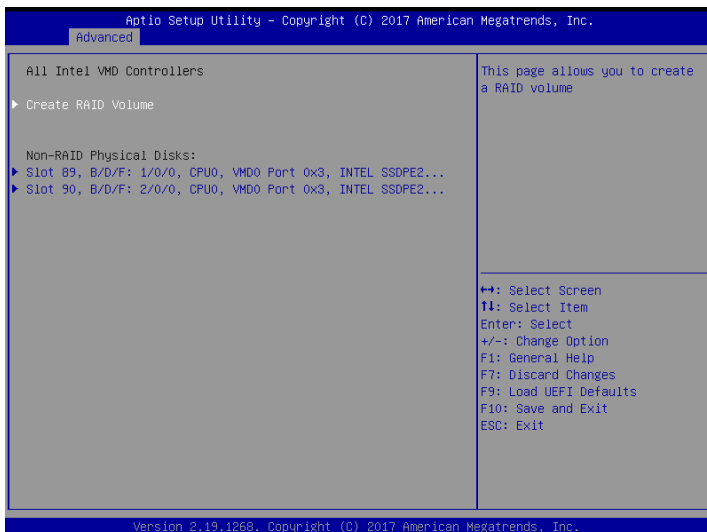


Intel VROC Managed Volumes (Available after the RAID has been created.)

Select to see more information about the RAID Volume.

All Intel VMD Controllers

Select to see more information about the Intel VMD Controllers.



Create RAID Volume

This page allows you to create a RAID volume.

Non-RAID Physical Disks (Available when no RAID is created.)

Select to see more information about the disk.

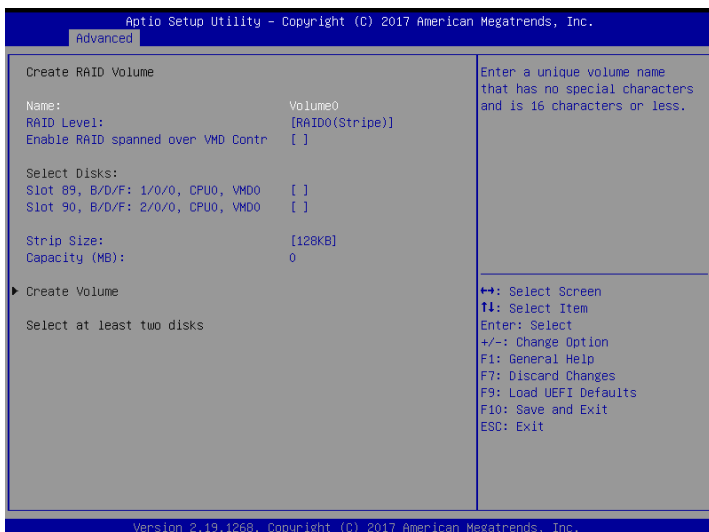
RAID Volumes (Available after the RAID has been created.)

Select to see more information about the RAID Volume.

Volume Actions

Delete

Select to delete the created RAID.



Name

Enter an unique volume name that has no special characters and is 16 charaters or less.

RAID Level

Select RAID Level.

Enable RAID spanned over VMD Controllers

Select [X] to enable RAID spanned over VMD Controllers.

Select Disks

Select [X] to select disks.

Strip Size

Select strip size.

Capacity (MB)

Determine the capacity in MB.

Create Volume

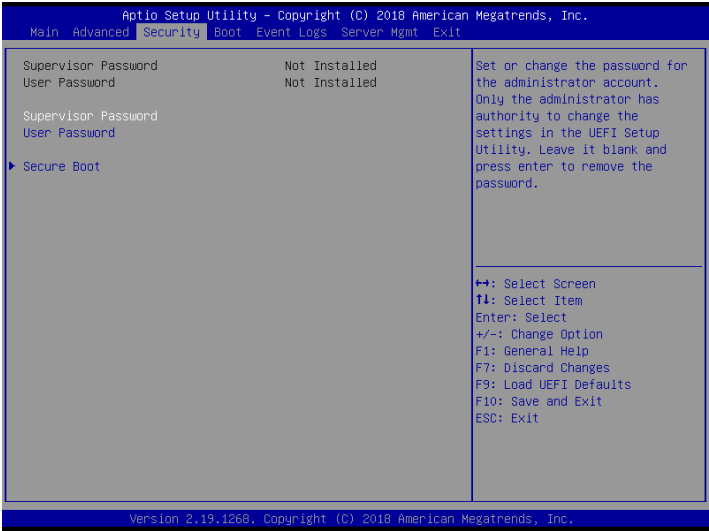
Select to start creating RAID immediately. (Available after selecting at least two disks.)

3.3.14 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.

3.4 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.

Secure Boot

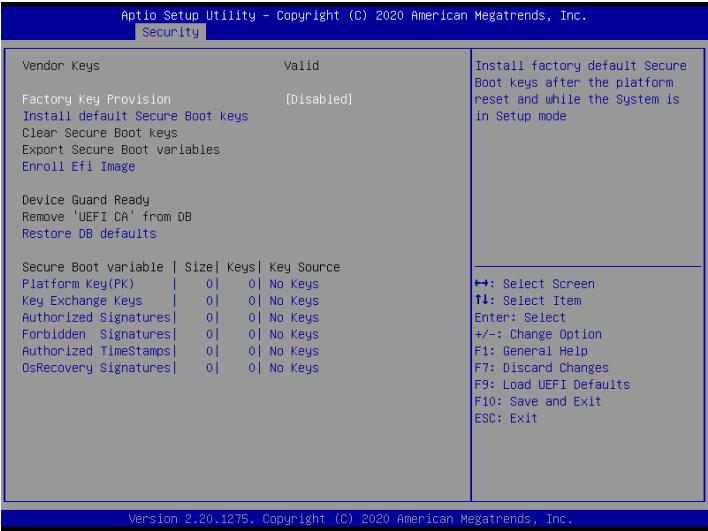
Use this to enable or disable Secure Boot Control. The default value is [Disabled].

Secure Boot Mode

Secure Boot mode options: Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication

3.4.1 Key Management

In this section, expert users can modify Secure Boot Policy variables without full authentication.



Factory Key Provision

Install factory default Secure Boot keys after the platform reset and while the System is in Setup mode.

Install Default Secure Boot Keys

Please install default secure boot keys if it's the first time you use secure boot.

Clear Secure Boot keys

Force System to Setup Mode - clear all Secure Boot Variables. Change takes effect after reboot.

Export Secure Boot variables

Copy NVRAM content of Secure Boot variables to files in a root folder on a file system device.

Enroll Efi Image

Allow the image to run in Secure Boot mode. Enroll SHA256 hash of the binary into

Authorized Signature Database (db).

Remove 'UEFI CA' from DB

Device Guard ready system must not list 'Microsoft UEFI CA' Certificate in Authorized Signature database (db).

Restore DB Defaults

Restore DB variable to factory defaults.

Platform Key(PK)

Enroll Factory Defaults or load certificates from a file:

1. Public Key Certificate in:

- a) EFI_SIGNATURE_LIST
- b) EFI_CERT_X509 (DER encoded)
- c) EFI_CERT_RSA2048 (bin)
- d) EFI_CERT_SHA256, 384, 512

2. Authenticated UEFI Variable

3. EFI PE/COFF Image(SHA256)

Key Source: Default, External, Mixed, Test

Key Exchange Keys

Enroll Factory Defaults or load certificates from a file:

1. Public Key Certificate in:

- a) EFI_SIGNATURE_LIST
- b) EFI_CERT_X509 (DER encoded)
- c) EFI_CERT_RSA2048 (bin)
- d) EFI_CERT_SHA256, 384, 512

2. Authenticated UEFI Variable

3. EFI PE/COFF Image(SHA256)

Key Source: Default, External, Mixed, Test

Authorized Signatures

Enroll Factory Defaults or load certificates from a file:

1. Public Key Certificate in:

- a) EFI_SIGNATURE_LIST
- b) EFI_CERT_X509 (DER encoded)
- c) EFI_CERT_RSA2048 (bin)
- d) EFI_CERT_SHA256, 384, 512

2. Authenticated UEFI Variable

3. EFI PE/COFF Image(SHA256)

Key Source: Default, External, Mixed, Test

Forbidden Signatures

Enroll Factory Defaults or load certificates from a file:

1. Public Key Certificate in:

- a) EFI_SIGNATURE_LIST
- b) EFI_CERT_X509 (DER encoded)
- c) EFI_CERT_RSA2048 (bin)
- d) EFI_CERT_SHA256, 384, 512

2. Authenticated UEFI Variable

3. EFI PE/COFF Image(SHA256)

Key Source: Default, External, Mixed, Test

Authorized TimeStamps

Enroll Factory Defaults or load certificates from a file:

1. Public Key Certificate in:

- a) EFI_SIGNATURE_LIST
- b) EFI_CERT_X509 (DER encoded)
- c) EFI_CERT_RSA2048 (bin)
- d) EFI_CERT_SHA256, 384, 512

2. Authenticated UEFI Variable

3. EFI PE/COFF Image(SHA256)

Key Source: Default, External, Mixed, Test

OsRecovery Signatures

Enroll Factory Defaults or load certificates from a file:

1. Public Key Certificate in:

a) EFI_SIGNATURE_LIST

b) EFI_CERT_X509 (DER encoded)

c) EFI_CERT_RSA2048 (bin)

d) EFI_CERT_SHA256, 384, 512

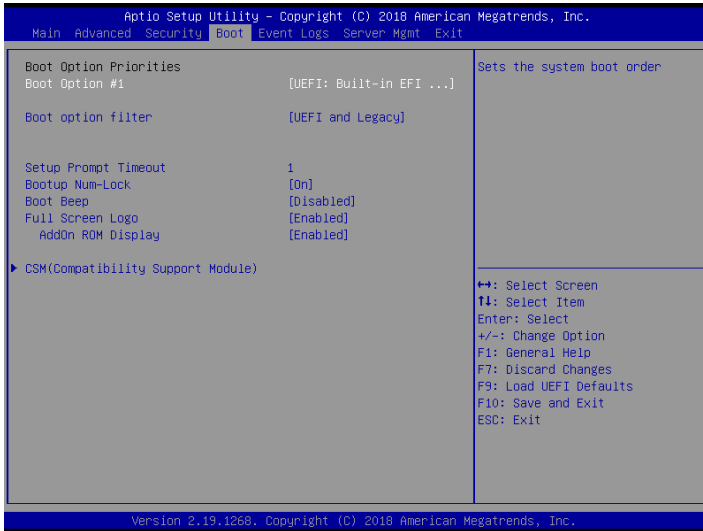
2. Authenticated UEFI Variable

3. EFI PE/COFF Image(SHA256)

Key Source: Default, External, Mixed, Test

3.5 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.

Boot Option Filter

This option controls Legacy/UEFI ROMs priority.

Setup Prompt Timeout

Configure the number of seconds to wait for the UEFI setup utility.

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].

3.5.1 CSM Parameters



CSM

Enable to launch the Compatibility Support Module. Please do not disable unless you're running a WHCK test. If you are using Windows 10 64-bit and all of your devices support UEFI, you may also disable CSM for faster boot speed.

Launch Other Storage OpROM Policy

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

Launch Video OpROM Policy

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

CPU1_PCIE1 Slot OpROM

This option controls Legacy/UEFI ROMs priority.

CPU2_PCIE1 Slot OpROM

This option controls Legacy/UEFI ROMs priority.

CPU2_PCIE2 Slot OpROM

This option controls Legacy/UEFI ROMs priority.

MEZZ_A1_B1 Slot OpROM

This option controls Legacy/UEFI ROMs priority.

MEZZ_C1 Slot OpROM *(for EP2C622D24LM only)*

This option controls Legacy/UEFI ROMs priority.

MEZZ_A2_B2 Slot OpROM

This option controls Legacy/UEFI ROMs priority.

SLIMLIN1-1 Slot OpROM

To select slot Storage and Network Option ROM policy. In Auto option, the default is Disabled with NVMe device, but it is LLegacy with other devices. (This item can't select Video Option ROM policy.)

SLIMLIN1-2 Slot OpROM

To select slot Storage and Network Option ROM policy. In Auto option, the default is Disabled with NVMe device, but it is LLegacy with other devices. (This item can't select Video Option ROM policy.)

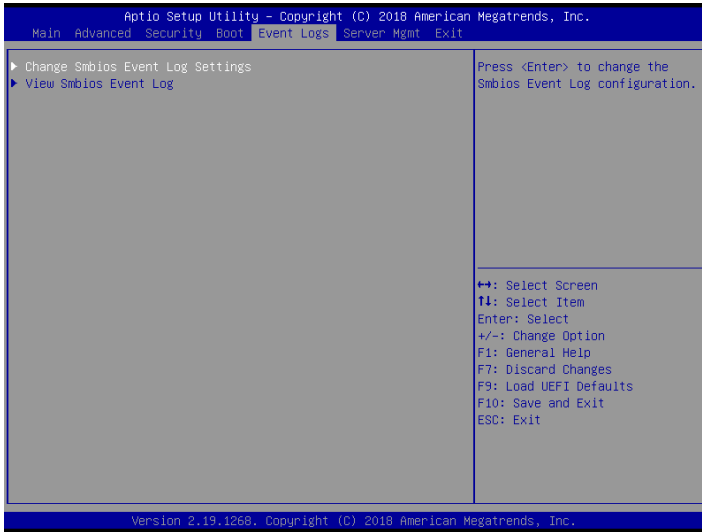
M_2_1 Slot OpROM

This option controls Legacy/UEFI ROMs priority.

M_2_2 Slot OpROM

This option controls Legacy/UEFI ROMs priority.

3.6 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].

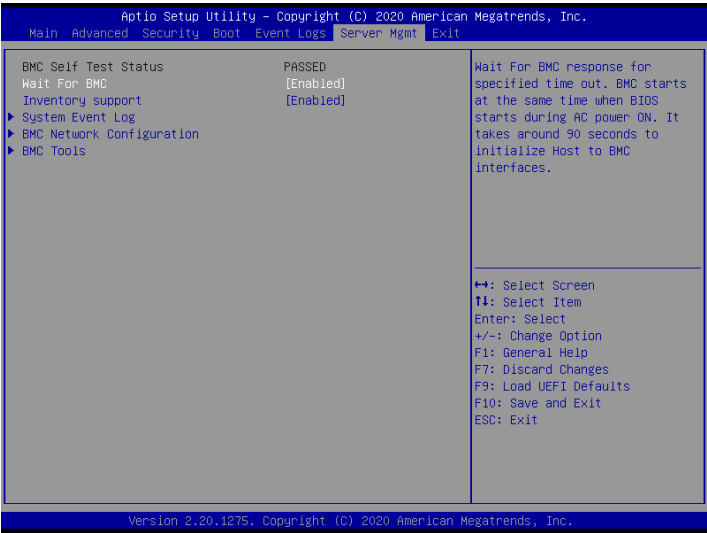
Log System Boot Event

Choose option to enable/disable logging of System boot event.

View Smbios Event Log

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

3.7 Server Mgmt



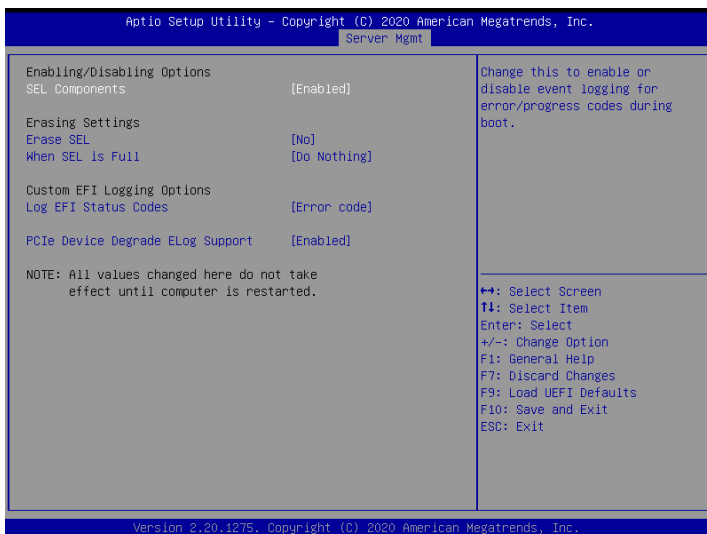
Wait For BMC

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.

Inventory Support

This will execute inventory function for system. Enabling this item will take some time at system boot.

3.7.1 System Event Log



SEL Components

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

Erase SEL

Use this to choose options for erasing SEL.

When SEL is Full

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

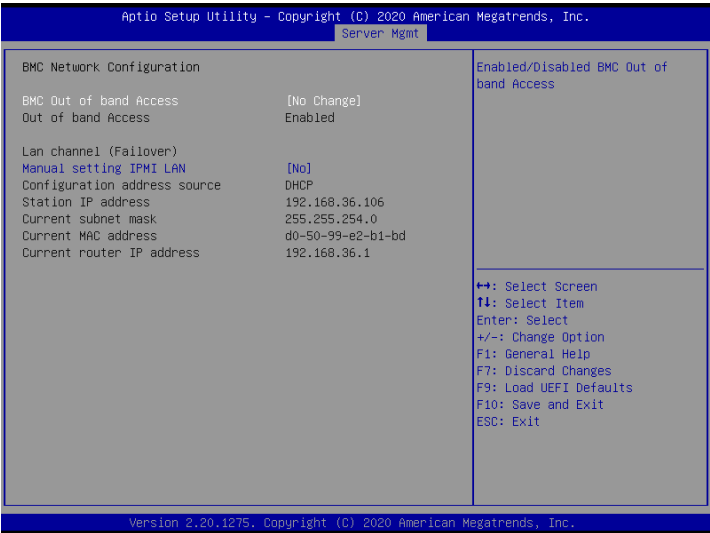
Log EFI Status Codes

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

PCIe Device Degrade ELog Support

Enable/Disable PCIe Device Degrade Error Logging Support

3.7.2 BMC Network Configuration



BMC Out of Band Access

Enabled/Disabled BMC Out of band Access.

Lan Channel (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 Tools

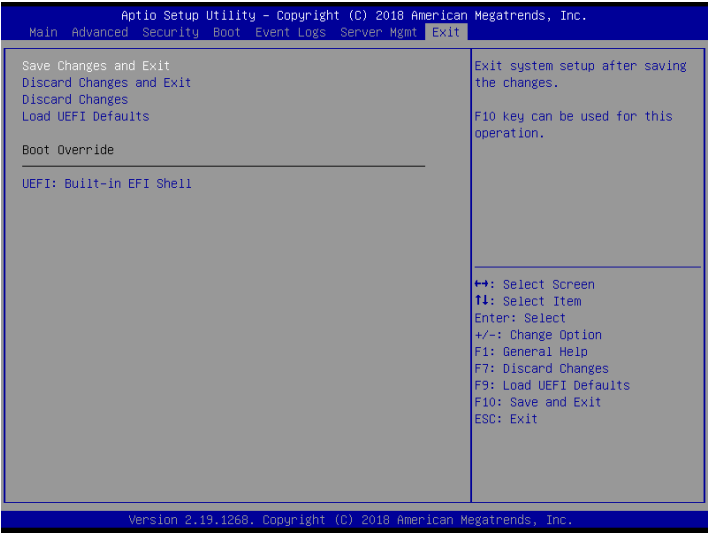
Load BMC Default Settings

Use this item to load BMC default settings.

KCS control

Select the KSC interface state after POST end. If [Enabled] is selected, the BMC will remain KCS interface after POST stage. If [Disabled] is selected, the BMC will disable KCS interface after POST stage.

3.8 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.

Boot Override

These items displays the available devices. Select an item to start booting from the selected device.

Chapter 4 Software Support

4.1 Install Operating System

This motherboard supports various Microsoft® Windows® 2012 R2 / 2016 / 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.*

** Before installing the Linux OS, please first enter the BIOS settings, go to "Advanced" > "Chipset Configuration" and set "IGPU Multi-Monitor" option to "Disabled".*

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 SO-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://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.

Appendix A

Mezzanine Card Support List

This motherboard supports the following ASRock Rack mezzanine cards.

Mezz Card Type	Mezz Slot Type	Supported MB Model	Model
LAN Card	Mezz Type A	EP2C626D24LM EP2C622D24LM EP2C621D24LM-AB	M350
LAN Card	Mezz Type A		M350R
LAN Card	Mezz Type A		M540
LAN Card	Mezz Type A		M540R
LAN Card	Mezz Type A		M599
LAN Card	Mezz Type A		M599R
LAN Card	Mezz Type A		M710
LAN Card	Mezz Type A		MX710R
Storage Card	Mezz Type A		M3008
Storage Card	Mezz Type A		M3008S
Storage Card	Mezz Type A		M3108
Storage Card	Mezz Type A		M3616
PHI Card	Mezz Type C		MP-557R2
PHI Card	Mezz Type C		MP-1543R4
PHI Card	Mezz Type C		MP-4227R2

**Please refer to our website for the latest support list.*

**Due to mechanical limits, use one type of the mezzanine card at a time.*