

Technical Specification

RenderCube XL Rev. 2
Dual CPU

Contents

Notices viii

 Federal Communications Commission Statement..... viii

 Canadian Department of Communications Statement..... viii

 REACH viii

Safety information..... ix

 Electrical safetyix

 Operation safety.....ix

 Australia statement notice..... x

 How this guide is organizedxi

 Where to find more information.....xi

Series specifications summary..... xiii

Chapter 1: Product Introduction

1.1 Welcome! 1-2

1.2 Package contents 1-2

1.3 Serial number label..... 1-3

1.4 Special features..... 1-3

 1.4.1 Product highlights..... 1-3

 1.4.2 Innovative features..... 1-4

Chapter 2: Hardware Information

2.1 Before you proceed2-2

2.2 Motherboard overview.....2-3

 2.2.1 Placement direction.....2-3

 2.2.2 Screw holes.....2-3

 2.2.3 Motherboard layout2-4

2.3 Central Processing Unit (CPU)2-6

 2.3.1 Installing the CPU2-6

2.4 System memory2-8

 2.4.1 Overview2-8

 2.4.2 Memory Configurations.....2-8

 2.4.3 Installing a DIMM on a single clip DIMM socket.....2-10

 2.4.4 Removing a DIMM from a single clip DIMM socket2-10

Contents

2.5	Expansion slots.....	2-11
2.5.1	Installing an expansion card.....	2-11
2.5.2	Configuring an expansion card	2-11
2.5.3	Interrupt assignments.....	2-12
2.5.4	PCI Express x16 slot (x16 link)	2-12
2.5.5	PCI Express x8 slot (x8 link)	2-12
2.6	Jumpers	2-14
2.7	Onboard LEDs	2-20
2.8	Connectors	2-24
2.8.1	Rear panel connectors	2-24
2.8.2	Internal connectors.....	2-25

Notices

Federal Communications Commission Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with manufacturer's instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



The use of shielded cables for connection of the monitor to the graphics card is required to assure compliance with FCC regulations. Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Canadian Department of Communications Statement

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

This class B digital apparatus complies with Canadian ICES-003.

REACH

Complying with the REACH (Registration, Evaluation, Authorization, and Restriction of Chemicals) regulatory framework, we publish the chemical substances in our products at REACH website at <http://csr..com/english/REACH.htm>.

Safety information

Electrical safety

- To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.
- When adding or removing devices to or from the system, ensure that the power cables for the devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.
- Before connecting or removing signal cables from the motherboard, ensure that all power cables are unplugged.
- Seek professional assistance before using an adapter or extension cord. These devices could interrupt the grounding circuit.
- Make sure that your power supply is set to the correct voltage in your area. If you are not sure about the voltage of the electrical outlet you are using, contact your local power company.
- If the power supply is broken, do not try to fix it by yourself. Contact a qualified service technician or your retailer.

Operation safety

- Before installing the motherboard and adding devices on it, carefully read all the manuals that came with the package.
- Before using the product, make sure all cables are correctly connected and the power cables are not damaged. If you detect any damage, contact your dealer immediately.
- To avoid short circuits, keep paper clips, screws, and staples away from connectors, slots, sockets and circuitry.
- Avoid dust, humidity, and temperature extremes. Do not place the product in any area where it may become wet.
- Place the product on a stable surface.
- If you encounter technical problems with the product, contact a qualified service technician or your retailer.



DO NOT throw the motherboard in municipal waste. This product has been designed to enable proper reuse of parts and recycling. This symbol of the crossed out wheeled bin indicates that the product (electrical and electronic equipment) should not be placed in municipal waste. Check local regulations for disposal of electronic products.



DO NOT throw the mercury-containing button cell battery in municipal waste. This symbol of the crossed out wheeled bin indicates that the battery should not be placed in municipal waste.

Conventions used in this guide

To ensure that you perform certain tasks properly, take note of the following symbols used throughout this manual.



DANGER/WARNING: Information to prevent injury to yourself when trying to complete a task.



CAUTION: Information to prevent damage to the components when trying to complete a task.



IMPORTANT: Instructions that you **MUST** follow to complete a task.



NOTE: Tips and additional information to help you complete a task.

Typography

Bold text

Indicates a menu or an item to select.

Italics

Used to emphasize a word or a phrase.

<Key>

Keys enclosed in the less-than and greater-than sign means that you must press the enclosed key.

Example: <Enter> means that you must press the Enter or Return key.

<Key1> + <Key2> + <Key3>

If you must press two or more keys simultaneously, the key names are linked with a plus sign (+).

Example: <Ctrl> + <Alt> +

Command

Means that you must type the command exactly as shown, then supply the required item or value enclosed in brackets.

Example: At DOS prompt, type the command line:

format A:/S

Series specifications summary

Model Name		
Processor Support / System Bus		2 x 165W Socket SP3 (LGA 3647) Dual Intel® Xeon® Scalable Processor Family
Core Logic		Intel® Lewisburg PCH (C621)
Form Factor		CEB
Features	Fan Speed Control	✓
	Rack Optimized (Dedicated for rack)	✓
	Control Center	✓
Memory	Total Slots	8 (4-channel per CPU, 4 DIMM per CPU)
	Voltage	1.2V
	Capacity	Maximum up to 1024GB
	Memory Type	DDR4 2666/2400/2133 RDIMM/LRDIMM/NVDIMM/3DS DIMM * Refer to www...com for the latest memory AVL update.
	Memory Size	4GB, 8GB, 16GB, 32GB (RDIMM) 32GB, 64GB, 128GB (LRDIMM) 64GB, 128GB (3DS)
Expansion Slots (follow SSI Location number)	Total PCI/ PCI-X / PCI-E Slots	3
	Slot Location 1	PCI-E x8 (x8 Gen3 Link) from CPU2
	Slot Location 2	-
	Slot Location 3	PCI-E x16 (x16 Gen3 Link) from CPU1
	Slot Location 4	-
	Slot Location 5	PCI-E x16 (x16 Gen3 Link) from CPU1
	Slot Location 6	MIO
	Slot Location 7	-
	Additional Slot 1	-
	Additional Slot 2	-
Networking	LAN	4 x Intel I210AT 1 x Management Port
Graphic	VGA	Aspeed AST2500 64MB

(continued on the next page)

Series specifications summary

Model Name		
Storage	SATA Controller	Intel® Lewisburg PCH - 12 x SATA 6Gb/s ports + 2 x M.2 connector (SATA 6Gb/s & PCI-E Gen3 x4 link) from CPU1 Marvell 88SE9230 - 4 x SATA 6Gb/s ports
	SAS Controller	Optional kits: PIKE II 3008 8-port SAS 12G HW RAID card PIKE II 3108 8-port SAS 12G HW RAID card
Onboard I/O Connectors	TPM Header	1
	PSU Connector	24-pin SSI power connector + 2 x 8-pin SSI 12V
	Management Connector	Onboard ASMB9-iKVM
	Fan Header	8 x 4 pin
	SMBus	1
	Chassis Intruder	1
	Front LAN LED	4
	Serial Port Header	1
	M.2 Connector	2 (NGFF Type 22110)
	Micro SD card	1
	VROC Key Header	1
Rear I/O Connectors	OCuLink Connector	2 (PCIe Gen3 x4) from CPU1
	External USB Port	4 x USB 3.0
	VGA Port	1
Management Solution	RJ-45	4 x GbE LAN 1 x Management LAN
	Out of Band Remote Management	ASMB9-iKVM for KVM-over-Internet
Monitoring	CPU Temperature	✓
	FAN RPM	✓
Environment		Operating temperature: 10°C ~ 35°C Non operating temperature: -40°C ~ 70°C Non operating humidity: 20% ~ 90% (Non condensing)

* Specifications are subject to change without notice.

** Refer to www.dell.com for the complete list of supported PIKE cards.

Product Introduction

1

This chapter describes the motherboard features and the new technologies it supports.

1.1 Welcome!

Congratulations and thank you for buying an ® Series motherboard!

The motherboard delivers a host of new features and latest technologies, making it another standout in the long line of quality motherboards!

Before you start installing the motherboard and hardware devices on it, check the items in your package with the list below.

1.2 Package contents

Check your motherboard package for the following items.

	Standard Gift Box Pack	Standard Bulk Pack
I/O Shield	1	1
Application CD Support DVD	1	1 piece per carton
Packaging Quantity	1 piece per carton	10 pieces per carton



If any of the above items is damaged or missing, contact your retailer.

Optional items	Description
PIKE 3008	LSI 8-port SAS 12G RAID card
PIKE 3108	LSI 8-port SAS 12G HW RAID card
ASMB9-iKVM	Remote management solution provides KVM over IP solution
PEM-FDR	Mellanox ConnectX-3 FDR card
PEB-10G/57840-2S	Dual port 10G SFP+ Ethernet Adapter
PEB-10G/57811-1S	Single port 10G SFP+ Ethernet Adapter



The PIKE 3008, PIKE 3108, and PEM-FDR cards must be installed on PCI-E slot 2/3/4/5.

1.3 Serial number label

Before requesting support from the Technical Support team, you must take note of the motherboard's serial number containing 12 characters xxS2xxxxxxx shown in the figure below. With the correct serial number of the product, Technical Support team members can then offer a quicker and satisfying solution to your problems.



1.4 Special features

1.4.1 Product highlights

Latest Processor Technology

The motherboard supports Intel® Xeon® Scalable processor family which provides compelling IPC increases for legacy performance improvements, floating point improvement, easier multi-core programming, and with next-generation processor power management. Intel® Xeon® Scalable processor family also improve the I/O capabilities and support UPI link speed of up to 10.4GT/s.

Intel® AVX 512

Intel® AVX 2.0 extends 512-bit vector support for integer vector operations, doubles fixed point arithmetic throughput, adds support for new vector gather, permutes/blend, vector shifts resulting in fixed and floating-point algorithm improvements. Also, Intel's new microarchitecture doubles the cache bandwidth at L1/L2 to support higher FLOPS and contributes to greater performance in signal and image processing applications.

Next Generation of processor power management

Intel® Xeon® Scalable processor family enhances the processor power management with the features of Energy Efficient Turbo, Uncore Frequency Scaling, and Per-Core P-state. Also, the Integrated Voltage Regulator enables generational performance and power improvements that the standard VR solutions cannot provide.

DDR4 memory support

The motherboard supports DDR4 memory that features faster clock frequencies and higher data transfer rates of 2133 MT/s to 2666 MT/s (million transfers per second). DDR4 offers a lower voltage standard of 1.2V that reduces memory power demand and provides improved performance.

M.2 Support

This motherboard features the M.2 slot, which shares bandwidth with the SATA 6Gb/s port and PCI-E Gen3 x4 and is dedicated to the operating system.

PCI Express 3.0

PCI Express 3.0 (PCIe 3.0) is the PCI Express bus standard that provides twice the performance and speed of PCIe 2.0. It provides an optimal graphics performance, unprecedented data speed, and seamless transition with its complete backward compatibility to PCIe 2.0 devices.

Intel® I210AT LAN Solution

The motherboard comes with four Gigabit LAN controllers and ports which provide a total solution for your networking needs. The onboard Intel® I210AT Gigabit LAN controllers use the PCI Express interface and could achieve network throughput close to Gigabit bandwidth.

Intel® C621 Series Chipset

The Intel® C621 series chipset supports with enterprise class features which is targeted for Cloud and Storage applications. It is optimized and validated to work with the latest Intel® Xeon® Scalable processor family, compared with the last generation, it also reduces the TDP, supports USB 3.0 with up to 12 SATA III ports thus bringing more features and benefits to the target users.

Serial ATA III technology

The motherboard supports the Serial ATA III technology through the Serial ATA interface and Intel® 621 chipset, delivering up to 6 Gb/s data transfer rates. It also provides enhanced scalability, faster data retrieval, and double the bandwidth of current bus systems.

Temperature, fan, and voltage monitoring

The CPU temperature is monitored to prevent overheating and damage. The system fan rotations per minute (RPM) is monitored for timely failure detection. The chip monitors the voltage levels to ensure a stable supply of current for critical components.

1.4.2 Innovative features

Fan Speed control technology

The Fan Speed control technology smartly adjusts the fan speeds according to the system loading to ensure a quiet, cool, and efficient operation.

Hardware Information

2

This chapter lists the hardware setup procedures that you have to perform when installing system components. It includes description of the jumpers and connectors on the motherboard.

2.1 Before you proceed

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



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

2.2 Motherboard overview

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

To optimize the features of your motherboard, we highly recommend that you install it in an ATX 2.2 compliant chassis.



Ensure to unplug the chassis power cord before installing or removing the motherboard. Failure to do so can cause you physical injury and damage motherboard components!

2.2.1 Placement direction

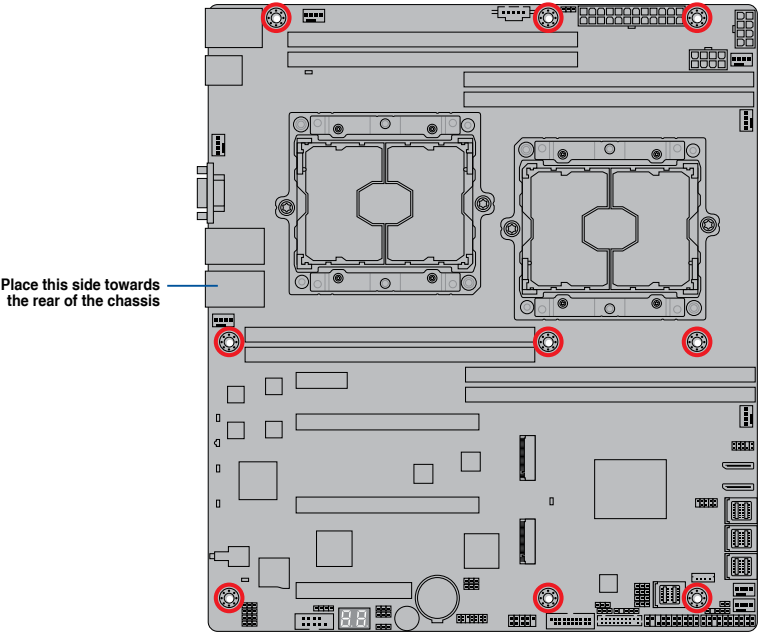
When installing the motherboard, ensure that you place it into the chassis in the correct orientation. The edge with external ports goes to the rear part of the chassis as indicated in the image below.

2.2.2 Screw holes

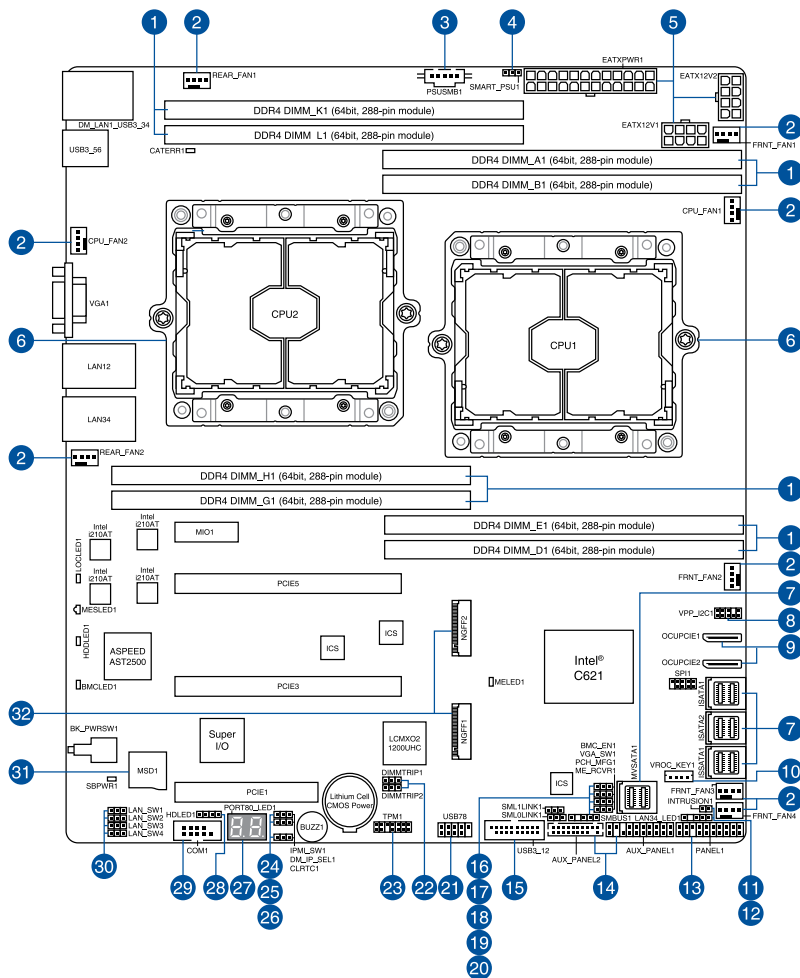
Place nine (9) screws into the holes indicated by circles to secure the motherboard to the chassis.



DO NOT overtighten the screws! Doing so can damage the motherboard.



2.2.3 Motherboard layout



Layout contents

Internal connectors / Sockets / Jumpers / LEDs	Page
1. DDR4 DIMM sockets	2-8
2. CPU, front, and rear fan connectors (4-pin CPU_FAN1-2; FRNT_FAN1-4; REAR_FAN1-2)	2-28
3. Power Supply SMBus connector (5-pin PSUSMB1)	2-26
4. PMBus 1.2 PSU select jumper (3-pin SMART_PSU1)	2-17
5. EATX power connectors (24-pin EATXPWR1; 8-pin EATX12V1-2)	2-30
6. CPU socket	2-6
7. Mini-SAS HD connector (ISATA1-2; ISSATA1; MVSATA1)	2-25
8. VPP_I2C1 connector (10-1 pin VPP_I2C1)	2-34
9. OCUPCIE connectors (OCUPCIE1-2)	2-34
10. VROC KEY connector (4-pin VROC_KEY1)	2-29
11. Chassis Intrusion (2-pin INTRUSION1)	2-33
12. LAN Activity LED connector (5-1 pin LAN34_LED1)	2-35
13. System panel connector (20-1 pin PANEL1)	2-31
14. Auxiliary panel connector (20-2 pin AUX_PANEL1, 20-1 pin AUX_PANEL2)	2-32
15. USB 3.0 connector (20-1 pin USB3_12)	2-27
16. Baseboard Management Controller setting (3-pin BMC_EN1)	2-18
17. VGA controller setting (3-pin VGA_SW1)	2-15
18. PCH_MFG1 setting (3-pin PCH_MFG1)	2-19
19. ME firmware force recovery setting (3-pin ME_RCVR1)	2-16
20. System Management Bus (SMBUS) connector (5-1 pin SMBUS1)	2-35
21. USB 2.0 connector (10-1 pin USB78)	2-27
22. DDR4 thermal event setting (3-pin DIMMTRIP1-2)	2-16
23. Trusted Platform Module connector (20-1 pin TPM1)	2-29
24. IPMI SW setting (3-pin IPMI_SW1)	2-18
25. DMLAN setting (3-pin DM_IP_EN1)	2-17
26. Clear RTC RAM (3-pin CLRTC1)	2-14
27. Q-Code LEDs (PORT80_LED1)	2-23
28. Hard disk activity LED connector (4-pin HDLED1)	2-33
29. Serial port connector (10-1 pin COM1)	2-28
30. LAN controller setting (3-pin LAN_SW1-4)	2-15
31. Micro SD card slot (MSD1)	2-25
32. M.2 (NGFF) connector (NGFF1-2)	2-26

2.3 Central Processing Unit (CPU)

The motherboard comes with a surface mount LGA 3647 socket designed for the Intel® Xeon® Scalable processor family.

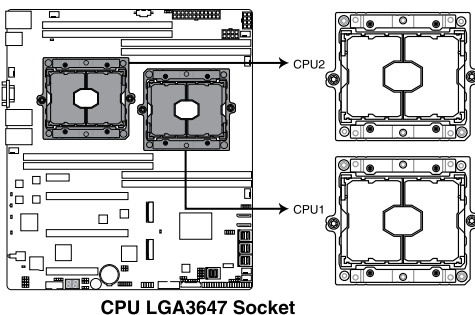


- Upon purchase of the motherboard, ensure that the PnP cap is on the socket and the socket contacts are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket contacts/motherboard components. will shoulder the cost of repair only if the damage is shipment/transit-related.
- Keep the cap after installing the motherboard. will process Return Merchandise Authorization (RMA) requests only if the motherboard comes with the cap on the LGA 3647 socket.
- The product warranty does not cover damage to the socket contacts resulting from incorrect CPU installation/removal, or misplacement/loss/incorrect removal of the PnP cap.

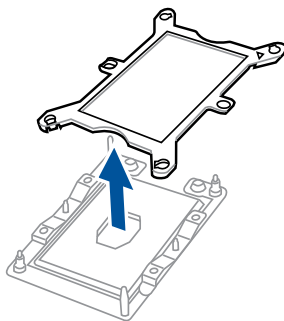
2.3.1 Installing the CPU

To install a CPU:

1. Locate the CPU socket on the motherboard.



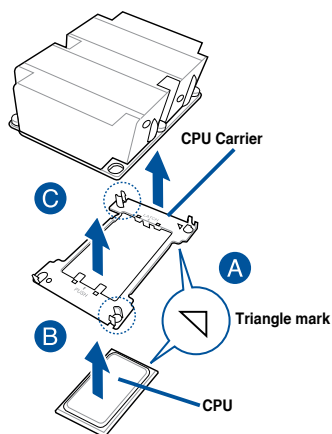
2. Remove the PnP caps from the CPU sockets.



3. Align the triangle mark on the CPU with the triangle mark on the CPU Carrier (A), then install the CPU into the CPU Carrier until it clicks firmly into place (B), and then install the CPU Carrier into the heatsink until it clicks firmly in place (C).



Ensure that the triangle mark on the CPU matches the triangle mark on the CPU Carrier.



4. Align the CPU and CPU Carrier in the correct orientation, and then place the heatsinks on top of the CPU sockets.

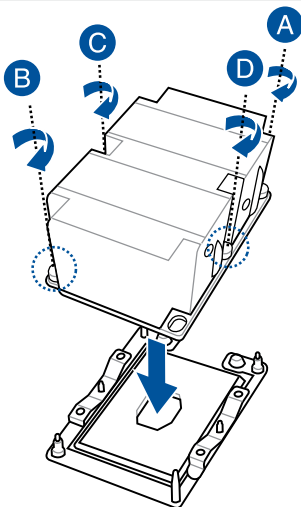
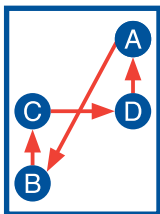


The CPU and CPU Carrier fits in only one correct orientation. DO NOT force the CPU and CPU Carrier into the socket to prevent damaging the CPU pins on the socket.

5. Twist each of the four screws with a screwdriver just enough to attach the heatsink to the motherboard. When the four screws are attached, tighten them one by one in a diagonal sequence to completely secure the heatsink.



The heatsink screws are T30 models. A torque value of 12 inch-lbf is recommended.

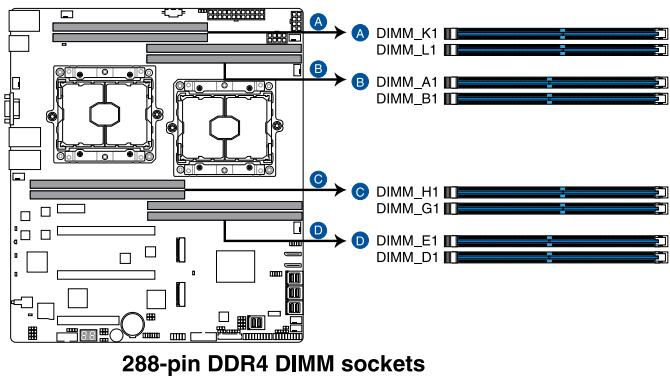


2.4 System memory

2.4.1 Overview

The motherboard comes with eight (8) Double Data Rate 4 (DDR4) Dual Inline Memory Modules (DIMM) sockets.

The figure illustrates the location of the DDR4 DIMM sockets:



2.4.2 Memory Configurations

You may install 4 GB, 8 GB, 16 GB, and 32 GB RDIMMs or 32 GB and 64 GB LR-DIMMs into the DIMM sockets using the memory configurations in this section.



- Refer to Server AVL for the updated list of compatible DIMMs.
- When installing DIMMs, always start from slot A1 (CPU1) and G1 (CPU2).
- Always install DIMMs with the same CAS latency. For optimum compatibility, it is recommended that you obtain memory modules from the same vendor.

Single CPU configuration

You can refer to the following recommended memory population for a single CPU configuration.

Single CPU configuration (must be installed on CPU1)				
	DIMM			
	A1	B1	D1	E1
1 DIMM	✓			
2 DIMMs	✓	✓		
4 DIMMs	✓	✓	✓	✓

Dual CPU configuration

You can refer to the following recommended memory population for a dual CPU configuration.

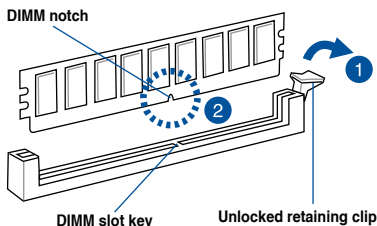
Dual CPU configuration								
	DIMM							
	A1	B1	D1	E1	G1	H1	K1	L1
2 DIMMs	✓				✓			
4 DIMMs	✓	✓			✓	✓		
8 DIMMs	✓	✓	✓	✓	✓	✓	✓	✓

2.4.3 Installing a DIMM on a single clip DIMM socket



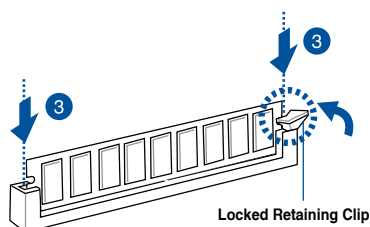
Ensure to unplug the power supply before adding or removing DIMMs or other system components. Failure to do so may cause severe damage to both the motherboard and the components.

1. Unlock a DIMM socket by pressing the retaining clip outward.
2. Align a DIMM on the socket such that the notch on the DIMM matches the DIMM slot key on the socket.



A DIMM is keyed with a notch so that it fits in only one direction. DO NOT force a DIMM into a socket in the wrong direction to avoid damaging the DIMM.

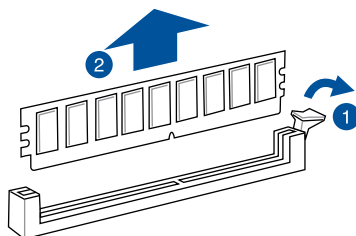
3. Hold the DIMM by both of its ends then insert the DIMM vertically into the socket. Apply force to both ends of the DIMM simultaneously until the retaining clip snaps back into place and the DIMM cannot be pushed in any further to ensure proper sitting of the DIMM.



Always insert the DIMM into the socket vertically to prevent DIMM notch damage.

2.4.4 Removing a DIMM from a single clip DIMM socket

1. Press the retaining clip outward to unlock the DIMM.
2. Remove the DIMM from the socket.



Support the DIMM lightly with your fingers when pressing the retaining clips. The DIMM might get damaged when it flips out with extra force.

2.5 Expansion slots

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



Ensure to unplug the power cord before adding or removing expansion cards. Failure to do so may cause you physical injury and damage motherboard components.

2.5.1 Installing an expansion card

To install an expansion card:

1. Before installing the expansion card, read the documentation that came with it and make the necessary hardware settings for the card.
2. Remove the system unit cover (if your motherboard is already installed in a chassis).
3. Remove the bracket opposite the slot that you intend to use. Keep the screw for later use.
4. Align the card connector with the slot and press firmly until the card is completely seated on the slot.
5. Secure the card to the chassis with the screw you removed earlier.
6. Replace the system cover.

2.5.2 Configuring an expansion card

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

1. Turn on the system and change the necessary BIOS settings, if any. See **Chapter 4** for information on BIOS setup.
2. Assign an IRQ to the card.



Refer to the table **Standard Interrupt assignments** in section **Interrupt assignments** for more information.

3. Install the software drivers for the expansion card.



When using PCI cards on shared slots, ensure that the drivers support “Share IRQ” or that the cards do not need IRQ assignments. Otherwise, conflicts may arise between the two PCI groups, making the system unstable and the card inoperable.

2.5.3 Interrupt assignments

Standard Interrupt assignments

IRQ	Priority	Standard function
0	1	System Timer
1	2	Keyboard Controller
2	-	Programmable Interrupt
3*	11	Communications Port (COM2)
4*	12	Communications Port (COM1)
5*	13	--
6	14	Floppy Disk Controller
7*	15	--
8	3	System CMOS/Real Time Clock
9*	4	ACPI Mode when used
10*	5	IRQ Holder for PCI Steering
11*	6	IRQ Holder for PCI Steering
12*	7	PS/2 Compatible Mouse Port
13	8	Numeric Data Processor
14*	9	Primary IDE Channel
15*	10	Secondary IDE Channel

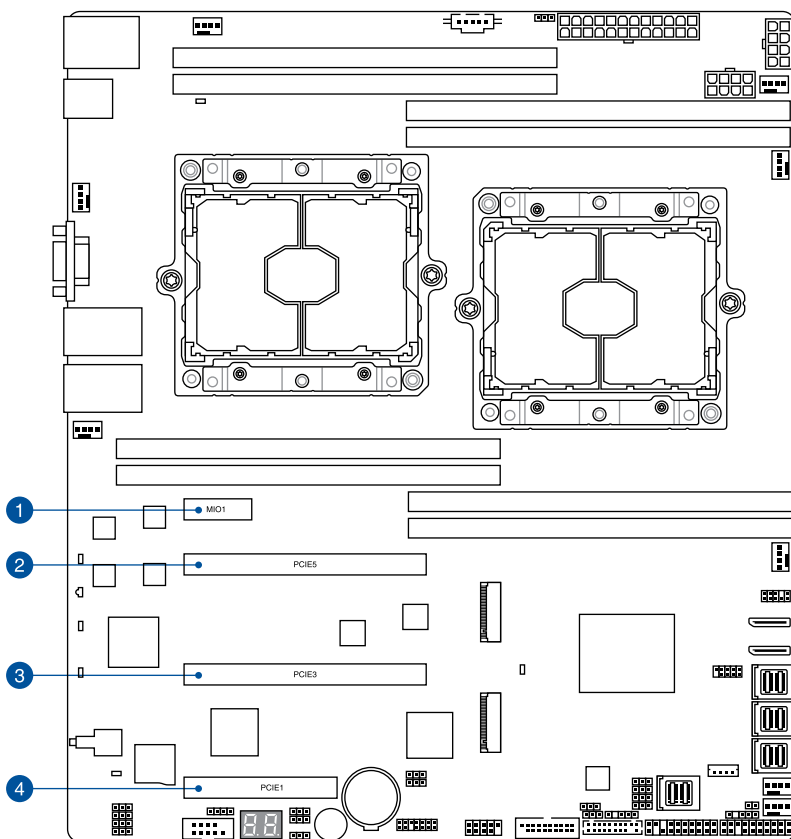
* These IRQs are usually available for ISA or PCI devices.

2.5.4 PCI Express x16 slot (x16 link)

The onboard PCIE3 and PCIE5 slots provides one x16 Gen3 link to CPU1. This slot supports VGA cards and various server class high performance add-on cards.

2.5.5 PCI Express x8 slot (x8 link)

The onboard PCIE1 slot provides one x8 Gen3 link to CPU2. These slots support VGA cards and various server class high performance add-on cards.



No. (Slot location) Short description		
1	PCI-E6	MIO
2	PCI-E5	PCI-E x16 (x16 Gen3 Link)
3	PCI-E3	PCI-E x16 (x16 Gen3 Link)
4	PCI-E1	PCI-E x8 (x8 Gen3 Link)

2.6 Jumpers

1. Clear RTC RAM (3-pin CLRTC1)

This jumper allows you to clear the Real Time Clock (RTC) RAM in CMOS. You can clear the CMOS memory of date, time, and system setup parameters by erasing the CMOS RTC RAM data. The onboard button cell battery powers the RAM data in CMOS which include system setup information such as system passwords.

To erase the RTC RAM:

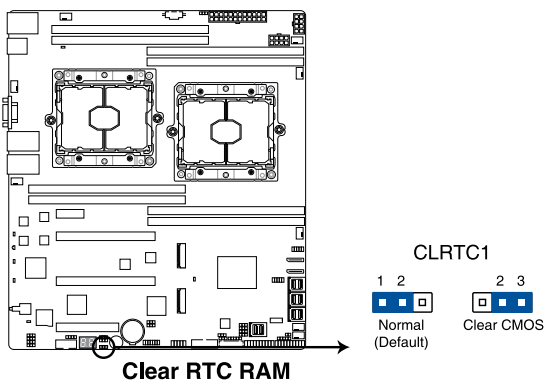
1. Turn OFF the computer and unplug the power cord.
2. Move the jumper cap from the default pins 1–2 to pins 2–3. Keep the cap on pins 2–3 for about 5 to 10 seconds, then move the cap back to pins 1–2.
3. Plug the power cord and turn ON the computer.
4. Hold down the key during the boot process and enter BIOS setup to re-enter data.



DO NOT remove the cap on CLRTC jumper default position except when clearing the RTC RAM. Removing the cap will cause system boot failure!

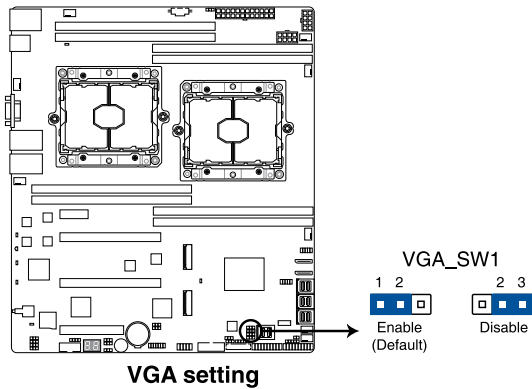


If the steps above do not help, remove the onboard battery and move the jumper again to clear the CMOS RTC RAM data. After the CMOS clearance, reinstall the battery.



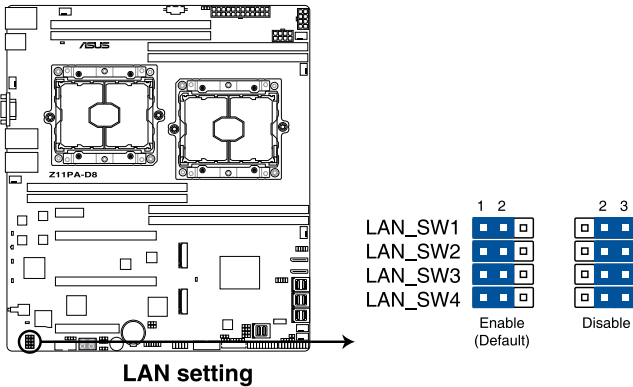
2. VGA controller setting (3-pin VGA_SW1)

This jumper allows you to enable or disable the onboard VGA controller. Set to pins 1-2 to activate the VGA feature.



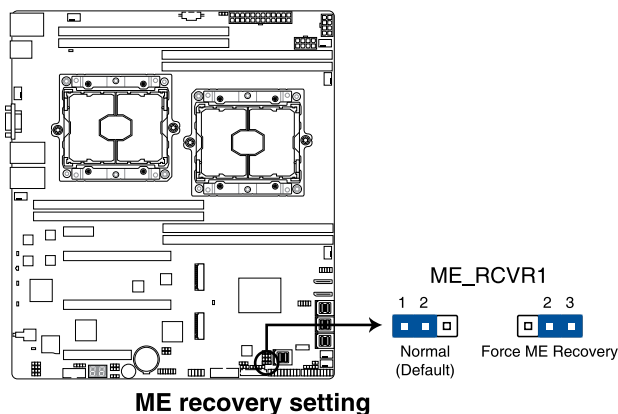
3. LAN controller setting (3-pin LAN_SW1-4)

These jumpers allow you to enable or disable the onboard LAN_SW1-4. Set to pins 1-2 to activate the Gigabit LAN feature.



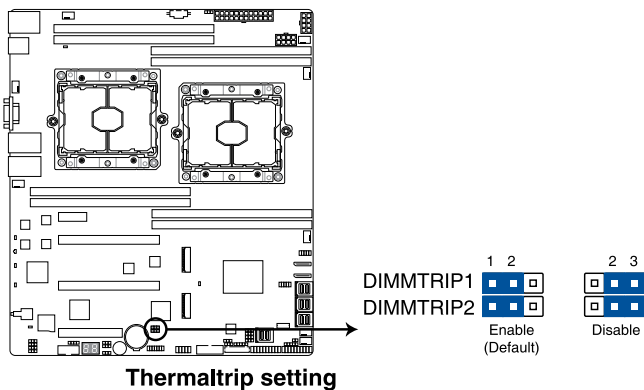
4. ME firmware force recovery setting (3-pin ME_RCVR1)

This jumper allows you to force Intel® Management Engine (ME) boot from recovery mode when ME becomes corrupted.



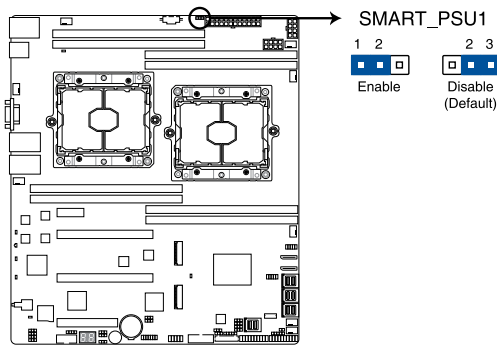
5. DDR4 thermal event setting (3-pin DIMMTRIP1-2)

This jumper allows you to enable or disable DDR4 DIMM thermal sensing event pin.



6. PMBus 1.2 PSU select jumper (3-pin SMART_PSU1)

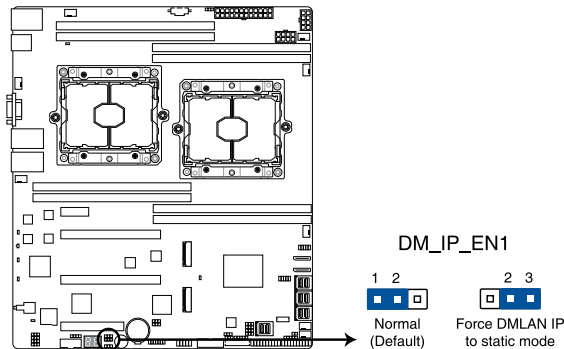
This jumper allows you to select PSU PMBus version. Set to pins 1–2 for PMBus, set to pins 2–3 for others.



Smart Ride Through setting

7. DMLAN setting (3-pin DM_IP_EN1)

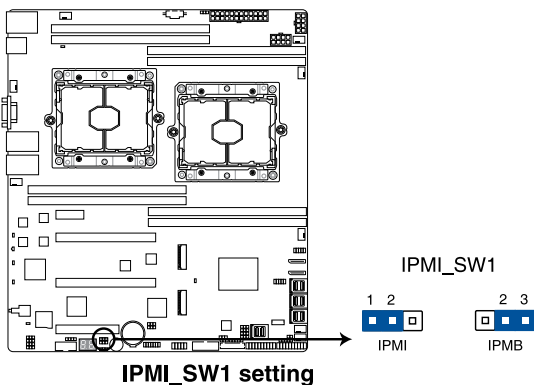
This jumper allows you to select the DMLAN setting. Set to pins 2-3 to force the DMLAN IP to static mode (IP=10.10.10.10, submask=255.255.255.0).



DM_IP_EN1 setting

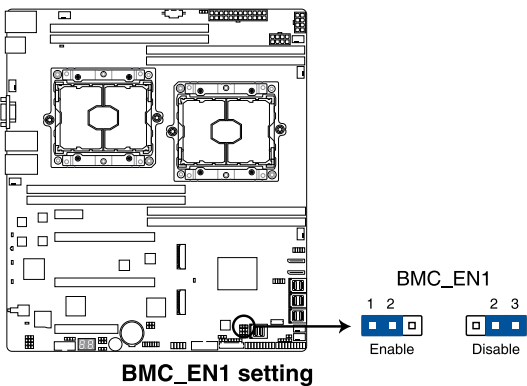
8. IPMI SW setting (3-pin IPMI_SW1)

This jumper allows you to select which protocol in the GPU sensor to function.



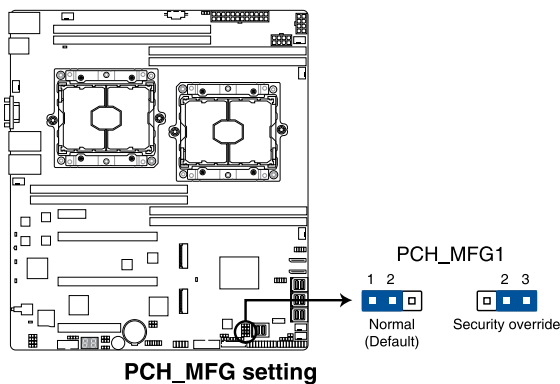
9. Baseboard Management Controller setting (3-pin BMC_EN1)

This jumper allows you to enable (default) or disable on-board BMC. Ensure to set this BMC jumper to enabled to avoid system fan control and hardware monitor error.



10. PCH_MFG1 setting (3-pin PCH_MFG1)

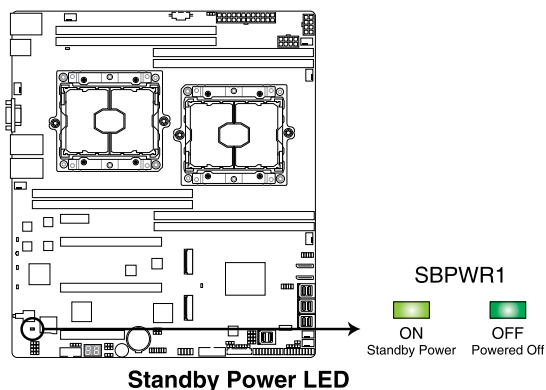
This jumper allows you to update the BIOS ME block.



2.7 Onboard LEDs

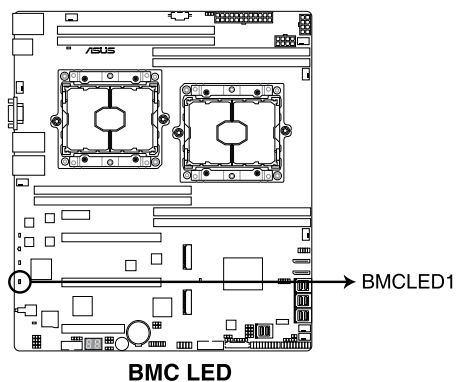
1. Standby Power LED (SB_PWR1)

The motherboard comes with a standby power LED. The green LED lights up to indicate that the system is ON, in sleep mode, or in soft-off mode. This is a reminder that you should shut down the system and unplug the power cable before removing or plugging in any motherboard component. The illustration below shows the location of the onboard LED.



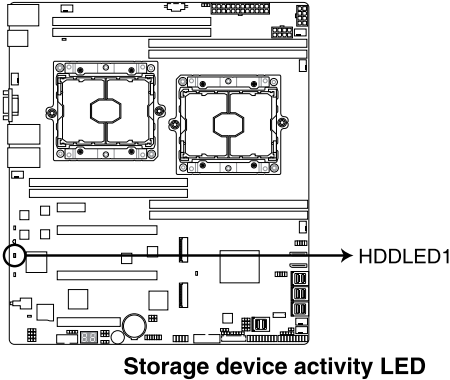
2. BMC LED (BMCLED1)

The BMC LED blinks to indicate that the on-board BMC is functional.



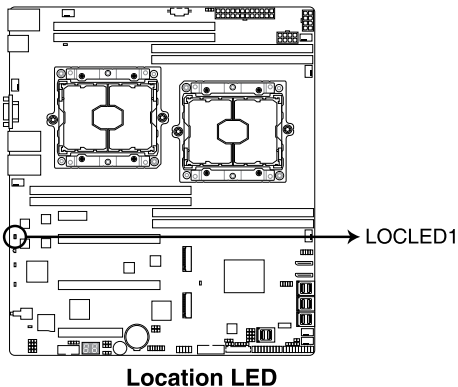
3. Storage device activity LED (HDDLED1)

This LED is for the storage devices connected to the onboard SATA, or SATA/SAS add-on card. The read or write activities of any device connected to the onboard SATA, or SATA/SAS add-on card causes the rear panel LED to light up.



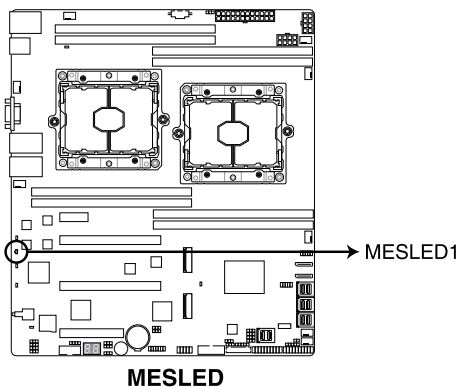
4. Location LED (LOCLED1)

This onboard LED lights up when the Location button on the server is pressed or when triggered by a system management software. The Location LED helps visually locate and quickly identify the server in error on a server rack.



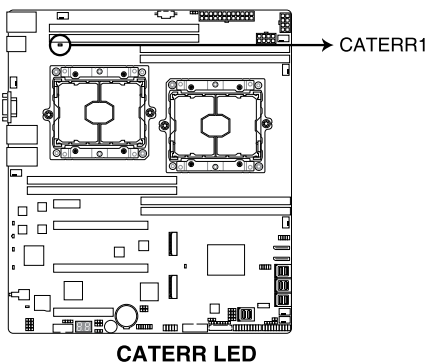
5. Message LED (MESLED1)

This onboard LED lights up to red when there is a BMC event log is generated.



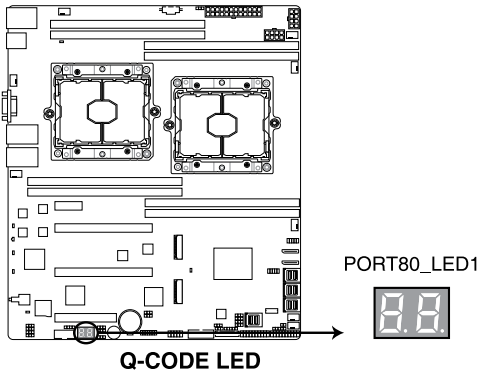
6. CATT LED (CATTERR_LED1)

The CATT LED indicates that the system has experienced a fatal or catastrophic error and cannot continue to operate.



7. Q-Code LEDs (PORT80_LED1)

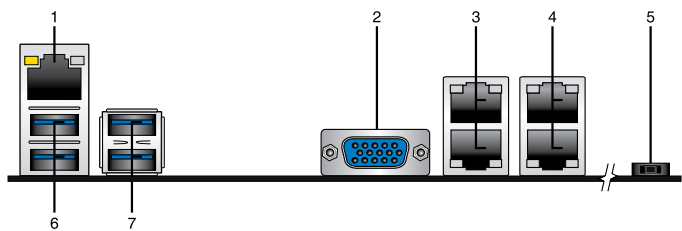
The Q-Code LED design provides you with a 2-digit error code that displays the system status.



- The Q-Code LEDs provide the most probable cause of an error code as a starting point for troubleshooting. The actual cause may vary from case to case.
- Please refer to the Q-Code table in the **Appendix** section for more details.

2.8 Connectors

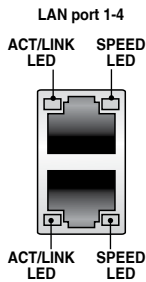
2.8.1 Rear panel connectors



- 1. RJ-45 port for iKVM. This RJ-45 port functions only when you enable ASMB9 controller.
- 2. Video Graphics Adapter (VGA) port. This port is for a VGA monitor or other VGA-compatible devices.
- 3. RJ-45 ports 1 and 2 for LAN. These ports allows Gigabit connection to a LAN through a network hub. Refer to the **LAN port LED indications** table for more information.
- 4. RJ-45 ports 3 and 4 for LAN. These ports allows Gigabit connection to a LAN through a network hub. Refer to the **LAN port LED indications** table for more information.
- 5. Power-on Button. Press this button to turn on the system.
- 6. USB 3.0 ports 3 and 4. These two 4-pin Universal Serial Bus (USB) ports are available for connecting USB 3.0 devices.
- 7. USB 3.0 ports 5 and 6. These two 4-pin Universal Serial Bus (USB) ports are available for connecting USB 3.0 devices.

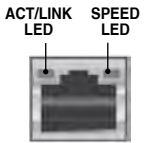
LAN port LED indications

Activity/Link LED		Speed LED	
Status	Description	Status	Description
OFF	No link	OFF	10 Mbps connection
GREEN	Linked	ORANGE	100 Mbps connection
BLINKING	Data activity	GREEN	1 Gbps connection



Management LAN port LED indications

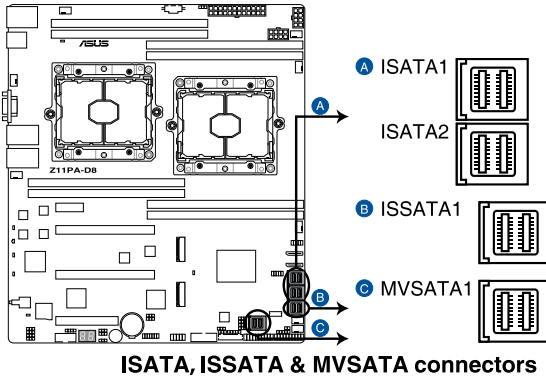
Activity/Link LED		Speed LED	
Status	Description	Status	Description
OFF	No link	OFF	10 Mbps connection
ORANGE	Linked	ORANGE	100 Mbps connection
BLINKING	Data activity	GREEN	1 Gbps connection



2.8.2 Internal connectors

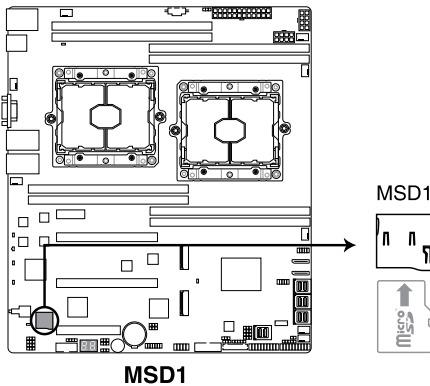
1. Mini-SAS HD connector (ISATA1-2; ISSATA1; MVSATA1)

This motherboard comes with mini Serial Attached SCSI (SAS) HD connectors, the storage technology that supports Serial ATA. Each connector supports up to four devices.



2. Micro SD card slot (MSD1)

Your motherboard supports SD Memory Card v2.00 (SDHC) / v3.00 (SDXC).



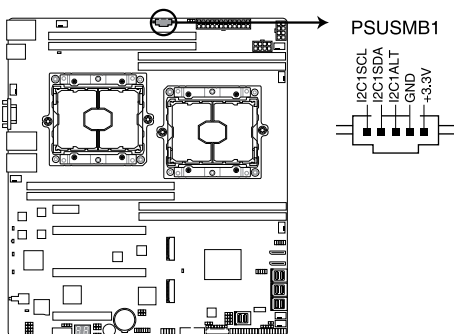
Disconnect all power (including redundant PSUs) from the existing system before you add or remove a Memory Card, then reboot the system to access the Memory Card.



Some memory cards may not be compatible with your motherboard. Ensure that you use only compatible memory cards to prevent loss of data, damage to your device, or memory card, or both.

3. Power Supply SMBus connector (5-pin PSUSMB1)

This connector allows you to connect SMBus (System Management Bus) to the PSU (power supply unit) to read PSU information. Devices communicate with an SMBus host and/or other SMBus devices using the SMBus interface.



Power supply SMBus connector



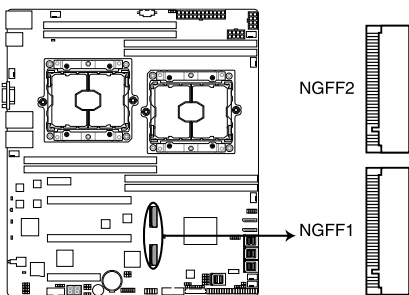
This connector functions only when you install the ASMB8.



Power supply is required to meet PMBus specification and customized BMC FW may be needed. Please contact if your need further support.

4. M.2 (NGFF) connector (NGFF1-2)

These connectors allow you to install M.2 devices.



NGFF connectors



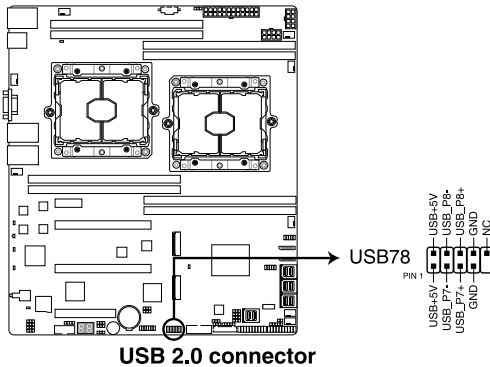
This connector supports type 22110 devices on both PCI-E and SATA interface.



The M.2 (NGFF) device is purchased separately.

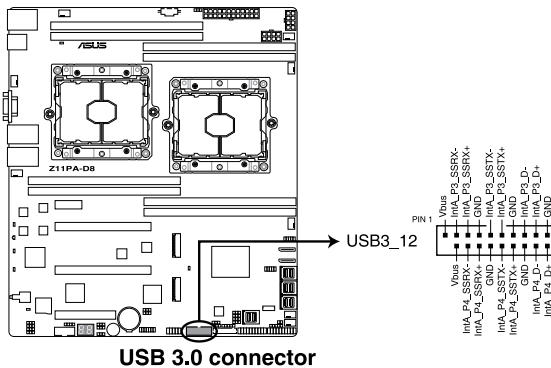
5. USB 2.0 connector (10-1 pin USB78)

This connector is for USB 2.0 ports. Connect the USB module cable to the connector, and then install the module to a slot opening at the back of the system chassis. The USB connectors comply with USB 2.0 specification that supports up to 480 Mbps connection speed.



6. USB 3.0 connector (20-1 pin USB3_12)

This connector allows you to connect a USB 3.0 module for additional USB 3.0 front or rear panel ports. With an installed USB 3.0 module, you can enjoy all the benefits of USB 3.0 including faster data transfer speeds of up to 5Gbps, faster charging time for USB-chargeable devices, optimized power efficiency, and backward compatibility with USB 2.0.

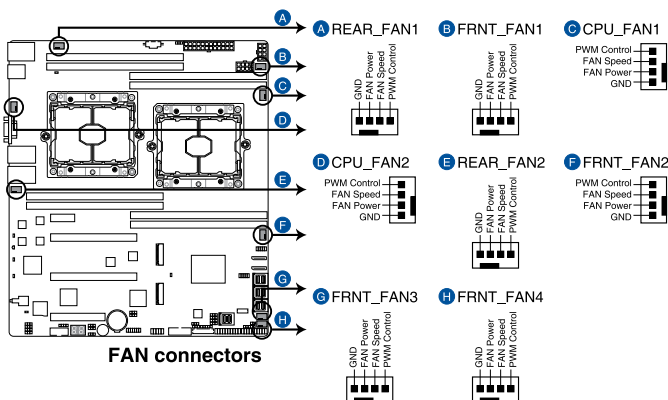


7. CPU, front, and rear fan connectors (4-pin CPU_FAN1-2; FRNT_FAN1-4; REAR_FAN1-2)

The fan connectors support cooling fans. Connect the fan cables to the fan connectors on the motherboard, ensuring that the black wire of each cable matches the ground pin of the connector.

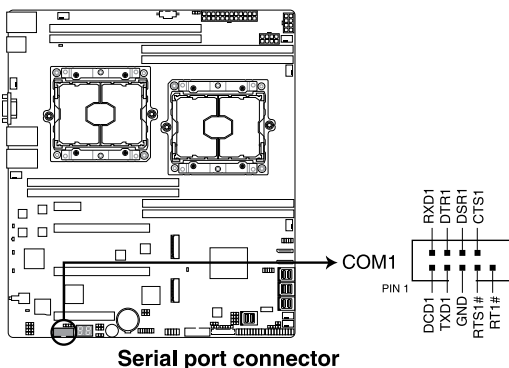


- DO NOT forget to connect the fan cables to the fan connectors. Insufficient air flow inside the system may damage the motherboard components.
- These are not jumpers! DO NOT place jumper caps on the fan connectors!
- All fans feature the Smart Fan technology.



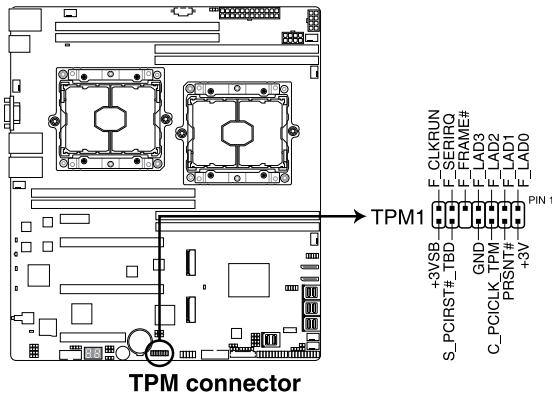
8. Serial port connector (10-1 pin COM1)

This connector is for the serial COM port. Connect the serial port module cable to one of these connectors, then install the module to a slot opening at the back of the system chassis.



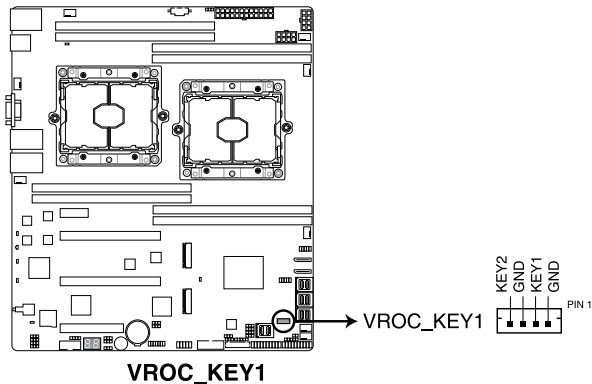
9. **Trusted Platform Module connector (20-pin TPM1)**

This connector supports a 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.



10. **VROC KEY connector (4-pin VROC_KEY1)**

This connector allows you to connect a KEY module to enable additional CPU RAID functions with Intel® CPU RSTe.



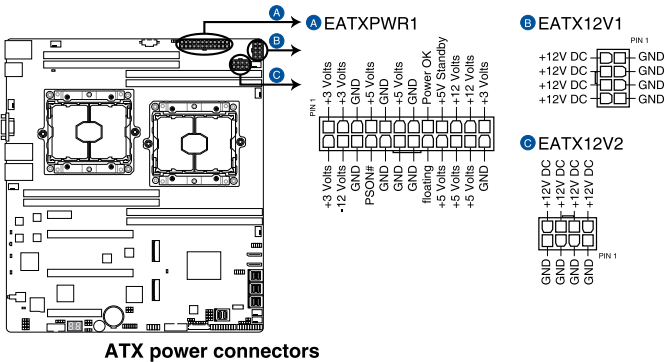
The KEY module is purchased separately.

11. EATX power connectors (24-pin EATXPWR1; 8-pin EATX12V1-2)

These connectors are for the SSI or ATX power supply plugs. The power supply plugs are designed to fit these connectors in only one orientation. Find the proper orientation and push down firmly until the connectors completely fit.

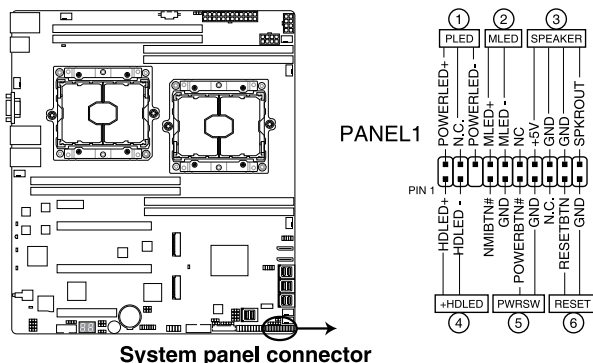


- DO NOT forget to connect the 24+8-pin power plugs when using 85W or below CPU; otherwise, the system will not boot up.
- DO NOT forget to connect the 24+8+8-pin power plugs when using 105W or above CPU; otherwise, the system will not boot up.
- Use of a PSU with a higher power output is recommended when configuring a system with more power-consuming devices. The system may become unstable or may not boot up if the power is inadequate.
- Ensure that your power supply unit (PSU) can provide at least the minimum power required by your system. Minimum requirement of ATX power supply 1) 500W 2) All+12V output > 20A.



12. System panel connector (20-1 pin PANEL1)

This connector supports several chassis-mounted functions.



1. System power LED (3-pin PLED)

This 3-pin connector is for the system power LED. Connect the chassis power LED cable to this connector. The system power LED lights up when you turn on the system power, and blinks when the system is in sleep mode.

2. Message LED (2-pin MLED)

This 2-pin connector is for the message LED cable that connects to the front message LED. The message LED is controlled by Hardware monitor to indicate an abnormal event occurrence.

3. System warning speaker (4-pin SPEAKER)

This 4-pin connector is for the chassis-mounted system warning speaker. The speaker allows you to hear system beeps and warnings.

4. Hard disk drive activity LED (2-pin HDD LED)

This 2-pin connector is for the HDD Activity LED. Connect the HDD Activity LED cable to this connector. The HDD LED lights up or flashes when data is read from or written to the HDD.

5. Power button/soft-off button (2-pin PWRSW)

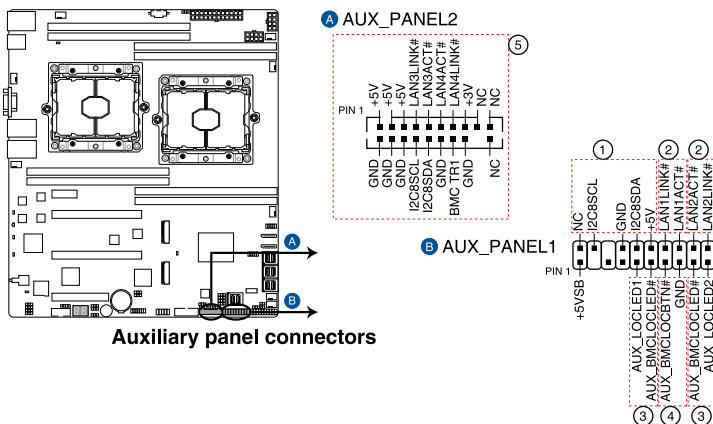
This connector is for the system power button. Pressing the power button turns the system on or puts the system in sleep or soft-off mode depending on the BIOS settings. Pressing the power switch for more than four seconds while the system is ON turns the system OFF.

6. Reset button (2-pin RESET)

This 2-pin connector is for the chassis-mounted reset button for system reboot without turning off the system power.

13. Auxiliary panel connector (20-2 pin AUX_PANEL1, 20-1 pin AUX_PANEL2)

This connector is for additional front panel features including front panel SMB, locator LED and switch, chassis intrusion, and LAN LEDs.



1. Front panel SMB (6-1 pin FPSMB)

This 6-1 pin connector is for the front panel SMBus cable.

2. LAN activity LED (2-pin LAN1_LED, LAN2_LED)

This 2-pin connector is for the Gigabit LAN activity LEDs on the front panel.

3. Locator LED (2-pin LOCATORLED1, 2-pin LOCATORLED2)

This 2-pin connector is for the locator LED1 and LED2 on the front panel. Connect the Locator LED cables to these 2-pin connector. The LEDs will light up when the Locator button is pressed.

4. Locator Button/Switch (2-pin LOCATORBTN)

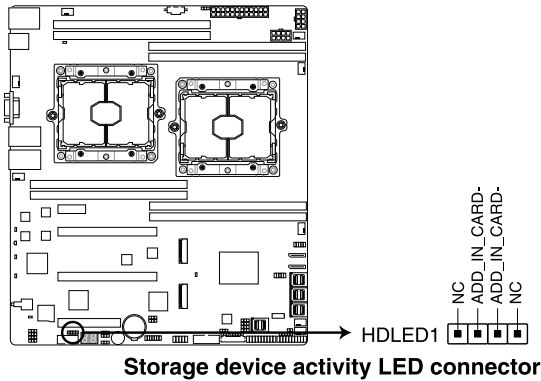
This 2-pin connector is for the locator button on the front panel. This button queries the state of the system locator.

5. LAN activity LED and USB port (2-pin LAN3_LED, LAN4_LED, USB ports)

These leads are for the Gigabit LAN activity LEDs and USB ports on the front panel.

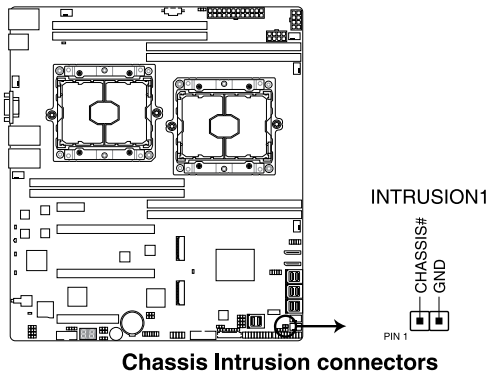
14. Hard disk activity LED connector (4-pin HDLED1)

This LED connector is for the storage add-on card cable connected to the SATA or SAS add-on card. The read or write activities of any device connected to the SATA or SAS add-on card causes the front panel LED to light up.



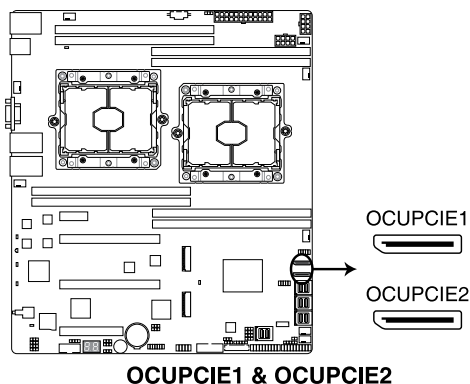
15. Chassis Intrusion (2-pin INTRUSION1)

These leads are for the intrusion detection feature for chassis with intrusion sensor or microswitch. When you remove any chassis component, the sensor triggers and sends a high level signal to these leads to record a chassis intrusion event. The default setting is short CHASSIS# and GND pin by jumper cap to disable the function.



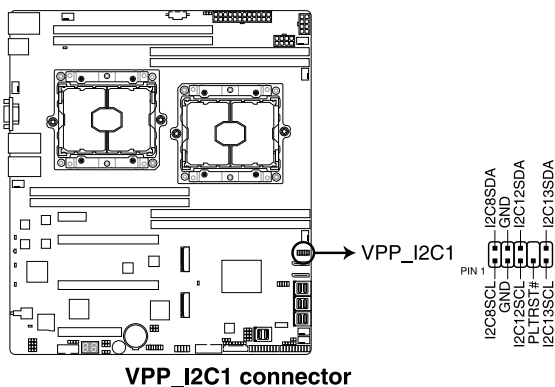
16. OCUPCIE connectors (OCUPCIE1-2)

The OCUPCIE connectors allows you to connect NVME storage devices.



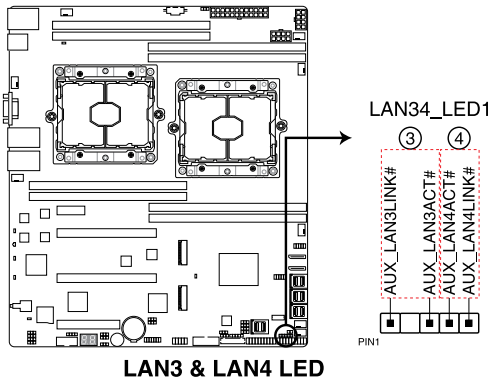
17. VPP_I2C1 connector (10-1 pin VPP_I2C1)

This connector is used for the Intel VMD function and sensor readings.



18. LAN Activity LED connector (5-1 pin LAN34_LED1)

These leads are for LAN activity LEDs on the front panel. Connect the LAN LED cable to the backplane for LAN activity indication.



19. System Management Bus (SMBUS) connector (5-1 pin SMBUS1)

This connector controls the system and power management-related tasks. This connector processes the messages to and from devices rather than tripping the individual control lines.

