



OPEN Industry Standard, Flexible Architecture

GREEN Less Heat, Less Power Consumption

STABLE Robust Design, Quality Parts

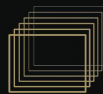
Stable and
Reliable Solution

Server/Workstation
Motherboard

2U1G-B650

User Manual

English



Version 1.10

Published Nov. 2024

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

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

CALIFORNIA, USA ONLY

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

“Perchlorate Material-special handling may apply, see www.dtsc.ca.gov/hazardouswaste/perchlorate”

Setting up the Server in a Restricted Access Location/Restricted Access Area

- Access can only be gained by service persons or by users who have been instructed about the reasons for the restrictions applied to the location and about any precautions that shall be taken.
- Access is through the use of a tool or lock and key, or other means of security, and is controlled by the authority responsible for the location.
- Leave enough clearance (25 inches in the front and 30 inches in the back of the rack) to allow the front door to be opened completely and to allow for sufficient airflow.
- This product is for installation merely in a Restricted Access Location.
- This product is not suitable for use with visual display work place devices according to §2 of the the German Ordinance for Work with Visual Display Units.
- Only skilled person and Instructed person can remove the chassis covers to access the inside of the system.

ASRock Rack's Website: www.ASRockRack.com

Replaceable Batteries

CAUTION

**RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE.
DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS**

Warning

When removal of the chassis lid required for servicing:

- Turn off power and unplug any power cords/cables, and
- Reinstall the chassis lid before restoring power.



Important Safety Instructions

Pay close attention to the following safety instructions before performing any of the operation. Basic safety precautions should be followed to protect yourself from harm and the product from damage:

- Operation of the product should be carried out by suitably trained, qualified, and certified personnel only to avoid risk of injury from electrical shock or energy hazard.
- Disconnect the power cord from the wall outlet when installing or removing main system components, such as the motherboard and power supply unit.
- Place the system on a stable and flat surface.
- Use extreme caution when working with high-voltage components.
- When handling parts, use a grounded wrist strap designed to prevent static discharge.
- Keep the area around the system clean and clutter-free.
- Keep all components and printed circuit boards (PCBs) in their antistatic bags when not in use.
- Handle a board by its edges only; do not touch its components, peripheral chips, memory modules or contacts.
- The power cord must be connected to a socket or outlet with a ground connection.

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Chapter 1 Introduction

Thank you for purchasing 2U1G-B650, a reliable barebone system 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.

This guide provides the instructions of insertion and extraction of chassis components, such as chassis covers, system fans, power supplies, hard disk drive trays, and other main components this system supports. If the system is pre-installed a serverboard, please refer to the user's manual of the serverboard for the information of the serverboard components, specifications and BIOS settings.

| System | ASRock Rack Server Board |
|-----------|--------------------------|
| 2U1G-B650 | B650D4U |



Because the hardware specifications might be updated, the content of this documentation will be subject to change without notice.



The illustrations shown in this manual are for reference purposes only and may not exactly match the model purchased.



*If requiring technical support related to this system, please visit the website for specific information about the using model.
<http://www.asrockrack.com/support/>*

1.1 Shipping Box Contents

| Item | Quantity |
|---|----------|
| Server Barebone : 2U1G-B650 | 1 |
| CPU Heatsink | 1 |
| Rail Kit | 1 |
| Accessory Box - 2 2.5" HDD trays - 2 Power cords - 1 Quick installation guide - 2 M3 screws | |



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

1.2 Specifications

| 2U1G-B650 | |
|--|---|
| System | |
| Form Factor | 2U Rackmount |
| Dimensions | 477.7 x 430.4 x 88 mm (18.8" x 16.9" x 3.5") |
| Support MB | B650D4U |
| Front Panel | |
| Buttons | Power button w/ LED, System Reset button |
| LEDs | System Fail LED, LAN1/LAN2 Activity, Power Status LED |
| I/O Ports | 2 Type-A (USB3.2 Gen1) |
| External Drive Bay / Storage | |
| Internal Side | 1 M-key (PCIe5.0 x4), supports 2280/2242 form factor [CPU] 1 M-key (PCIe4.0 x4), supports 2280/2242 form factor [FCH] |
| Power Supply | |
| Type | 1+1 Hot-swap CRPS |
| Output Watts | 1000W @ 100-127Vac input / 1200W @ 200-240Vac input |
| Efficiency | 80-PLUS Platinum |
| AC Input | AC 100-127V/12A, 50-60Hz; AC 200-240V/7.5A, 50-60Hz |
| System Fan | |
| Fan | 4 PWM easy-swap 80x38 mm fans |
| Processor System | |
| CPU | Supports AMD Ryzen 7000 series Processors |
| Socket | Single Socket AM5 (LGA 1718) |
| Thermal Design Power | Up to 120W |
| Chipset | AMD B650E |
| System Memory | |
| Supported DIMM Quantity | 4 DIMM slots (2DPC) |
| Supported Type | DDR5 288-pin ECC/non-ECC UDIMM |
| Max. Capacity per DIMM | 48GB |
| Max. DIMM Frequency | 5200 MHz (1DPC); 3600 MHz (2DPC) |
| Voltage | 1.1V |
| PCIe Expansion Slots (SLOT7 close to CPU) | |
| PCIe x 16 | 1 FHFL triple-slot PCIe5.0 x16 via RB2UX16L_G5_RDV Support GPU card dimensions (L x W x H): 335 x 131 x 62 mm (GPU power connector on the south edge) 312 x 154.5 x 62 mm (GPU power connector on the east edge) |
| PCIe x 4 | 1 FHHL PCIe4.0 x4 via riser cable |

| | |
|---------------------------|--|
| Ethernet | |
| Additional GbE Controller | Intel® i210: 2 RJ45 (1GbE) |
| Server Management | |
| BMC Controller | ASPEED AST2600 |
| IPMI Dedicated GLAN | 1 Realtek RTL8211F for dedicated management GLAN |
| Graphics | |
| Controller | ASPEED AST2600: 1 DB15 (VGA), 1 (15-pin) header AMD Processors with Graphics: 1 HDMI, 1 DisplayPort |
| Rear I/O | |
| UID Button/ LED | 1 UID button w/ LED |
| VGA Port | 1 DB15 (VGA), 1 DisplayPort, 1 HDMI |
| Serial Port | 1 DB9 (COM) |
| USB 3.2 Gen1 Port | 4 Type-A (USB3.2 Gen1) |
| RJ45 | 2 RJ45 (1GbE) 1 dedicated IPMI |
| System BIOS | |
| BIOS Type | AMI UEFI BIOS; 256Mb (32MB) SPI Flash ROM |
| BIOS Features | Plug and Play, ACPI 6.4 compliance wake up events, SMBIOS 3.5 |
| Hardware Monitor | |
| Temperature | CPU, DDR, MB, Card Side, Chipset, M.2 slot |
| Fan | Fan Tachometer, Multi-Speed Control, CPU Quiet Fan (Allow Chassis Fan Speed Auto-Adjust by CPU Temperature) |
| Voltage | VOLT_3VSB, VOLT_5VSB, VOLT_P0_VCORE, VOLT_P0_VSOC, VOLT_VMEM, VOLT_VMISC, VOLT_1.8V_PT21, VOLT_VSU\$10, VOLT_VDD10, VOLT_V10_PHY_DIG, VOLT_VDD_1P8, VOLT_MD_VDDO, VOLT_BAT, VOLT_3V, VOLT_5V, VOLT_12V |
| Environment | |
| Temperature | Operation temperature: 10°C ~ 35°C / Non operation temperature: -40°C ~ 70°C |
| Humidity | Non operation humidity: 20% ~ 90% (Non condensing) |

*Please be noted that the functions are supported depending on the type of the server board.

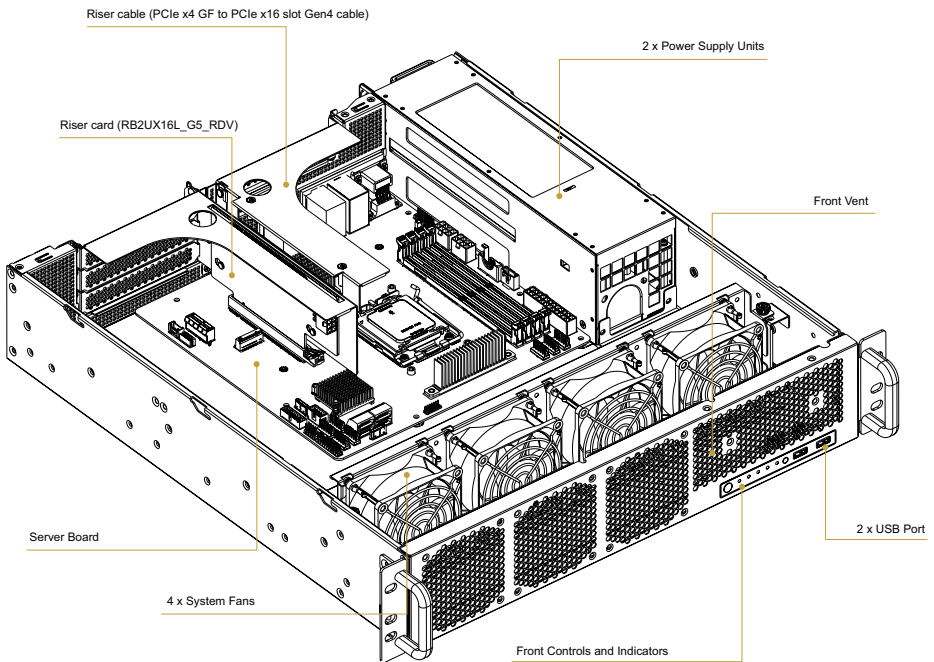


Please refer to the user manual of the motherboard you use for detailed information about motherboard components and features.

Chapter 2 Server System Overview

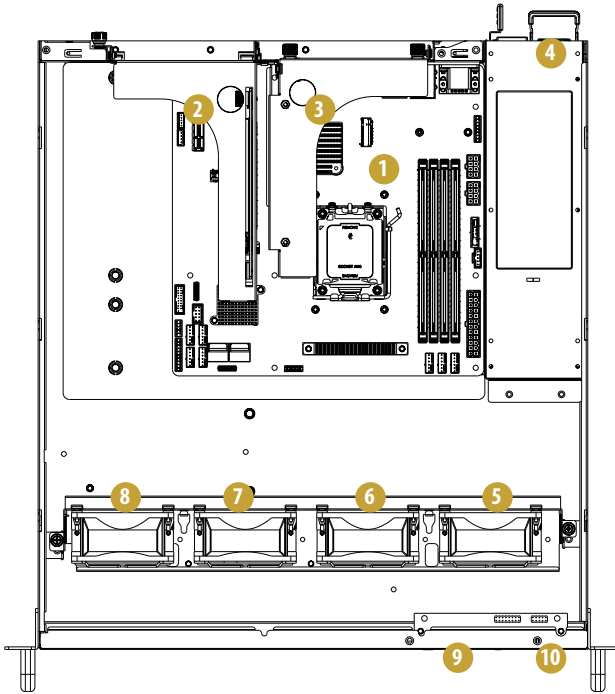
This chapter provides diagrams showing the location of important components of the server system.

2.1 System Components



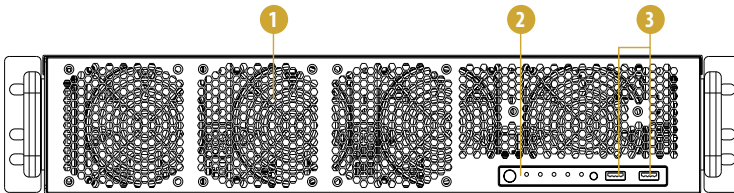
**The illustrations in this User Manual are for references only. The actual product may be slightly different by SKU.*

2.2 Internal Features



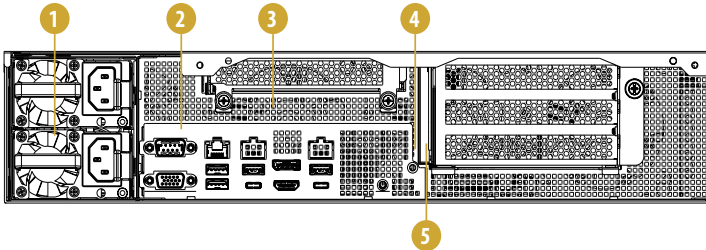
| No. | From |
|-----|--|
| 1 | Server Board |
| 2 | Riser card (RB2UX16L_G5_RDV) |
| 3 | Riser cable (PCIe x4 GF to PCIe x16 slot Gen4 cable) |
| 4 | 2 x Power Supply Units |
| 5 | System Fan (FAN1) |
| 6 | System Fan (FAN2) |
| 7 | System Fan (FAN3) |
| 8 | System Fan (FAN4) |
| 9 | Control Panel Buttons and LED Indicators |
| 10 | 2 x USB Port |

2.3 System Front Panel



| No. | Description |
|-----|--|
| 1 | Front Vent |
| 2 | Control Panel (depends on the specification of the server board) |
| 3 | 2 x USB Ports |

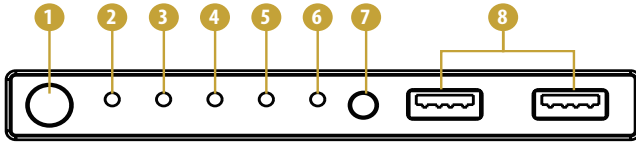
2.4 System Rear Panel



| No. | Description |
|-----|---|
| 1 | 2 x Power Supply Units (PSU) |
| 2 | I/O Shield (depends on the specification of the server board) |
| 3 | Rear Vent |
| 4 | Riser cable (PCIe x4 GF to PCIe x16 slot Gen4 cable) |
| 5 | Riser card (RB2UX16L_G5_RDV) |

2.5 Front Control Panel Buttons and LEDs

Front Control Panel



| No. | Description |
|-----|-----------------------|
| 1 | Power Button |
| 2 | Power Status LED |
| 3 | Hard Drive Status LED |
| 4 | LAN1 Activity LED |
| 5 | LAN2 Activity LED |
| 6 | System Status LED |
| 7 | System Reset Button |
| 8 | 2 x USB Port |

**Please be noted that the functions are supported depending on the type of the server board.*

Power Button

Press the power button to power on or power off the system.

To remove all power from the system completely, disconnect the power cord from the server.

UID Button

Press the ID button to toggle the front panel UID LED and the baseboard UID LED on and off. You are able to locate the server you're working on from behind a rack of servers.

System Reset Button

When the system is completely unresponsive, press the system reset button to reboot the server without shutting it off and initialize the system.

Status LED Definitions

| Power LED | |
|------------|-------------|
| Status | Description |
| Solid Blue | Power on |
| Off | Power off |

| UID LED | |
|------------|------------------------------------|
| Status | Description |
| Solid Blue | System identification is active. |
| Off | System identification is disabled. |

| LAN LED | |
|---------------|---------------------------------|
| Status | Description |
| Blinking Blue | Link between system and network |
| Off | No Link |

| System Event LED | |
|------------------|--|
| Status | Description |
| Off | Running or normal operation |
| Solid Red | At least one sensor has critical alert |

Chapter 3 Hardware Installation and Maintenance

This chapter helps you assemble the chassis and install components.

Before You Begin

Before you work with the server, pay close attention to the “Important Safety Instructions” at the beginning of this manual.

1. Make sure the server is powered off.

Power down the server if it is still running.

- (1) Press the Power button to power off the server from full-power mode to standby-power (sleep) mode. The Power LED at the front turns from solid green to blinking green.
- (2) Disconnect the power cord first from the AC outlet and then from the server. The power LED turns off.



The server is not completely powered down when you press the Power button on the front panel. The Power button lets the server toggle between Power On and Standby (Sleep) modes. Some internal circuitry remain active in the Standby mode. To remove all power from the system completely, be sure to disconnect the power cord from the server.

2. Ensure you have a clean and stable working environment. Avoid dust and dirt because contaminants may cause malfunctions.
3. Ground yourself properly before touching any system component. A discharge of static electricity may damage components. Wear a grounded wrist strap if available.

Installing Procedures

The followings are prerequisite to be installed.

- Power Supply Units (Pre-installed)
- System Fans (Pre-installed)
- Server Board (Pre-installed)
- Power Distribution Board (Pre-installed)
- Front Panel Board (Pre-installed)



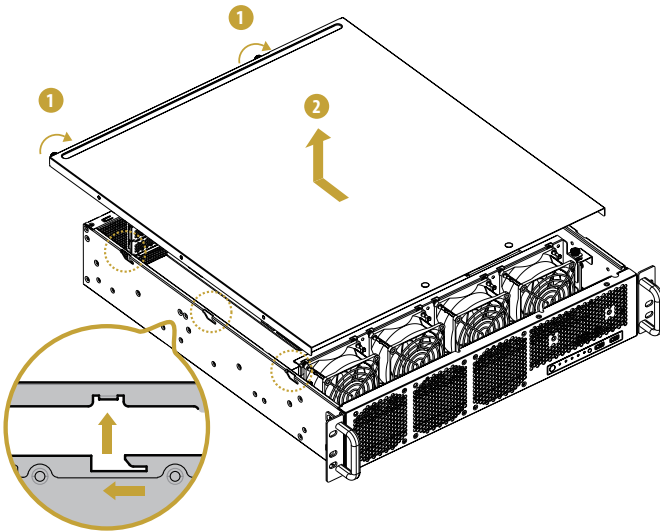
1. Some components are already pre-installed. Simply properly connect the required cables before or after installation. See the Quick Installation Guide for more details.
2. Refer to the user manual of the server board you use for instructions on how to install server board components.

3.1 Server Top Cover

Removing the Server Top Cover

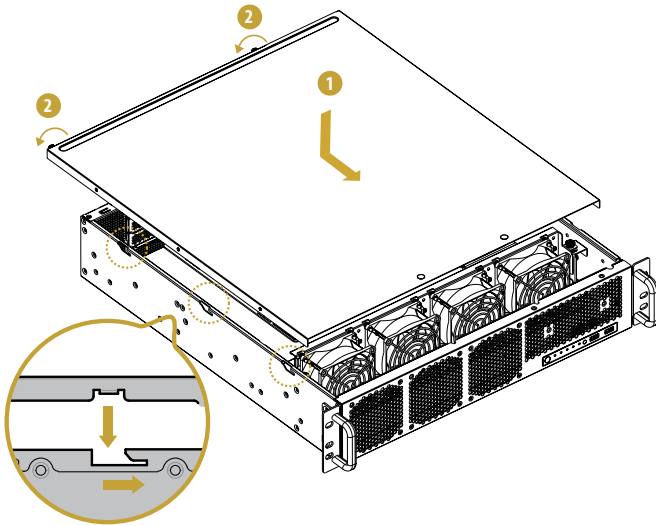


1. Before removing the top cover, power off the server and unplug the power cord.
2. The system must be operated with the chassis top cover installed to ensure proper cooling.



1. Hand-release the thumbscrew on the rear side of the chassis.
2. Push the top cover toward the rear side of the chassis to remove the cover from the locked position. Lift up and remove the top cover.

Installing the Server Top Cover



1. Lower the top cover on the chassis, making sure the side latches align with the cutouts. Slide the top cover toward the front side
2. Hand-tighten the thumbscrew on the rear side of the chassis.

3.2 Power Supply

The system can accommodate four AC or two DC power supplies in the bay at the rear of the chassis. One power supply is required for full load operation, with the other power supply purely as a redundant, load-sharing backup. It can be removed without affecting system operation.

Replacing the Power Supply

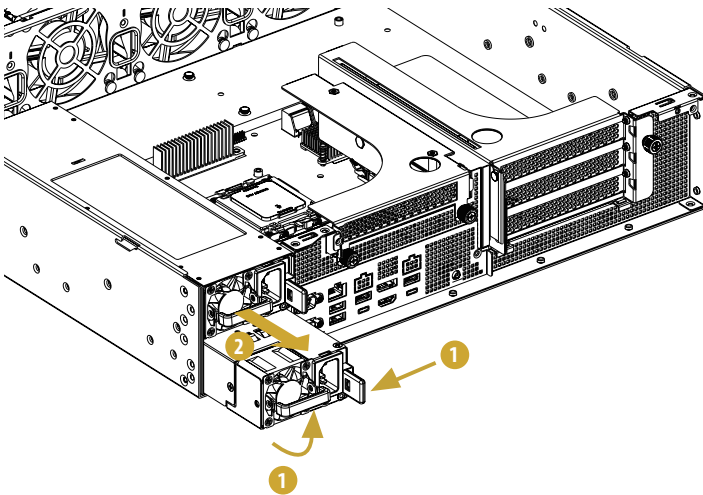


Before replacing the power supply, power off the server, unplug the power cord, and disconnect all wiring from the power supply.

Removing the Power Supply Unit

To remove a failed power supply, identify the failed power supply by checking the power supply LED on the PSU.

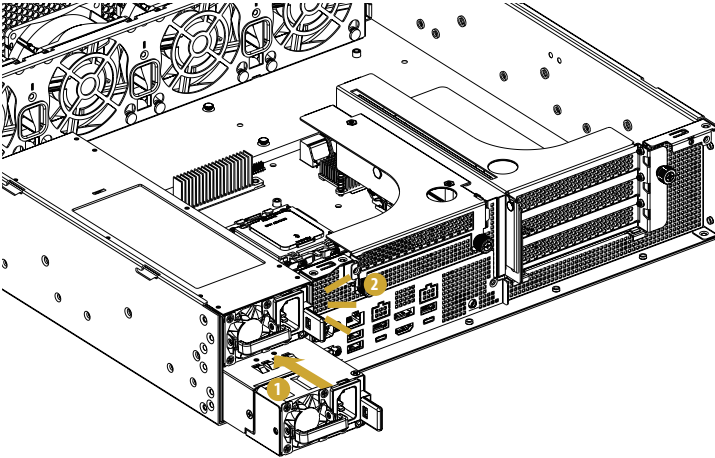
1. Hold onto the power supply handle while pressing the locking lever towards the power supply handle.
2. Pull to remove the power supply from the chassis.



Installing the Power Supply Unit

To install a new power supply, please follow the steps below.

1. Carefully slide the PSU all the way into the power supply bay.
2. Make sure the power supply clicks into place and is well installed.

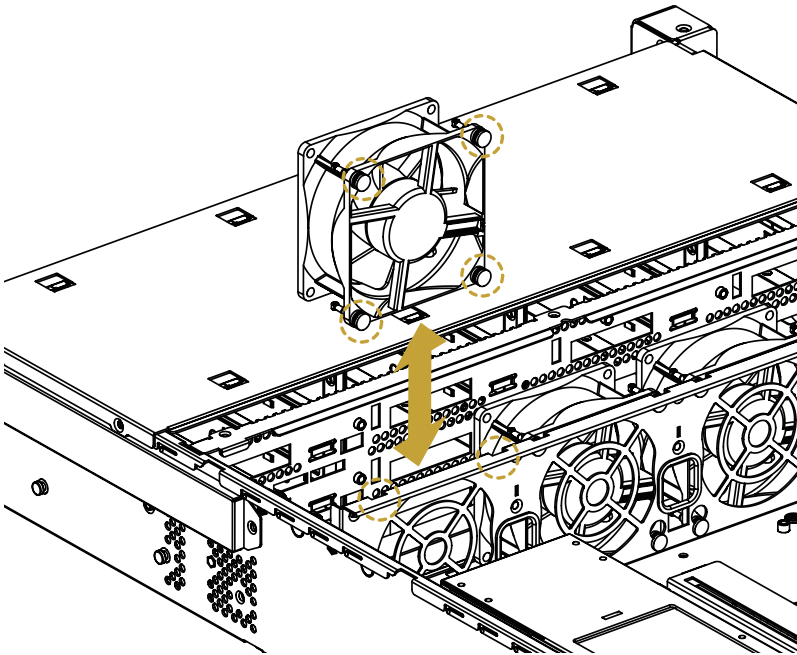


3.3 System Fan

The system supports hot-swappable system fans.

Replacing the System Fan

1. Lift to remove the failed fan.
2. Align the mounting holes on the replacement fan corners with the fan mounts on the fan bracket.
3. Gently place the fan onto the mounts.
4. Make sure the fan is well seated.



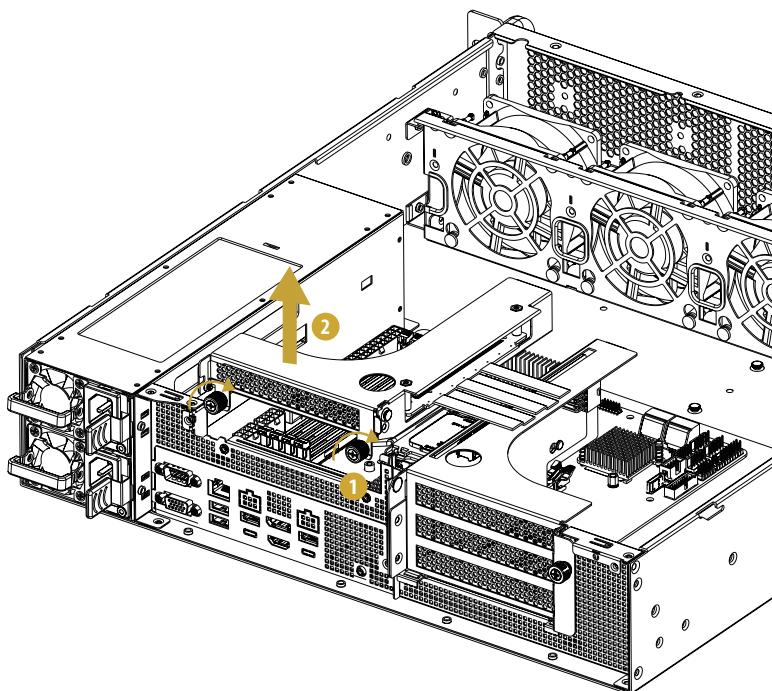
3.4 Riser cable (PCIe x4 GF to PCIe x16 slot Gen4 cable)



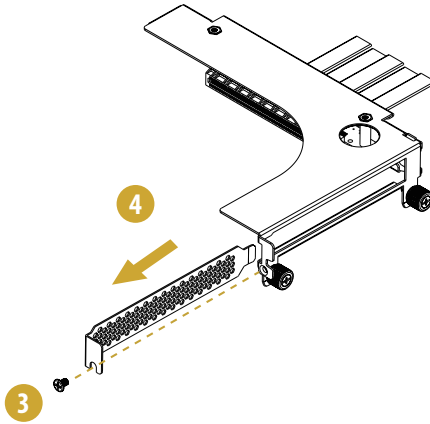
1. You can install an add-in card to the chassis only when you have a riser cable installed on the server board.
2. Before installing the add-in card, power off the server and unplug the power cord.

Removing the Riser Cable Bracket from the Chassis

1. Hand-release the thumbscrew on the rear side of the chassis.
2. Lift up and remove the riser cable bracket from the chassis.

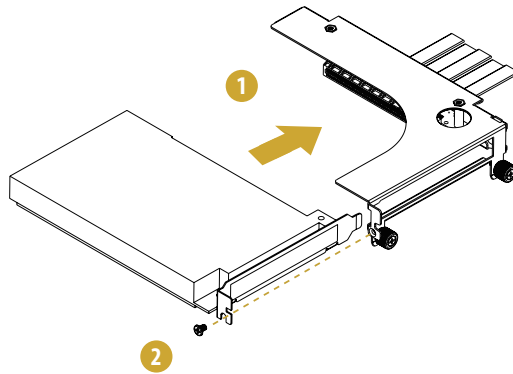


3. Remove the screw securing the blanking plate on the riser cable bracket.
4. Slide the blanking plate out sideways.

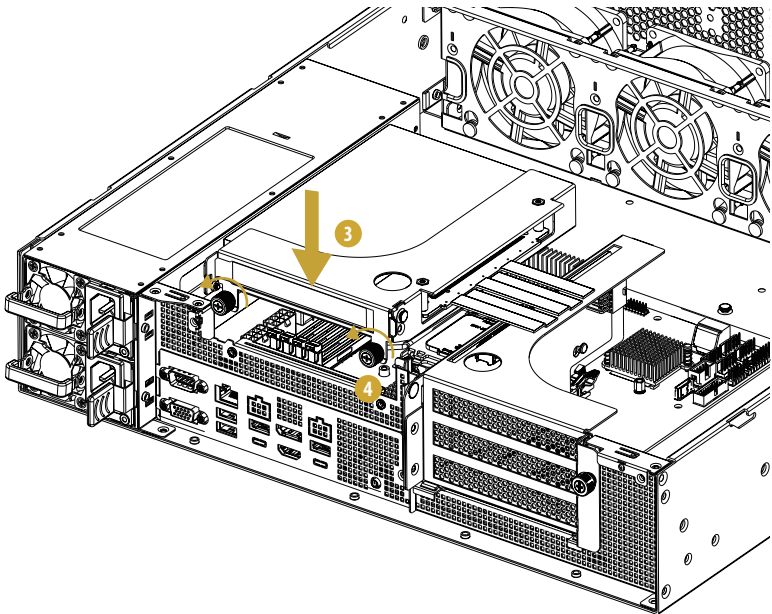


Installing the Add-in Card

1. Install the add-in card to the riser cable bracket.
2. Secure the add-in card to the bracket with a screw.



3. Align the riser cable assembly with the openings of the chassis. Place it into the chassis.
4. Hand-tighten the screw to secure the assembly to the chassis.



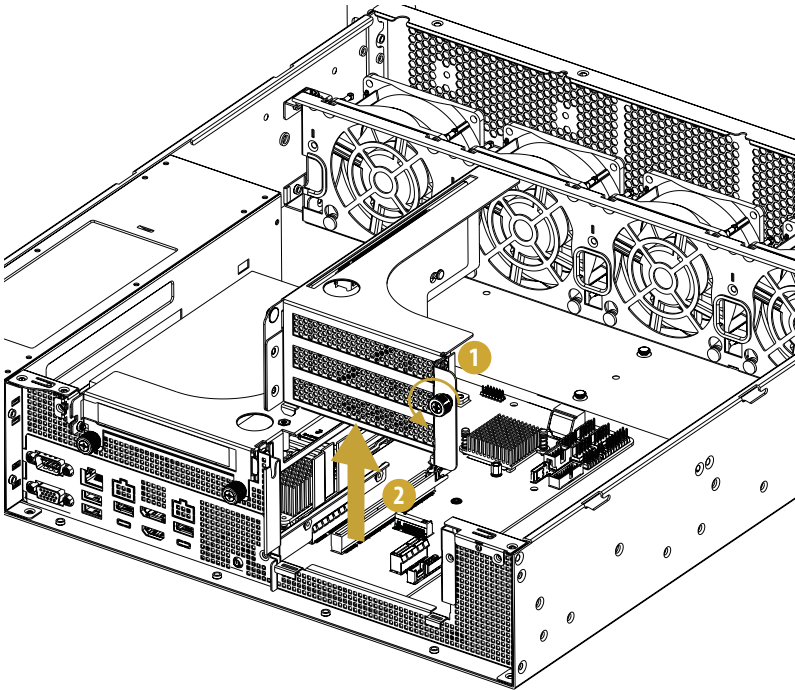
3.5 Riser Card (RB2UX16L_G5_RDV)



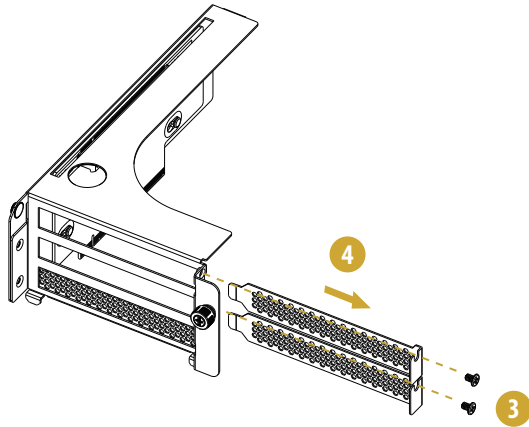
1. You can install an add-in card to the chassis only when you have a riser card installed on the server board.
2. Before installing the add-in card, power off the server and unplug the power cord.

Removing the Riser-Card Bracket from the Chassis

1. Release the thumbscrew that secures the riser-card bracket on the chassis.
2. Lift up and remove the riser-card bracket from the chassis.

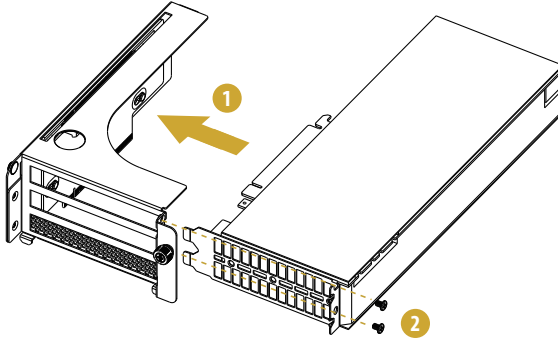


1. Remove the screws securing the blanking plates on the riser-card bracket.
2. Slide the blanking plates out sideways.

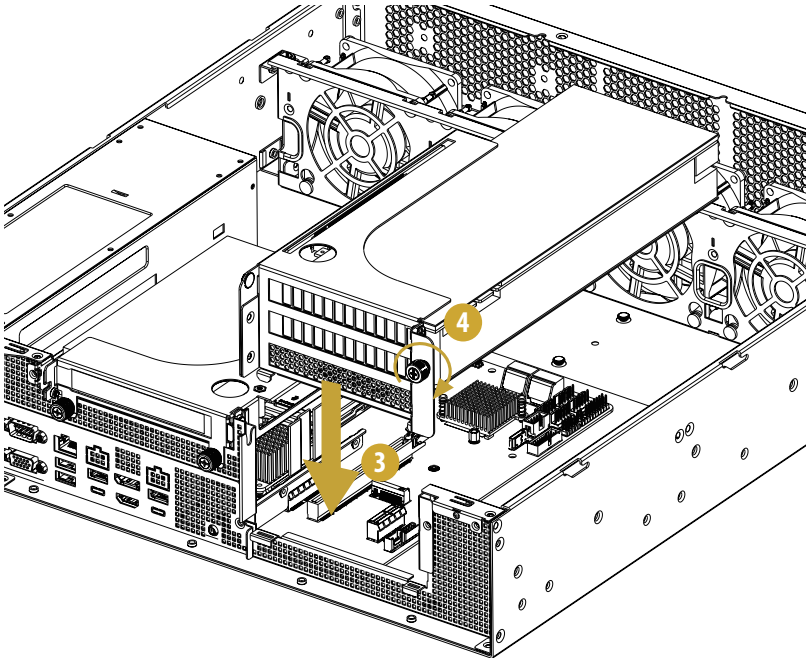


Installing the Add-in Card

1. Install the add-in card to the riser-card bracket.
2. Secure the add-in card to the bracket with screws.



3. Align the riser-card assembly with the openings of the chassis. Place it into the chassis.
4. Hand-tighten the screw to secure the assembly to the chassis.

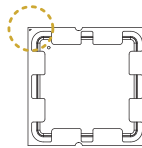
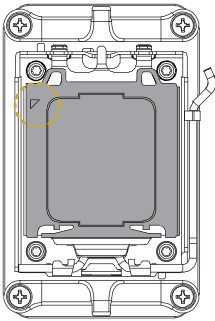


Appendix A

Installing the CPU

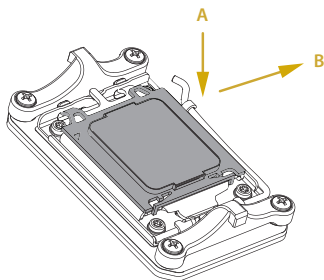


1. Before you insert the 1718-Pin CPU into the socket, please check if the **PnP cap** is on the socket, if the CPU surface is unclean, or if there are any **bent pins** in the socket. Do not force to insert the CPU into the socket if above situation is found. Otherwise, the CPU will be seriously damaged.
2. Unplug all power cables before installing the CPU.

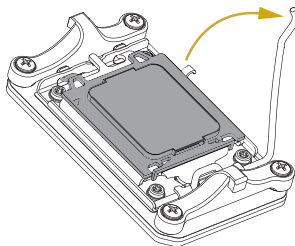


Turn your CPU to the correct orientation before opening the CPU socket cover.

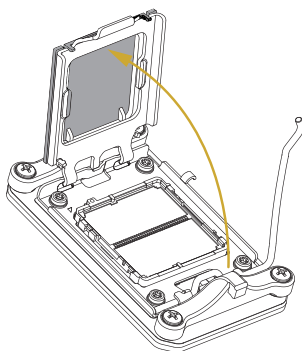
1



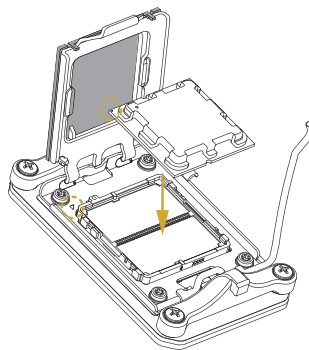
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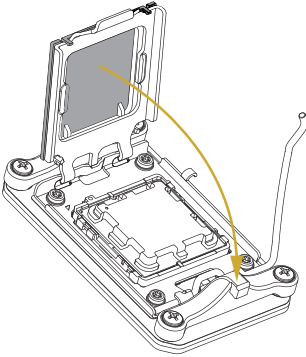


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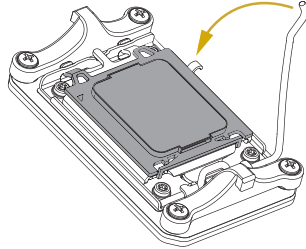


Carefully place the CPU in as flat as possible. Do not drop it.

5



6

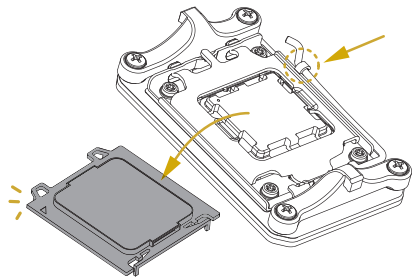


Make sure the CPU is aligned with the socket before locking it into place.

7



Make sure the black cover plate is always in place until it pops off when closing the socket lever.



Please save the cover if the processor is removed. The cover must be placed if you wish to return the motherboard for after service.

Appendix B

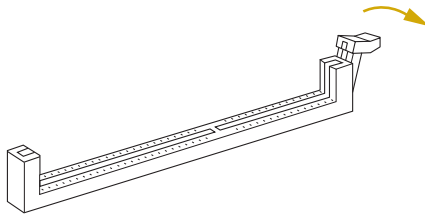
Installation of Memory Modules (DIMM)



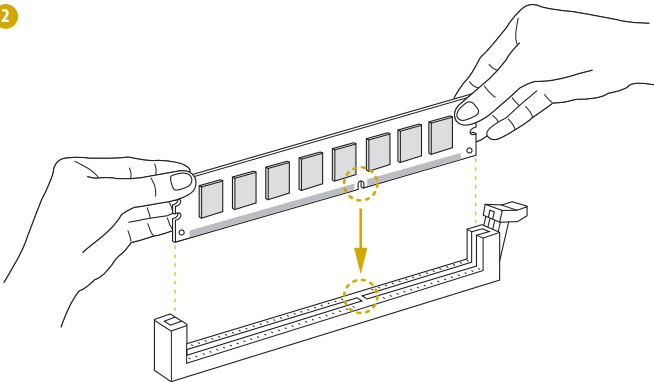
The DIMM only fits in one correct orientation. It will cause permanent damage to the motherboard and the DIMM if you force the DIMM into the slot at incorrect orientation. For more information about DIMM installation, please refer to the User Manual that comes with the serverboard you use.

Type A (Single Clip)

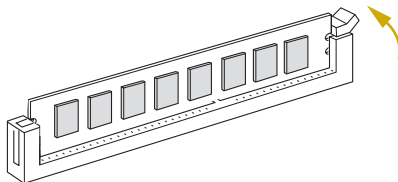
1



2

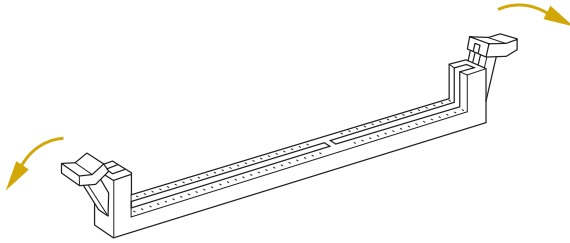


3

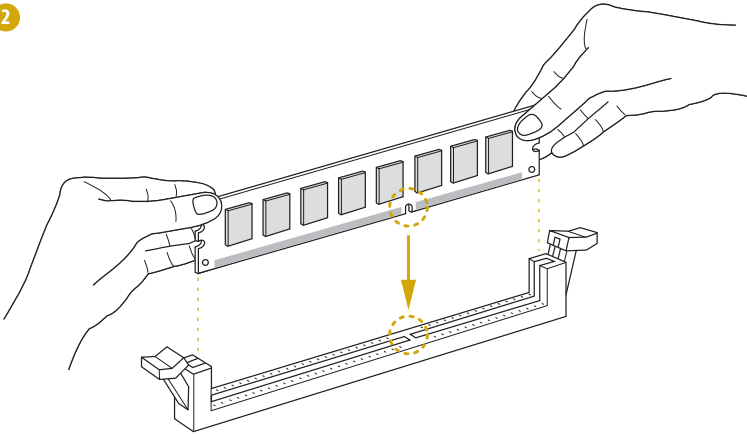


Type B (Two Clips)

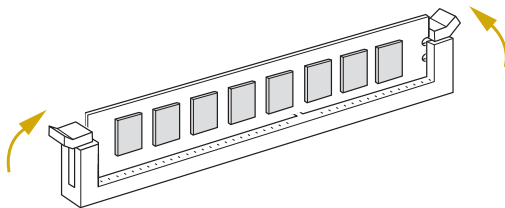
1



2

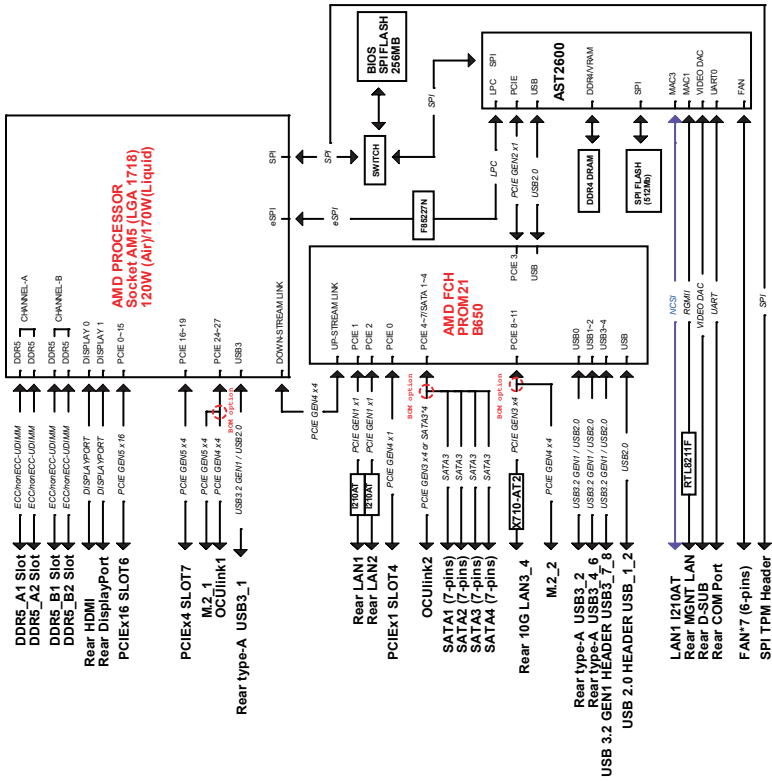


3



Appendix C

Block Diagram (B650D4U)



Contact Information

Contact ASRock Rack or want to know more about ASRock Rack, you're welcome to visit ASRock Rack's website at <http://www.asrockrack.com>; or contact the dealer for further information. For technical questions, please submit a support request form at <https://event.asrockrack.com/tsd.asp>

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