

# Hitachi Advanced Server DS220 G2

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## Hardware Guide

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# 1.1 Introduction

This document provides an overview of the hardware features of the chassis, troubleshooting information, and instructions on how to add and replace components of the server.

For the latest version of this manual, see [support.HitachiVantara.com](https://support.HitachiVantara.com).

## System Features

The system comprises a 2U/30.7" long chassis. Major features include:

- **Processors (x2):** Intel® Xeon® processor scalable family
- **Expansion:**



### CAUTION!

SOME ADD-ON CARDS MIGHT BE HOT AFTER SYSTEM POWER IS OFF. CONTACT SHOULD BE MADE WITH CARE.

<Option 1>

- FHHL PCIe Gen4 x16 slots + 4x FHHL PCIe Gen4 x8 slots
- Optional 2x HHHL PCIe Gen4 x16 slots

<Option 2>

- 2x FHFL PCIe Gen4 x16 slots (Support dual width GPUs)
- 2x FHHL PCIe Gen4 x16 slots
- Optional 2x HHHL PCIe Gen4 x16 slots

<Option 3>

- 4x FHFL PCIe Gen4 x16 slots (support single width GPUs)
- Optional 2x HHHL PCIe Gen4 x16 slots
- **Memory:** Up to 32 DIMM slots are available; ECC DDR4 3200 MHz LRDIMM/RDIMM memory
  - Up to 8TB (256Gx32) of memory for LRDIMM/RDIMM
- **Network\*:** Dedicated GbE management NIC port from PHY RTL8211E to BMC

\*Visit [support.HitachiVantara.com](https://support.HitachiVantara.com) for the latest Network support listings.

### Note:

The system supports:

(2) 1200W/1600W/2200W 86mm Titanium/Platinum redundant PSU,  
100-240VAC 50/60Hz, AC/ HVDC

## Specifications

Table 1: System Specifications


SPECIFICATIONS	DESCRIPTION
Form factor	2U rack mount
Chassis dimensions (W x H x D)	447mm x 87.5 mm x 780 mm 17.6" x 3.4" x 30.7"
Processor	<b>Processor type:</b> Intel® Xeon® processor scalable family <b>Max. TDP support:</b> 270W <b>Number of processors: 2</b>
Memory	<b>Total slots: 32</b> <b>Memory type:</b> DDR4 3200 MHz LRDIMM/RDIMM <b>Memory size:</b> 8GB, 16GB, 32 GB* *More options refer to the AVL
Onboard storage	(2) M.2 2230
Networking	Dedicated GbE management NIC port from PHY RTL8211E to BMC
Expansion slots	<p>EXPANSION: OPTION1</p> 2x FHHL PCIe Gen4 x16 slots + 4x FHHL PCIe Gen4 x8 slots Optional 2x HHHL PCIe Gen4 x16 slots <p>EXPANSION: OPTION2</p> 2x FHFL PCIe Gen4 x16 slots (Support dual width GPUs) 2x FHHL PCIe Gen4 x16 slots Optional 2x HHHL PCIe Gen4 x16 slots <p>EXPANSION: OPTION3</p> 4x FHFL PCIe Gen4 x16 slots (support single width GPUs) Optional 2x HHHL PCIe Gen4 x16 slots <div>  <p><b>CAUTION!</b> SOME ADD-ONS CARDS MIGHT BE HOT AFTER SYSTEM POWER IS OFF. CONTACT SHOULD BE MADE WITH CARE.</p> </div>
Video	Integrated Nuvoton NPCM750R 16MB DDR4 video memory
Network options	Dedicated management NIC port from PHY RTL8211E to BMC
Front I/O	<ul style="list-style-type: none"> <li>• Power/ID/Reset Buttons</li> <li>• Power/ID/Status/HDD LEDs</li> <li>• (2) USB 3.0 ports</li> <li>• (1) VGA port (Display Priority: First; one device one time)</li> </ul>
Rear I/O	<ul style="list-style-type: none"> <li>• (2) USB 3.0 ports</li> <li>• (1) VGA port (Display Priority: Second; one device one time)</li> <li>• (1) Micro-USB as RS232 serial port</li> <li>• (1) GbE RJ45 management port</li> <li>• (1) ID LED</li> <li>• (1) MicroSD slot</li> </ul>
TPM	Yes (optional, SPI mode)
ACPI	ACPI compliance, S0, S5 support

Table 1: System Specifications (Continued)

SPECIFICATIONS	DESCRIPTION
Power supply	(2) 1200W/1600W/2200W 86mm Titanium/Platinum redundant PSU, 100-240VAC 50/60Hz, AC/ HVDC support
System rating	1200W: 100-120/200-240Vac, 50/60Hz, 10/7A or 240Vdc, 5A (Per PSU inlet) 1600W: 200-240Vac, 50/60Hz, 8A or 240Vdc, 7A (Per PSU inlet) 2200W: 200-240Vac, 50/60Hz, 10A or 240Vdc, 8A (Per PSU inlet)
Fan	(6) dual rotor fans (11+1 redundant)
System management	IPMI v2.0 Compliant, on board "KVM over IP" support
Operating environment	<ul style="list-style-type: none"> <li>Operating temperature: 5°C to 35°C (41°F to 95°F)</li> <li>Non-operating temperature: -40°C to 70°C (-40°F to 158°F)</li> <li>Operating relative humidity: 50% to 85%RH</li> <li>Non-operating relative humidity: 20% to 95%RH</li> </ul>

## SKU information

### LFF Tiered SKU (General)

**Dimensions (WxHxD):** 440mm x 43.2mm x 780mm

**CPU:** (2) Intel® Ice Lake-SP processors (up to 270W TDP)

**PCH:** LBG-R

**DIMM slot:** (32) DDR4 RDIMM/LRDIMM

With up to (16) Intel® Optane™ PMem (BPS) supported

**Storage: Front** (4) 3.5"/2.5" SAS/SATA Drives

+ (4) 3.5"/2.5" SAS/SATA/NVMe [CPU0] Drives

+ (4) 3.5"/2.5" SAS/SATA/NVMe [CPU1] Drives

Optional HW RAID with Intel® VROC key

Optional **Rear** (2) 2.5" SAS/SATA/NVMe [CPU1] Drives

**Onboard** (2) 2230 M.2 for OS boot

**Expansion:**

(1) PCIe 4.0 x8 for internal SAS Mezzanine [CPU0]

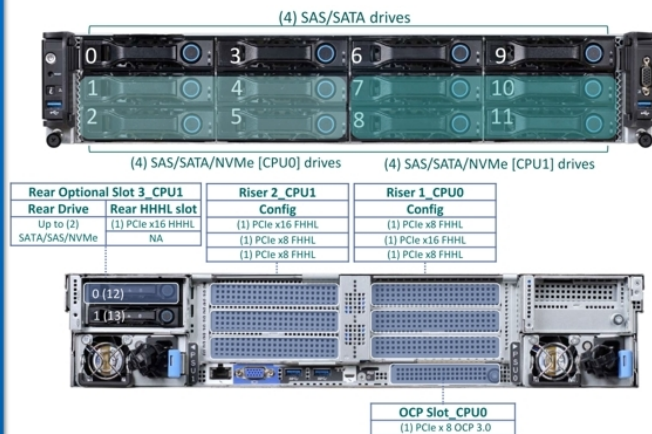
(1) PCIe 4.0 x8 for OCP 3.0 SFF Mezzanine [CPU0]

(1) PCIe 4.0 x16 FHHL + (2) PCIe 4.0 x8 FHHL [CPU0]

(1) PCIe 4.0 x16 FHHL + (2) PCIe 4.0 x8 FHHL [CPU1]

Optional (1) PCIe 4.0 x16 HHHL [CPU0, Above PSU0]<sup>1</sup>

Optional (1) PCIe 4.0 x16 HHHL [CPU1, Above PSU1]



<sup>1</sup>. Supported when Front Storage option with 6pcs NVMe SSDs or less.

LFF Tiered SKU (DWGPU)

**Dimensions (WxHxD):** 440mm x 43.2mm x 780mm

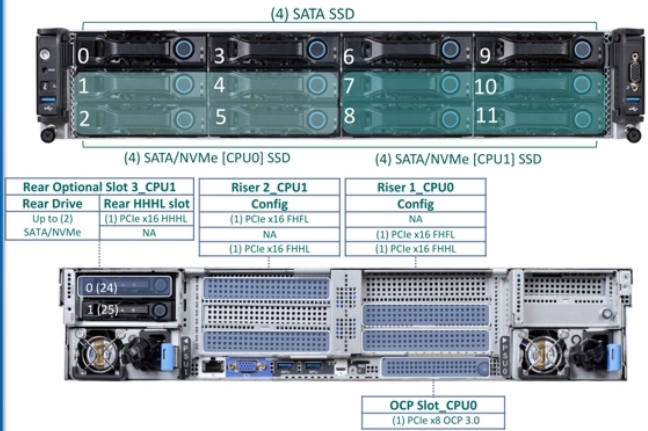
**CPU:** (2) Intel® Ice Lake-SP processors (up to 270W TDP)

**PCH:** LBG-R

**DIMM slot:** (32) DDR4 RDIMM/LRDIMM

**Storage: Front** (4) 2.5" SATA SSD  
+ (4) 2.5" SATA/NVMe [CPU0] SSD  
+ (4) 2.5" SATA/NVMe [CPU1] SSD  
Optional HW RAID with Intel® VROC key  
Optional **Rear** (2) 2.5" SATA/NVMe [CPU1] SSD  
**Onboard** (2) 2230 M.2 for OS boot

**Expansion:**  
(1) PCIe 4.0 x8 for internal SAS Mezzanine [CPU0]  
(1) PCIe 4.0 x8 for OCP 3.0 SFF Mezzanine [CPU0]  
(2) PCIe 4.0 x16 FHFL  
(2) PCIe 4.0 x16 FHHL  
Optional (1) PCIe 4.0 x16 HHHL [CPU0, Above PSU0] <sup>1</sup>  
Optional (1) PCIe 4.0 x16 HHHL [CPU1, Above PSU1]



1. Supported when Front Storage option with 6pcs NVMe SSDs or less.

LFF Tiered (SWGPU)

**Dimensions (WxHxD):** 440mm x 43.2mm x 780mm

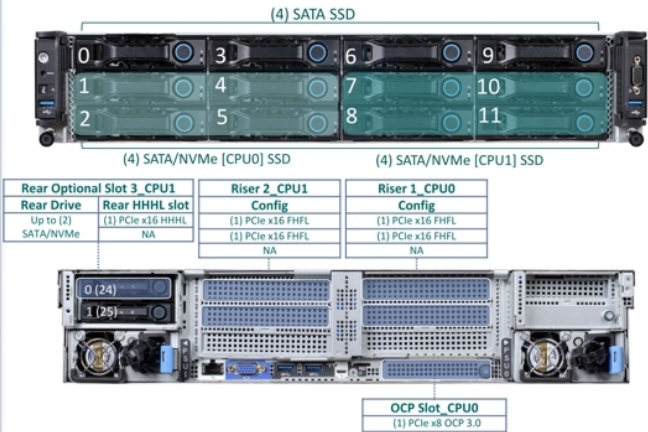
**CPU:** (2) Intel® Ice Lake-SP processors (up to 270W TDP)

**PCH:** LBG-R

**DIMM slot:** (32) DDR4 RDIMM/LRDIMM

**Storage: Front** (4) 2.5" SATA SSD  
+ (4) 2.5" SATA/NVMe [CPU0] SSD  
+ (4) 2.5" SATA/NVMe [CPU1] SSD  
Optional HW RAID with Intel® VROC key  
Optional **Rear** (2) 2.5" SATA/NVMe [CPU1] SSD  
**Onboard** (2) 2230 M.2 for OS boot

**Expansion:**  
(1) PCIe 4.0 x8 for internal SAS Mezzanine [CPU0]  
(1) PCIe 4.0 x8 for OCP 3.0 SFF Mezzanine [CPU0]  
(2) PCIe 4.0 x16 FHFL [CPU0]  
(2) PCIe 4.0 x16 FHFL [CPU1]  
Optional (1) PCIe 4.0 x16 HHHL [CPU0, Above PSU0] <sup>1</sup>  
Optional (1) PCIe 4.0 x16 HHHL [CPU1, Above PSU1]



1. Supported when Front Storage option with 6pcs NVMe SSDs or less.



SFF Expander Tiered SKU (General)

**Dimensions (WxHxD):** 440mm x 43.2mm x 780mm

**CPU:** (2) Intel® Ice Lake-SP processors (up to 270W TDP)

**PCH:** LBG-R

**DIMM slot:** (32) DDR4 RDIMM/LRDIMM

With up to (16) Intel® Optane™ PMem (BPS) supported

**Storage: Front** (16) 2.5" SAS/SATA Drives

+ (4) 2.5" SAS/SATA/NVMe [CPU0] Drives

+ (4) 2.5" SAS/SATA/NVMe [CPU1] Drives

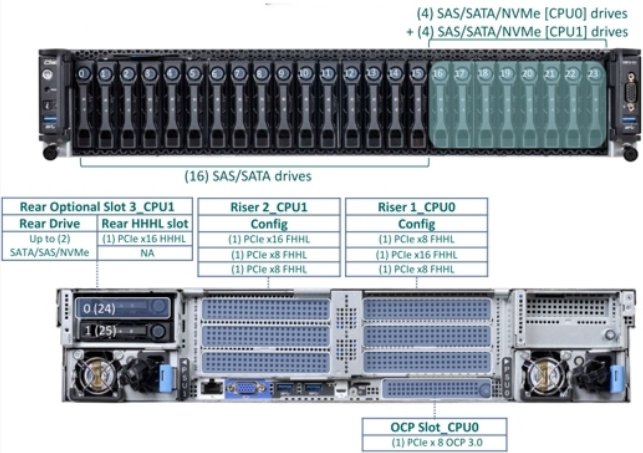
Optional HW RAID with Intel® VROC key

Optional **Rear** (2) 2.5" SAS/SATA/NVMe [CPU1] Drives

**Onboard** (2) 2230 M.2 for OS boot

**Expansion:**

- (1) PCIe 4.0 x8 for internal SAS Mezzanine [CPU0]
- (1) PCIe 4.0 x8 for OCP 3.0 SFF Mezzanine [CPU0]
- (1) PCIe 4.0 x16 FHHL + (2) PCIe 4.0 x8 FHHL [CPU0]
- (1) PCIe 4.0 x16 FHHL + (2) PCIe 4.0 x8 FHHL [CPU1]
- Optional (1) PCIe 4.0 x16 HHHL [CPU0, Above PSU0]<sup>1</sup>
- Optional (1) PCIe 4.0 x16 HHHL [CPU1, Above PSU1]



1. Supported when Front Storage option with 6pcs NVMe SSDs or less.

SFF Expander Tiered SKU (DWGPU)

**Dimensions (WxHxD):** 440mm x 43.2mm x 780mm

**CPU:** (2) Intel® Ice Lake-SP processors (up to 270W TDP)

**PCH:** LBG-R

**DIMM slot:** (32) DDR4 RDIMM/LRDIMM

**Storage: Front** (16) 2.5" SATA SSD

+ (4) 2.5" SATA/NVMe [CPU0] SSD

+ (4) 2.5" SATA/NVMe [CPU1] SSD

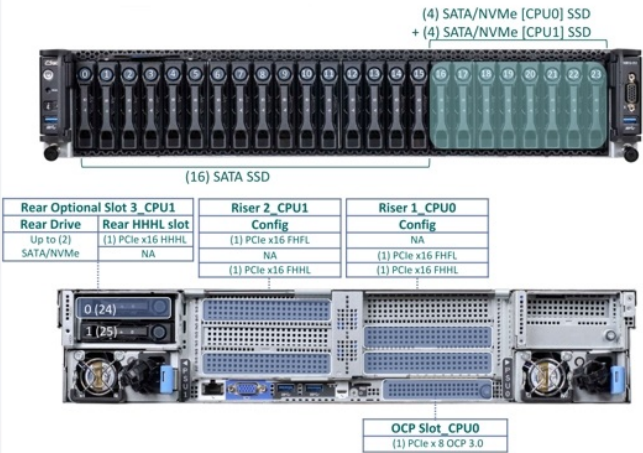
Optional HW RAID with Intel® VROC key

Optional **Rear** (2) 2.5" SATA/NVMe [CPU1] SSD

**Onboard** (2) 2230 M.2 for OS boot

**Expansion:**

- (1) PCIe 4.0 x8 for internal SAS Mezzanine [CPU0]
- (1) PCIe 4.0 x8 for OCP 3.0 SFF Mezzanine [CPU0]
- (2) PCIe 4.0 x16 FHFL
- (2) PCIe 4.0 x16 FHHL
- Optional (1) PCIe 4.0 x16 HHHL [CPU0, Above PSU0]<sup>1</sup>
- Optional (1) PCIe 4.0 x16 HHHL [CPU1, Above PSU1]



1. Supported when Front Storage option with 6pcs NVMe SSDs or less.



SFF Expander Tiered SKU (SWGPU)

**Dimensions (WxHxD):** 440mm x 43.2mm x 780mm

**CPU:** (2) Intel® Ice Lake-SP processors (up to 270W TDP)

**PCH:** LBG-R

**DIMM slot:** (32) DDR4 RDIMM/LRDIMM

**Storage: Front** (16) 2.5" SATA SSD

+ (4) 2.5" SATA/NVMe [CPU0] SSD

+ (4) 2.5" SATA/NVMe [CPU1] SSD

Optional HW RAID with Intel® VROC key

Optional **Rear** (2) 2.5" SATA/NVMe [CPU1] SSD

**Onboard** (2) 2230 M.2 for OS boot

**Expansion:**

(1) PCIe 4.0 x8 for internal SAS Mezzanine [CPU0]

(1) PCIe 4.0 x8 for OCP 3.0 SFF Mezzanine [CPU0]

(2) PCIe 4.0 x16 FHFL [CPU0]

(2) PCIe 4.0 x16 FHFL [CPU1]

Optional (1) PCIe 4.0 x16 HHHL [CPU0, Above PSU0]<sup>1</sup>

Optional (1) PCIe 4.0 x16 HHHL [CPU1, Above PSU1]

(4) SATA/NVMe [CPU0] SSD  
+ (4) SATA/NVMe [CPU1] SSD

(16) SATA SSD

<b>Rear Optional Slot 3_CPU1</b>	<b>Riser 2_CPU1</b>	<b>Riser 1_CPU0</b>
<b>Rear Drive</b>	<b>Config</b>	<b>Config</b>
Up to (2)	(1) PCIe x16 FHFL	(1) PCIe x16 FHFL
SATA/NVMe	(1) PCIe x16 FHFL	(1) PCIe x16 FHFL
	NA	NA

OCP Slot\_CPU0

(1) PCIe x 8 OCP 3.0

1. Supported when Front Storage option with 6pcs NVMe SSDs or less.

SFF All Flash SKU (General)

**Dimensions (WxHxD):** 440mm x 43.2mm x 780mm

**CPU:** (2) Intel® Ice Lake-SP processors (up to 270W TDP)

**PCH:** LBG-R

**DIMM slot:** (32) DDR4 RDIMM/LRDIMM

With up to (16) Intel® Optane™ PMem (BPS) supported

**Storage: Front** (24) 2.5" NVMe SSD

Optional **Rear** (2) 2.5" NVMe [CPU1] SSD

**Onboard** (2) 2230 M.2 for OS boot

**Expansion:**

(1) PCIe 4.0 x8 for OCP 3.0 SFF Mezzanine [CPU0]

(1) PCIe 4.0 x16 FHHL + (2) PCIe 4.0 x8 FHHL [CPU0]

(1) PCIe 4.0 x16 FHHL + (2) PCIe 4.0 x8 FHHL [CPU1]

Optional (1) PCIe 4.0 x8 HHHL [CPU0, Above PSU0]

Optional (1) PCIe 4.0 x16 HHHL [CPU1, Above PSU1]

(24) NVMe SSD

<b>Rear Optional Slot 3_CPU1</b>	<b>Riser 2_CPU1</b>	<b>Riser 1_CPU0</b>	<b>Riser 0_CPU0</b>
<b>Rear Drive</b>	<b>Config</b>	<b>Config</b>	<b>Config</b>
Up to (2)	(1) PCIe x16 FHHL	(1) PCIe x8 FHHL	(1) PCIe x8 HHHL
NVMe	(1) PCIe x8 FHHL	(1) PCIe x16 FHHL	NA
	(1) PCIe x8 FHHL	(1) PCIe x8 FHHL	

OCP Slot\_CPU0

(1) PCIe x 8 OCP 3.0

## 1.2 Package Contents

- (1) D53XQ-2U system
- (2) processor heat sinks
- (1) power supply unit
- (1) power cord (optional)

**Note:**

For exact shipping contents, contact your Hitachi sales representative.

# 1.3 A Tour of the System

## System Overview

The server is available as a 2.5" and 3.5" storage drive configuration.

## System Front View

The 2.5" and 3.5" storage drive systems are displayed in the following images:

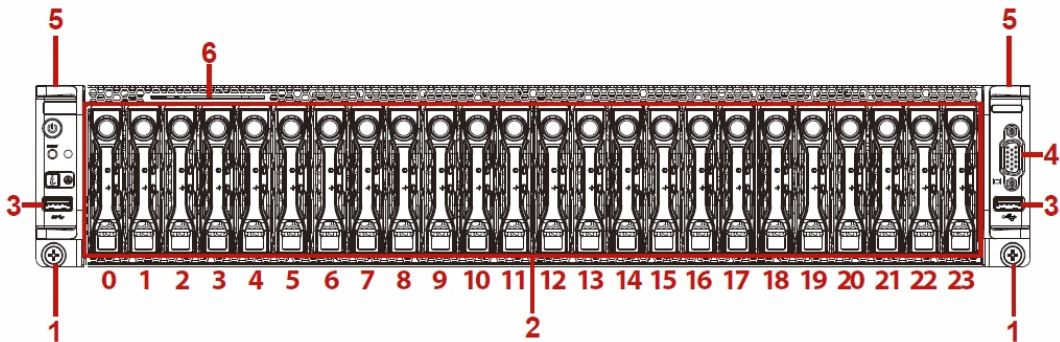



Figure 1-1. 2.5" Storage Drive System Component Overview

Table 2: Front View

No.	NAME	DESCRIPTION
1.	Thumb screw	Secure the system to rack frame.
2.	USB port	Connect to USB device.
3.	VGA port	Maximum display resolution: 1920x1200 32bpp@60Hz (reduced blanking) (Display Priority: First; one device one time)
4.	2.5" storage drive tray	Housing up to 24x 2.5" storage drive (15mm)
5.	Handle	Two server handles used for pulling the system out of the rack <div><b>CAUTION!</b> THE HANDLES ARE DESIGNED FOR THE EXTENSION OF THE SYSTEM FROM THE RACK. THE HANDLES ARE NOT DESIGNED TO CARRY THE WEIGHT OF THE SYSTEM. DO NOT USE THE HANDLES TO MOVE OR LIFT THE SYSTEM.</div>
6.	Asset tag	Record serial number or other important information

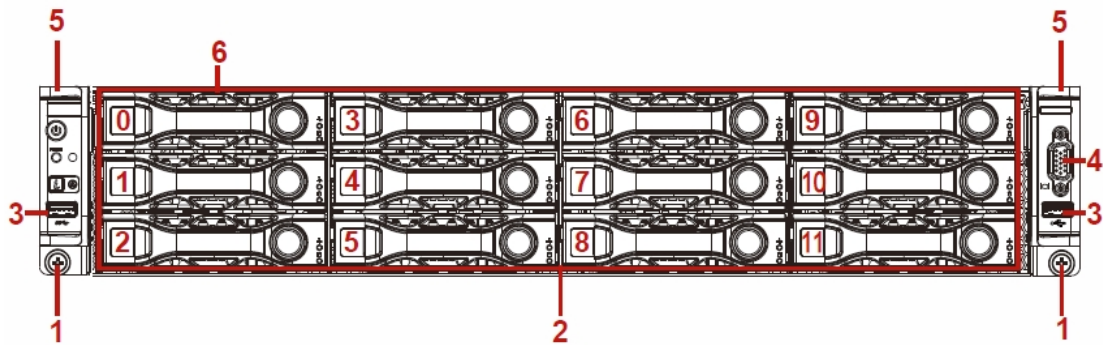



Figure 1-2. 3.5" Storage Drive System Component Overview

Table 3: Front View

No.	NAME	DESCRIPTION
1.	Thumb screw	Secure the system to rack frame.
2.	3.5" storage drive tray	Housing up to twelve 3.5" storage drive
3.	USB port	Connect to USB device.
4.	VGA port	Maximum display resolution: 1920x1200 32bpp@60Hz (reduced blanking) (Display Priority: First; one device one time)
5.	Handle	Two server handles used for pulling the system out of the rack <div><b>CAUTION!</b> THE HANDLES ARE DESIGNED FOR THE EXTENSION OF THE SYSTEM FROM THE RACK. THE HANDLES ARE NOT DESIGNED TO CARRY THE WEIGHT OF THE SYSTEM. DO NOT USE THE HANDLES TO MOVE OR LIFT THE SYSTEM.</div>
6.	Asset tag	Record serial number or other important information

## Front Control Panel (FCP)

For purposes of this procedure, the FCP is used for the numbering indicators.

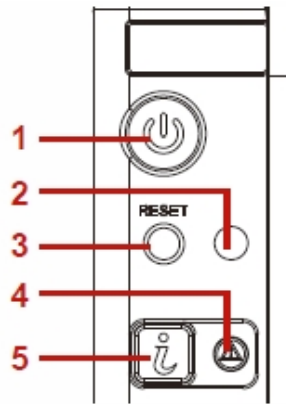






Figure 1-3. Front Control Panel

Table 4: Front Control Panel Definition

No.	ICON	NAME	DESCRIPTION
1.		Power button with LED	Power on / off Blue on – S0 system power on; off – S5 system power off
2.		PFR Status LED (Only for certain models)	Provides notification of PFR operation status Off: Power Off/PFR Module is not installed Green On: Authenticated Amber On: Failed Amber Blinking: Authentication/Recovery is executing in T-1
3.		Reset button	Soft reset system function
4.		System Status LED	Provides critical and non-critical failure notification Amber blinking – failed; Off – SEL cleared / good
5.		Identification button with LED	Toggles ID LED, activate ID LED to identify system Blue blinking – Identifier on front and rear chassis; off – Normal.

## System Rear View

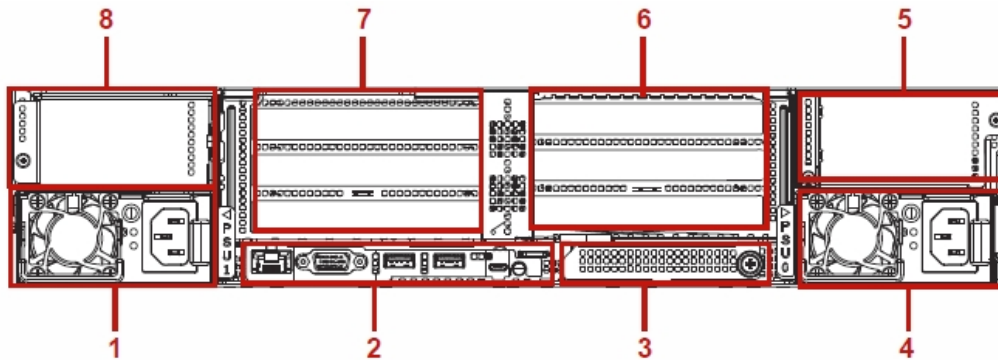


Figure 1-4. System Rear View

Table 5: System Rear View

No.	FEATURE	DESCRIPTION
1.	Power sub-system	Main power supply unit (PSU1). See <i>Power Sub-System</i> on page 1-12
2.	System I/O ports	See <i>System Rear I/O</i> on page 1-11
3.	Expansion slot	Support OCP 3.0 mezzanine card installation (CPU0)
4.	Power sub-system	Main power supply unit (PSU0). See <i>Power Sub-System</i> on page 1-12
5.	Expansion option	Single-Wide HHHL PCIe Expansion Slot
6.	Expansion slot	Support full height PCIe card installation
7.		
8.	Expansion option	<ul style="list-style-type: none"> <li>Rear 2.5" HDD: House up to two 2.5" storage drives</li> <li>Rear Single-Wide Expansion Slot: House HHHL PCIe card installation</li> </ul>

## System Rear I/O

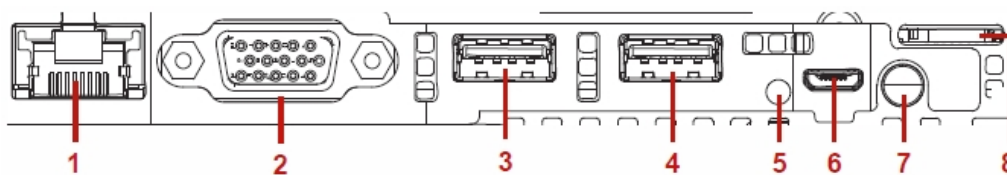







Figure 1-5. System Rear I/O

Table 6: System Rear I/O Definition

No.	ICON	NAME	DESCRIPTION
1.		Dedicated NIC	Dedicated RJ45 connector
2.		VGA connector	Maximum display resolution: 1920x1200 32bpp@60Hz (reduced blanking) (Display Priority: First; one device one time)



Table 6: System Rear I/O Definition (Continued)

No.	ICON	NAME	DESCRIPTION
3.		USB 3.0 port	USB 1 port; connect to USB device
4.			USB 0 port; connect to USB device
5.		PFR Status LED (Only for certain models)	Off: Power Off/PFR Module is not installed Green On: Authenticated Amber On: Failed Amber Blinking: Authentication/Recovery is executing in T-1
6.		Micro USB port	Transmit in serial signal for debug or terminal concentrator
7.		Identification LED	Blue blinking - Identifier; Off - Normal
8.		MicroSD slot	Backup BMC SEL

## Power Sub-System

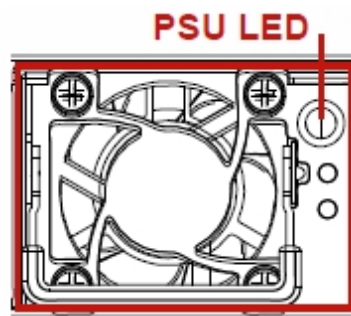


Figure 1-6. PSU to Mainboard Module Description

A single power supply unit (default) is supplied in the system. A secondary PSU is available for redundancy functionality.

Table 7: Power Supply Units by Model

PSU	AC INPUT
2 x 1200W/1600W/2200W Titanium/Platinum high efficiency redundant PSU	100-240VAC 50/60Hz, AC/HVDC support

Table 8: Power Supply Unit LED

PSU LED COLOR	DESCRIPTION
Amber On	PSU failure
Green On	PSU good
Green Blinking at 0.5Hz	PSU standby
Green Blinking at 2Hz	PSU cold redundancy standby

System Top View

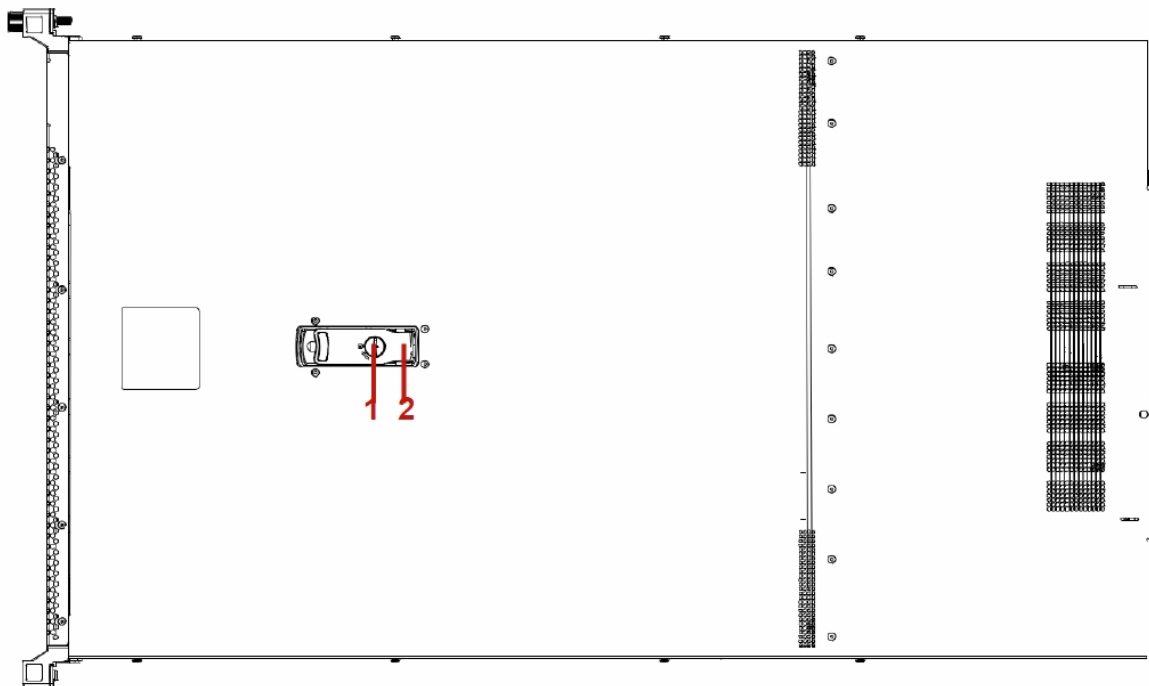
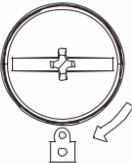
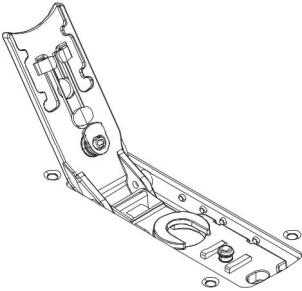


Figure 1-7. System Top View

Table 9: System Top View

No.	NAME	DESCRIPTION
1.	Latch	Rotate to the unlock position to unsecure the handle 
2.	Handle	Open toward to rear chassis to eject and lift up the top cover to remove 

# LED Status Descriptions

## Front Control Panel LEDs

For location of the FCP, see *System Front View* on page 1-8.

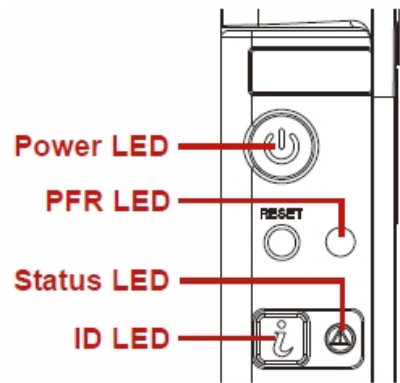


Figure 1-8. Front Control Panel LEDs

Table 10: Front Control Panel LEDs Behavior

NAME	COLOR	CODITION	LED DESCRIPTIONS
Power LED	Blue	On	System S0 power on
		Off	System S5 power off
PFR Status LED (Only for certain models)	Off		Power Off/PFR Module is not installed
	Green	On	Authenticated
	Amber	On	Failed
		Blinking	Authentication /Recovery is executing in T-1
Identification	Blue	Blinking	Unit selected for identification
		Off	No identification request
Status LED	Amber	Blinking	Critical Failure: critical fan, voltage, temperature state
			Non-Critical Failure: non-critical fan, voltage, temperature state, CPU thermal trip, DC off
		Off	SEL cleared
			Last pending warning or error has been de-asserted.

## BMC Management Port LEDs

The system mainboard includes one dedicated RJ45 GbE management port. The RJ45 connector has two built-in LEDs. See the following illustration and table for details.

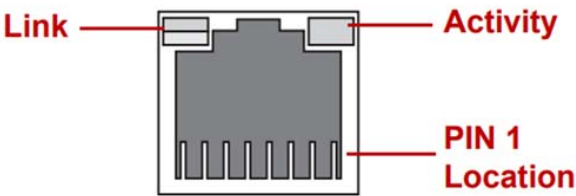


Figure 1-9. GbE RJ45 Management

Table 11: RJ45 LED Descriptions

CONDITION	LINK	ACTIVITY
Unplugged	Off	Off
1G active link	On amber	Blinking green
100M active link	On green	Blinking green
10M active link	Off	Blinking green

## Storage Drive LED

### Front 2.5" Storage Drive LED Status Behavior

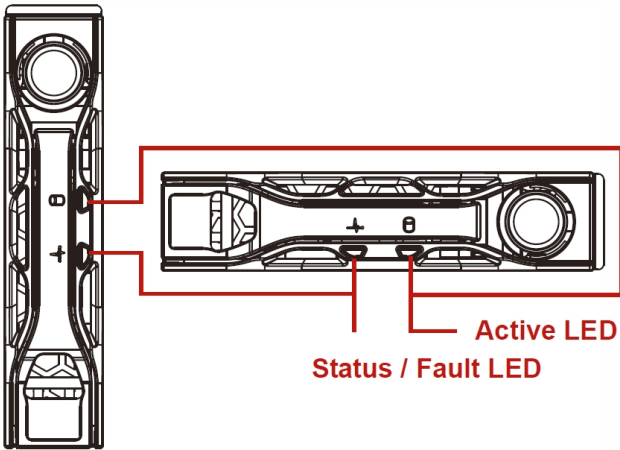


Figure 1-10. 2.5" Storage Drive LED Identification

The following LED behavior table represents LED conditions.

Table 12: 2.5" Storage Drive LED Status Behavior

NAME	COLOR	CONDITION	DESCRIPTIONS
Drive Status / Fault	Blue	On	Drive is online
		Blinking	Twice per second: Identification Once per second: Rebuilding
	Amber	On	HDD failure
	Off		Slot is empty
Drive Active	Blue	Blinking	HDD access is active

#### Front 3.5" Storage Drive LED Status Behavior

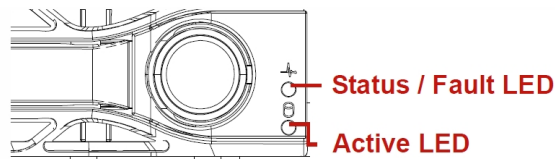


Figure 1-11. 3.5" Storage Drive LED Identification

The following LED behavior table represents LED conditions.

Table 13: 3.5" Storage Drive LED Status Behavior

NAME	COLOR	CONDITION	DESCRIPTIONS
Drive Status / Fault	Blue	On	Drive is online
		Blinking	Twice per second: Identification Once per second: Rebuilding
	Amber	On	HDD failure
	Off		Slot is empty
Drive Active	Blue	Blinking	HDD access is active

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