



# Maintaining the Server

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## Status LEDs and Buttons

This section contains information for interpreting LED states.

# Front-Panel LEDs

Figure 1: Front Panel LEDs

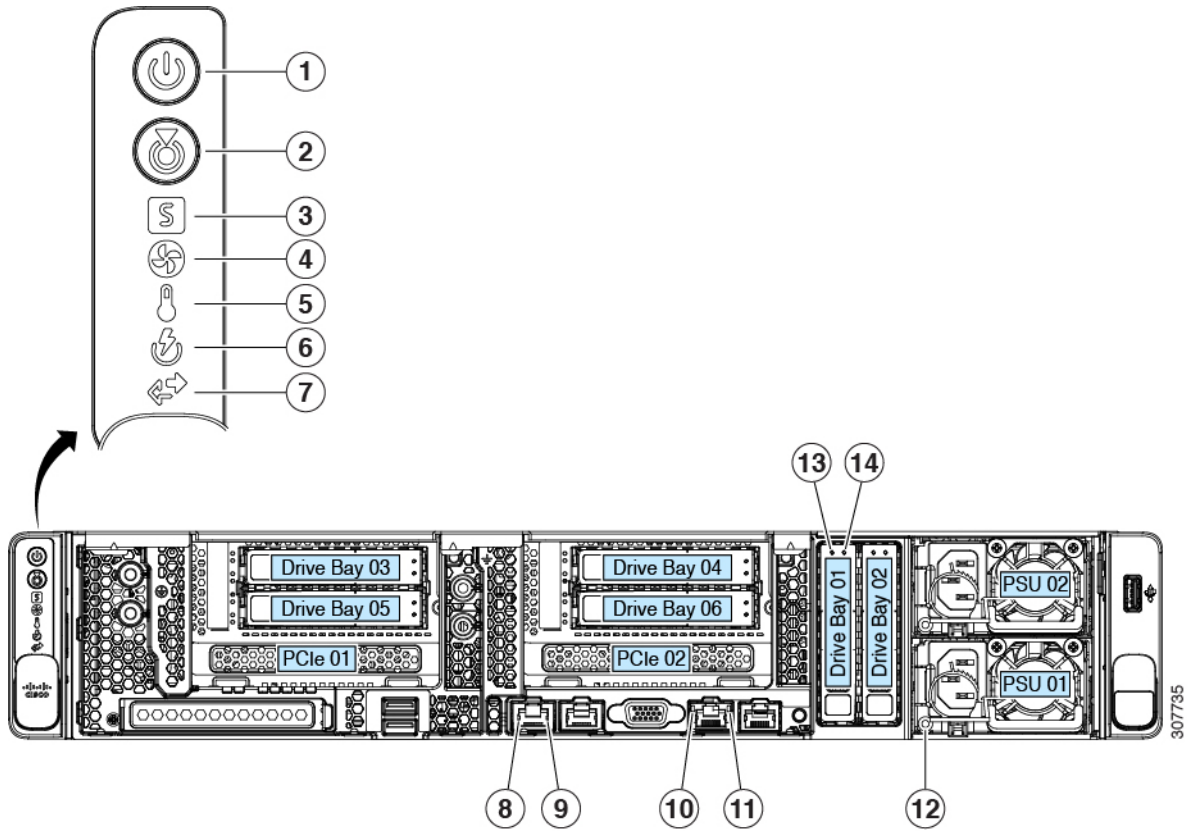


Table 1: Front Panel LEDs, Definition of States

LED Name	States
Power button/LED	<ul style="list-style-type: none"> <li>• Off—There is no AC power to the server.</li> <li>• Amber—The server is in standby power mode. Power is supplied only to the Cisco IMC and some motherboard functions.</li> <li>• Green—The server is in main power mode. Power is supplied to all server components.</li> </ul>
Unit identification	<ul style="list-style-type: none"> <li>• Off—The unit identification function is not in use.</li> <li>• Blue, blinking—The unit identification function is activated.</li> </ul>

<p><b>S</b>ystem health</p>	<ul style="list-style-type: none"> <li>• Green—The server is running in normal operating condition.</li> <li>• Green, blinking—The server is performing system initialization and memory check.</li> <li>• Amber, steady—The server is in a degraded operational state (minor fault). For example:                         <ul style="list-style-type: none"> <li>• Power supply redundancy is lost.</li> <li>• CPUs are mismatched.</li> <li>• At least one CPU is faulty.</li> <li>• At least one DIMM is faulty.</li> <li>• At least one drive in a RAID configuration failed.</li> </ul> </li> <li>• Amber, 2 blinks—There is a major fault with the system board.</li> <li>• Amber, 3 blinks—There is a major fault with the memory DIMMs.</li> <li>• Amber, 4 blinks—There is a major fault with the CPUs.</li> </ul>
<p><b>F</b>an status</p>	<ul style="list-style-type: none"> <li>• Green—All fan modules are operating properly.</li> <li>• Amber, blinking—One or more fan modules breached the non-recoverable threshold.</li> </ul>
<p><b>T</b>emperature status</p>	<ul style="list-style-type: none"> <li>• Green—The server is operating at normal temperature.</li> <li>• Amber, steady—One or more temperature sensors breached the critical threshold.</li> <li>• Amber, blinking—One or more temperature sensors breached the non-recoverable threshold.</li> </ul>
<p><b>P</b>ower supply status</p>	<ul style="list-style-type: none"> <li>• Green—All power supplies are operating normally.</li> <li>• Amber, steady—One or more power supplies are in a degraded operational state.</li> <li>• Amber, blinking—One or more power supplies are in a critical fault state.</li> </ul>
<p><b>N</b>etwork link activity</p>	<ul style="list-style-type: none"> <li>• Off—The Ethernet LOM port link is idle.</li> <li>• Green—One or more Ethernet LOM ports are link-active, but there is no activity.</li> <li>• Green, blinking—One or more Ethernet LOM ports are link-active, with activity.</li> </ul>

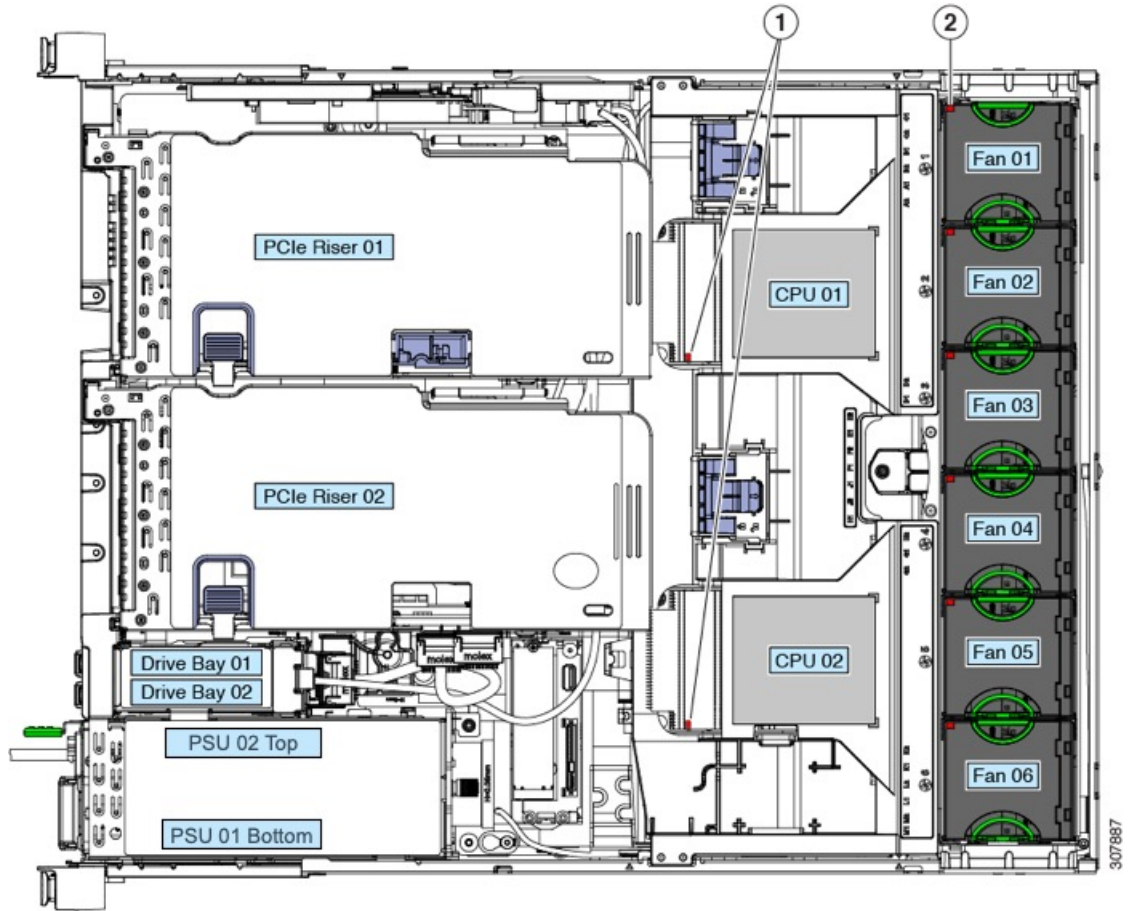
80-Gb Ethernet link speed (on both LAN1 and LAN2)	<ul style="list-style-type: none"> <li>• Off—Link speed is 10 Mbps.</li> <li>• Amber—Link speed is 1 Gbps/100 Mbps.</li> <li>• Green—Link speed is 10 Gbps.</li> </ul>
90-Gb Ethernet link status (on both LAN1 and LAN2)	<ul style="list-style-type: none"> <li>• Off—No link is present.</li> <li>• Green—Link is active.</li> <li>• Green, blinking—Traffic is present on the active link.</li> </ul>
01-Gb Ethernet dedicated management link speed	<ul style="list-style-type: none"> <li>• Off—Link speed is 10 Mbps.</li> <li>• Amber—Link speed is 100 Mbps.</li> <li>• Green—Link speed is 1 Gbps.</li> </ul>
11-Gb Ethernet dedicated management link status	<ul style="list-style-type: none"> <li>• Off—No link is present.</li> <li>• Green—Link is active.</li> <li>• Green, blinking—Traffic is present on the active link.</li> </ul>
2Power supply status (one LED each power supply unit)	<p><b>AC power supplies:</b></p> <ul style="list-style-type: none"> <li>• Off—No AC input (12 V main power off, 12 V standby power off).</li> <li>• Green, blinking—12 V main power off; 12 V standby power on.</li> <li>• Green, solid—12 V main power on; 12 V standby power on.</li> <li>• Amber, blinking—Warning threshold detected but 12 V main power on.</li> <li>• Amber, solid—Critical error detected; 12 V main power off (for example, over-current, over-voltage, or over-temperature failure).</li> </ul> <p><b>DC power supply (UCSC-PSUF-1050WDC):</b></p> <ul style="list-style-type: none"> <li>• Off—No DC input (12 V main power off, 12 V standby power off).</li> <li>• Green, blinking—12 V main power off; 12 V standby power on.</li> <li>• Green, solid—12 V main power on; 12 V standby power on.</li> <li>• Amber, blinking—Warning threshold detected but 12 V main power on.</li> <li>• Amber, solid—Critical error detected; 12 V main power off (for example, over-current, over-voltage, or over-temperature failure).</li> </ul>

<p><b>3</b> SAS/SATA drive fault</p> <p><b>Note</b> NVMe solid state drive (SSD) drive tray LEDs have different behavior than SAS/SATA drive trays.</p>	<ul style="list-style-type: none"> <li>• Off—The hard drive is operating properly.</li> <li>• Amber—Drive fault detected.</li> <li>• Amber, blinking—The device is rebuilding.</li> <li>• Amber, blinking with one-second interval—Drive locate function activated in the software.</li> </ul>
<p><b>4</b> SAS/SATA drive activity LED</p>	<ul style="list-style-type: none"> <li>• Off—There is no hard drive in the hard drive tray (no access, no fault).</li> <li>• Green—The hard drive is ready.</li> <li>• Green, blinking—The hard drive is reading or writing data.</li> </ul>
<p>NVMe SSD drive fault</p> <p><b>Note</b> NVMe solid state drive (SSD) drive tray LEDs have different behavior than SAS/SATA drive trays.</p>	<ul style="list-style-type: none"> <li>• Off—The drive is not in use and can be safely removed.</li> <li>• Green—The drive is in use and functioning properly.</li> <li>• Green, blinking—the driver is initializing following insertion or the driver is unloading following an eject command.</li> <li>• Amber—The drive has failed.</li> <li>• Amber, blinking—A drive Locate command has been issued in the software.</li> </ul>
<p>NVMe SSD activity</p>	<ul style="list-style-type: none"> <li>• Off—No drive activity.</li> <li>• Green, blinking—There is drive activity.</li> </ul>

## Internal Diagnostic LEDs

The server has internal fault LEDs for CPUs, DIMMs, and fan modules.

Figure 2: Internal Diagnostic LED Locations



**CPU fault LEDs** (one behind each CPU socket on the motherboard).

These LEDs operate only when the server is in standby power mode.

- Amber—CPU has a fault.
- Off—CPU is OK.

**Note** Visible after removing the air baffle.

**DIMM fault LEDs** (one behind each DIMM socket on the motherboard)

These LEDs operate only when the server is in standby power mode.

- Amber—DIMM has a fault.
- Off—DIMM is OK.

**Fan module fault LEDs** (one on the top of each fan module)

- Amber—Fan has a fault or is not fully seated.
- Green—Fan is OK.

# Preparing For Component Installation

This section includes information and tasks that help prepare the server for component installation.

## Required Equipment For Service Procedures

The following tools and equipment are used to perform the procedures in this chapter:

- T-30 Torx driver (supplied with replacement CPUs for heatsink removal)
- #1 flat-head screwdriver (used during CPU or heatsink replacement)
- #1 Phillips-head screwdriver (for M.2 SSD and intrusion switch replacement)
- Electrostatic discharge (ESD) strap or other grounding equipment such as a grounded mat

## Shutting Down and Removing Power From the Server

The server can run in either of two power modes:

- Main power mode—Power is supplied to all server components and any operating system on your drives can run.
- Standby power mode—Power is supplied only to the service processor and certain components. It is safe for the operating system and data to remove power cords from the server in this mode.



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**Caution**

After a server is shut down to standby power, electric current is still present in the server. To completely remove power, you must disconnect all power cords from the power supplies in the server, as directed in the service procedures.

You can shut down the server by using the front-panel power button or the software management interfaces.

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## Shutting Down Using the Power Button

**Step 1** Check the color of the Power button/LED:

- Amber—The server is already in standby mode and you can safely remove power.
- Green—The server is in main power mode and must be shut down before you can safely remove power.

**Step 2** Invoke either a graceful shutdown or a hard shutdown:

**Caution** To avoid data loss or damage to your operating system, you should always invoke a graceful shutdown of the operating system.

- Graceful shutdown—Press and release the **Power** button. The operating system performs a graceful shutdown and the server goes to standby mode, which is indicated by an amber Power button/LED.

- Emergency shutdown—Press and hold the **Power** button for 4 seconds to force the main power off and immediately enter standby mode.

**Step 3** If a service procedure instructs you to completely remove power from the server, disconnect all power cords from the power supplies in the server.

---

## Shutting Down Using The Cisco IMC GUI

You must log in with user or admin privileges to perform this task.

---

**Step 1** In the Navigation pane, click the **Server** tab.

**Step 2** On the Server tab, click **Summary**.

**Step 3** In the Actions area, click **Power Off Server**.

**Step 4** Click **OK**.

The operating system performs a graceful shutdown and the server goes to standby mode, which is indicated by an amber Power button/LED.

**Step 5** If a service procedure instructs you to completely remove power from the server, disconnect all power cords from the power supplies in the server.

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## Shutting Down Using The Cisco IMC CLI

You must log in with user or admin privileges to perform this task.

---

**Step 1** At the server prompt, enter:

**Example:**

```
server# scope chassis
```

**Step 2** At the chassis prompt, enter:

**Example:**

```
server/chassis# power shutdown
```

The operating system performs a graceful shutdown and the server goes to standby mode, which is indicated by an amber Power button/LED.

**Step 3** If a service procedure instructs you to completely remove power from the server, disconnect all power cords from the power supplies in the server.

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## Shutting Down Using The Cisco UCS Manager Equipment Tab

You must log in with user or admin privileges to perform this task.

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**Step 1** In the Navigation pane, click **Equipment**.



**Step 2** Expand **Equipment > Rack Mounts > Servers**.

**Step 3** Choose the server that you want to shut down.

**Step 4** In the Work pane, click the **General** tab.

**Step 5** In the Actions area, click **Shutdown Server**.

**Step 6** If a confirmation dialog displays, click **Yes**.

The operating system performs a graceful shutdown and the server goes to standby mode, which is indicated by an amber Power button/LED.

**Step 7** If a service procedure instructs you to completely remove power from the server, disconnect all power cords from the power supplies in the server.

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## Shutting Down Using The Cisco UCS Manager Service Profile

You must log in with user or admin privileges to perform this task.

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**Step 1** In the Navigation pane, click **Servers**.

**Step 2** Expand **Servers > Service Profiles**.

**Step 3** Expand the node for the organization that contains the service profile of the server that you are shutting down.

**Step 4** Choose the service profile of the server that you are shutting down.

**Step 5** In the **Work** pane, click the **General** tab.

**Step 6** In the **Actions** area, click **Shutdown Server**.

**Step 7** If a confirmation dialog displays, click **Yes**.

The operating system performs a graceful shutdown and the server goes to standby mode, which is indicated by an amber Power button/LED.

**Step 8** If a service procedure instructs you to completely remove power from the server, disconnect all power cords from the power supplies in the server.

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## Removing the Server Top Cover

**Caution**

To maintain proper cooling, Cisco recommends not to operate the server for more than one minute without the top cover.

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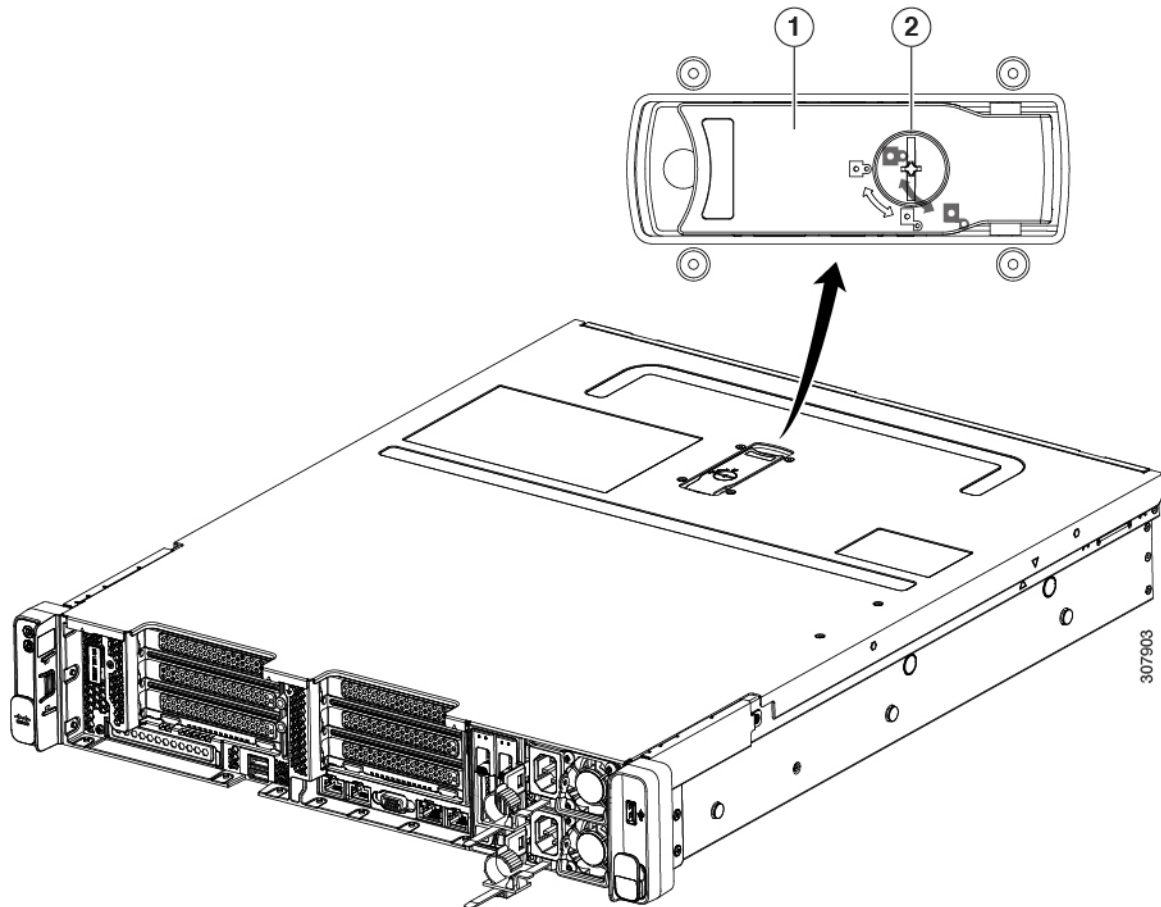
**Step 1** Remove the top cover:

- a) If the cover latch is locked, use a screwdriver to turn the lock 90-degrees counterclockwise to unlock it.
- b) Lift on the end of the latch that has the green finger grip. The cover is pushed back to the open position as you lift the latch.
- c) Lift the top cover straight up from the server and set it aside.

**Step 2** Replace the top cover:

- a) With the latch in the fully open position, place the cover on top of the server about one-half inch (1.27 cm) behind the lip of the front cover panel. The opening in the latch should fit over the peg that sticks up from the fan tray.
- b) Press the cover latch down to the closed position. The cover is pushed forward to the closed position as you push down the latch.
- c) If desired, lock the latch by using a screwdriver to turn the lock 90-degrees clockwise.

**Figure 3: Removing the Top Cover**



Cover latch	Serial number label location
Cover lock	

## Serial Number Location

The serial number for the server is printed on a label on the top of the server, near the front. See [Removing the Server Top Cover, on page 9](#).

## Hot Swap vs Hot Plug

Some components can be removed and replaced without shutting down and removing power from the server. This type of replacement has two varieties: hot-swap and hot-plug.

- Hot-swap replacement—You do not have to shut down the component in the software or operating system. This applies to the following components:
  - SAS/SATA hard drives
  - SAS/SATA solid state drives
  - Cooling fan modules
  - Power supplies (when redundant as 1+1)
- Hot-plug replacement—You must take the component offline before removing it for the following component:
  - NVMe PCIe solid state drives

## Removing and Replacing Components

**Warning**

**Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.**

Statement 1029

**Caution**

When handling server components, handle them only by carrier edges and use an electrostatic discharge (ESD) wrist-strap or other grounding device to avoid damage.

**Tip**

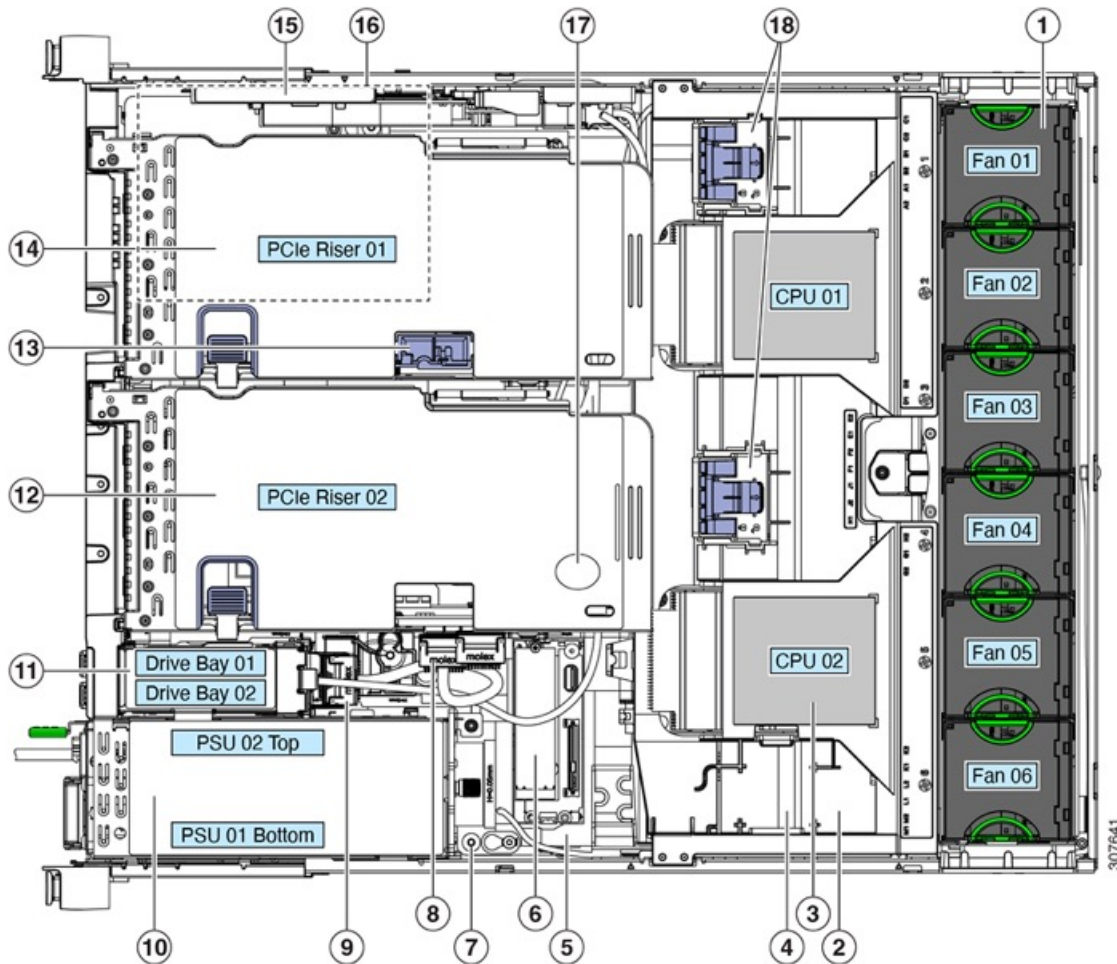
You can press the unit identification button on the front panel or rear panel to turn on a flashing, blue unit identification LED on both the front and rear panels of the server. This button allows you to locate the specific server that you are servicing when you go to the opposite side of the rack. You can also activate these LEDs remotely by using the Cisco IMC interface.

This section describes how to install and replace server components.

## Serviceable Component Locations

This topic shows the locations of the field-replaceable components and service-related items. The view in the following figure shows the server with the top cover removed.

Figure 4: Cisco UCS C240 SD M5 Server, Serviceable Component Locations



<p>1 Cooling fan modules (six, hot-swappable)</p>	<p>11 Two 2.5-inch drive bays (Drive bays 01 and 02):</p> <ul style="list-style-type: none"> <li>• Supports only SAS/SATA HDD/SSD with SAS-backplane</li> <li>• Supports only NVME SSDs with NVMe-backplane</li> </ul>
<p>2 DIMM sockets on motherboard (up to 12 per CPU) Not visible under air baffle in this view. See <a href="#">DIMM Population Rules and Memory Performance Guidelines</a>, on page 37 for DIMM slot numbering.</p>	<p>2 PCIe riser 2 with the following options (Drive bays 04 and 06, and PCIe 02):</p> <ul style="list-style-type: none"> <li>• 2B—Slots 4 (x8), 5 (x16), 6 (x8); slot 3 requires CPU2.</li> <li>• 2E—Drive bay 04 (x4), Drive bay 06 (x4), PCIe 4 (x16); all slots supported by CPU2</li> </ul>
<p>3 CPUs and heatsinks (up to two) Not visible under air baffle in this view.</p>	<p>3 Micro-SD socket on PCIe riser 01</p>

<p>4 SuperCap power module mounting clip on air baffle (if applicable)</p>	<p>4 PCIe riser 1 with the following options (Drive bays 03 and 05, and PCIe 01):</p> <ul style="list-style-type: none"> <li>• 1—Slots 1 (x8), 2 (x16), 3 (x8); slot 3 requires CPU2.</li> <li>• 1C—Drive bay 03 (x4), Drive bay 05 (x4), PCIe 1 (x16); all slots supported by CPU1</li> </ul> <p>See <a href="#">PCIe Slot Specifications, on page 59</a> for slot specifications.</p>
<p>5 Internal, vertical USB 3.0 port on motherboard</p>	<p>5 Storage controller dedicated slot</p>
<p>6 Mini-storage module socket. Options:</p> <ul style="list-style-type: none"> <li>• SD card module with two SD card slots</li> <li>• M.2 module with slots for two SATA M.2 drives</li> </ul>	<p>6 LOM card socket on board</p>
<p>7 Chassis intrusion switch (optional)</p>	<p>7 RTC battery</p>
<p>8 PCIe cable connectors for NVMe SSDs.</p>	<p>8 Securing clips for GPU cards on air baffle</p>
<p>9 Vertical drive backplane assembly</p>	
<p>10 Power supplies (hot-swappable when redundant as 1+1)</p>	

The Technical Specifications Sheets for all versions of this server, which include supported component part numbers, are at [Cisco UCS Servers Technical Specifications Sheets](#) (scroll down to *Technical Specifications*).

# Replacing SAS/SATA Drives in PCIe Risers and Vertical Drive Bays



**Note** You do not have to shut down the server or drive to replace SAS/SATA hard drives or SSDs because they are hot-swappable.

## SAS/SATA Drive Population Guidelines

Cisco UCS C240 SD M5 supports 2.5 inch SAS/SATA in the following combinations:

- PCIe Riser 1 and PCIe Riser 2B—This combination supports:
  - Two vertical drive bays with up to two 2.5-inch SAS/SATA drives
- PCIe Riser 1C and PCIe Riser 2E—This combination supports:
  - Four drive bays in the PCIe risers support 2.5-inch SAS/SATA drives
  - Two vertical drive bays support up to two 2.5-inch SAS/SATA drives

Observe these drive population guidelines for optimum performance:

- You can mix SAS/SATA hard drives and SAS/SATA SSDs in the same server. However, you cannot configure a logical volume (virtual drive) that contains a mix of hard drives and SSDs. That is, when you create a logical volume, it must contain all SAS/SATA hard drives or all SAS/SATA SSDs.

## 4K Sector Format SAS/SATA Drives Considerations

- You must boot 4K sector format drives in UEFI mode, not legacy mode. See the procedures in this section.
- Do not configure 4K sector format and 512-byte sector format drives as part of the same RAID volume.
- For operating system support on 4K sector drives, see the interoperability matrix tool for your server: [Hardware and Software Interoperability Matrix Tools](#)

### Setting Up UEFI Mode Booting in the BIOS Setup Utility

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- Step 1** Enter the BIOS setup utility by pressing the **F2** key when prompted during bootup.
- Step 2** Go to the **Boot Options** tab.
- Step 3** Set **UEFI Boot Options** to **Enabled**.
- Step 4** Under **Boot Option Priorities**, set your OS installation media (such as a virtual DVD) as your **Boot Option #1**.
- Step 5** Go to the **Advanced** tab.
- Step 6** Select **LOM** and **PCIe Slot Configuration**.
- Step 7** Set the **PCIe Slot ID: HBA Option ROM** to **UEFI Only**.
- Step 8** Press **F10** to save changes and exit the BIOS setup utility. Allow the server to reboot.
- Step 9** After the OS installs, verify the installation:
- Enter the BIOS setup utility by pressing the **F2** key when prompted during bootup.
  - Go to the **Boot Options** tab.
  - Under **Boot Option Priorities**, verify that the OS you installed is listed as your **Boot Option #1**.
- 

### Setting Up UEFI Mode Booting in the Cisco IMC GUI

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- Step 1** Use a web browser and the IP address of the server to log into the Cisco IMC GUI management interface.
- Step 2** Navigate to **Server > BIOS**.
- Step 3** Under **Actions**, click **Configure BIOS**.
- Step 4** In the **Configure BIOS Parameters** dialog, select the **Advanced** tab.
- Step 5** Go to the **LOM** and **PCIe Slot Configuration** section.
- Step 6** Set the **PCIe Slot: HBA Option ROM** to **UEFI Only**.
- Step 7** Click **Save Changes**. The dialog closes.
- Step 8** Under **BIOS Properties**, set **Configured Boot Order** to **UEFI**.
- Step 9** Under **Actions**, click **Configure Boot Order**.

- Step 10** In the Configure Boot Order dialog, click **Add Local HDD**.
- Step 11** In the Add Local HDD dialog, enter the information for the 4K sector format drive and make it first in the boot order.
- Step 12** Save changes and reboot the server. The changes you made will be visible after the system reboots.
- 

## Replacing a SAS/SATA Drive



**Note** You do not have to shut down the server or drive to replace SAS/SATA hard drives or SSDs because they are hot-swappable.

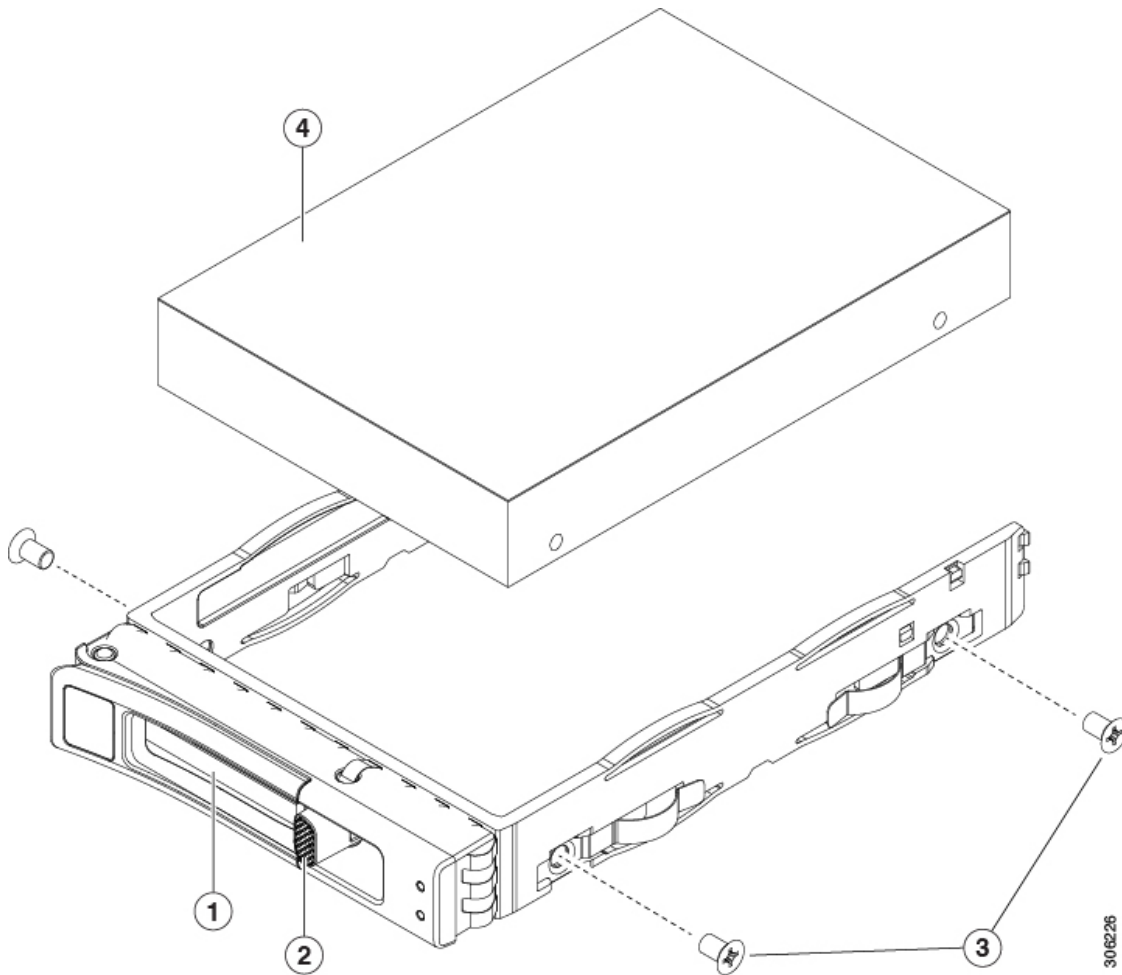
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Follow this procedure to remove a SAS/SATA drive from a PCIe Riser or from a vertical drive bay.

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- Step 1** Remove the drive that you are replacing or remove a blank drive tray from the front of the server:
- Press the release button on the face of the drive tray.
  - Grasp and open the ejector lever and then pull the drive tray out of the slot.
  - If you are replacing an existing drive, remove the four drive-tray screws that secure the drive to the tray and then lift the drive out of the tray.
- Step 2** Install a new drive:
- Place a new drive in the empty drive tray and install the four drive-tray screws.
  - With the ejector lever on the drive tray open, insert the drive tray into the empty drive bay.
  - Push the tray into the slot until it touches the backplane, and then close the ejector lever to lock the drive in place.

Figure 5: Replacing a Drive in a Drive Tray



Ejector lever	Drive tray screws (two on each side)
Release button	Drive removed from drive tray

## Replacing NVMe SSDs

This section is for replacing 2.5-inch form-factor NVMe solid-state drives (SSDs) in vertical drive bays.

To replace HHHL form-factor NVMe SSDs in the PCIe slots, see [Replacing HHHL Form-Factor NVMe Solid State Drives](#), on page 19.

## Front-Loading NVMe SSD Population Guidelines

Cisco UCS C240 SD M5 supports 2.5 inch NVMe SSDs in the following combinations:



- PCIe Riser 1 and PCIe Riser 2B—This combination supports:
  - Two vertical drive bays with up to two 2.5-inch NVMe SSDs.
- PCIe Riser 1C and PCIe Riser 2E—This combination supports:
  - Four drive bays in the PCIe risers support up to two 2.5-inch NVMe
  - Two vertical drive bays support up to two 2.5-inch NVMe

## NVMe SSD Requirements and Restrictions

Observe these requirements:

- Hot-plug support must be enabled in the system BIOS. If you ordered the system with NVMe drives, hot-plug support is enabled at the factory.

Observe these restrictions:

- NVMe 2.5 inch SSDs support booting only in UEFI mode. Legacy boot is not supported. For instructions on setting up UEFI boot, see [Setting Up UEFI Mode Booting in the BIOS Setup Utility, on page 14](#) or [Setting Up UEFI Mode Booting in the Cisco IMC GUI, on page 14](#).
- You cannot control NVMe PCIe SSDs with a SAS RAID controller because NVMe SSDs interface with the server via the PCIe bus.
- You can combine NVMe 2.5 inch SSDs and HHHL form-factor SSDs in the same system, but the same partner brand must be used. For example, two *Intel* NVMe SFF 2.5-inch SSDs and two *HGST* HHHL form-factor SSDs is an invalid configuration. A valid configuration is two HGST NVMe SFF 2.5-inch SSDs and two HGST HHHL form-factor SSDs.
- UEFI boot is supported in all supported operating systems. Hot-insertion and hot-removal are supported in all supported operating systems except VMWare ESXi.

## Enabling Hot-Plug Support in the System BIOS

Hot-plug (OS-informed hot-insertion and hot-removal) is disabled in the system BIOS by default.

- If the system was ordered with NVMe PCIe SSDs, the setting was enabled at the factory. No action is required.
- If you are adding NVMe PCIe SSDs after-factory, you must enable hot-plug support in the BIOS. See the following procedures.

### Enabling Hot-Plug Support Using the BIOS Setup Utility

- 
- Step 1** Enter the BIOS setup utility by pressing the **F2** key when prompted during bootup.
- Step 2** Navigate to **Advanced > PCI Subsystem Settings > NVMe SSD Hot-Plug Support**.
- Step 3** Set the value to **Enabled**.

**Step 4** Save your changes and exit the utility.

---

## Enabling Hot-Plug Support Using the Cisco IMC GUI

---

- Step 1** Use a browser to log in to the Cisco IMC GUI for the server.
- Step 2** Navigate to **Compute > BIOS > Advanced > PCI Configuration**.
- Step 3** Set NVMe SSD Hot-Plug Support to **Enabled**.
- Step 4** Save your changes.
- 

## Replacing a NVMe SSD

This topic describes how to replace 2.5 inch form-factor NVMe SSDs in the PCIe Risers or the vertical drive bays.



**Note** OS-surprise removal is not supported. OS-informed hot-insertion and hot-removal are supported on all supported operating systems except VMware ESXi.

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**Note** OS-informed hot-insertion and hot-removal must be enabled in the system BIOS. See [Enabling Hot-Plug Support in the System BIOS, on page 17](#).

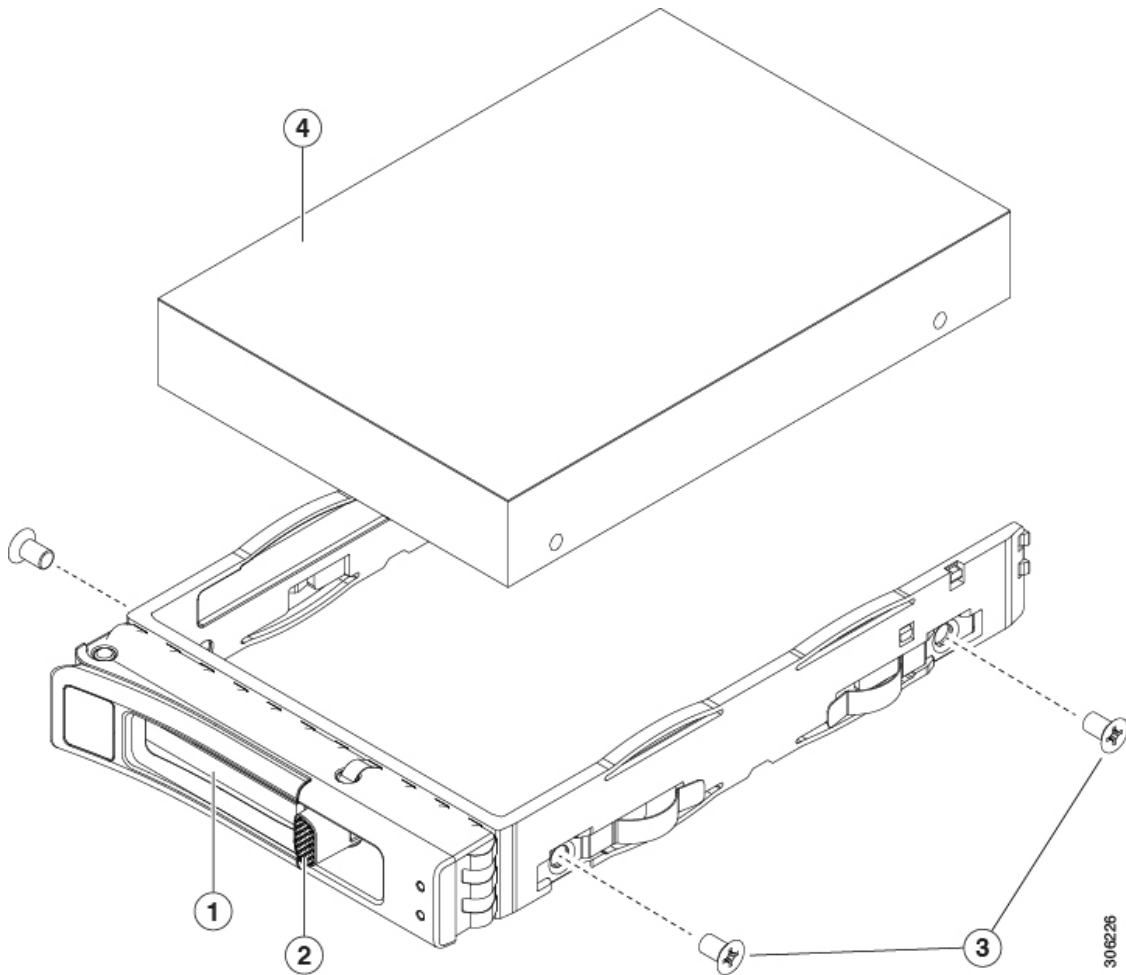
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- Step 1** Remove an existing NVMe SSD:
- Shut down the NVMe SSD to initiate an OS-informed removal. Use your operating system interface to shut down the drive, and then observe the drive-tray LED:
    - Green—The drive is in use and functioning properly. Do not remove.
    - Green, blinking—the driver is unloading following a shutdown command. Do not remove.
    - Off—The drive is not in use and can be safely removed.
  - Press the release button on the face of the drive tray.
  - Grasp and open the ejector lever and then pull the drive tray out of the slot.
  - Remove the four drive tray screws that secure the SSD to the tray and then lift the SSD out of the tray.
- Note** If this is the first time that NVMe SSDs are being installed in the server, you must install a PCIe cable with PCIe riser. See [Installing PCIe Risers 1C and 2E, on page 56](#).
- Step 2** Install a new NVMe SSD:
- Place a new SSD in the empty drive tray and install the four drive-tray screws.
  - With the ejector lever on the drive tray open, insert the drive tray into the empty drive bay.
  - Push the tray into the slot until it touches the backplane, and then close the ejector lever to lock the drive in place.

**Step 3** Observe the drive-tray LED and wait until it returns to solid green before accessing the drive:

- Off—The drive is not in use.
- Green, blinking—the driver is initializing following hot-plug insertion.
- Green—The drive is in use and functioning properly.

**Figure 6: Replacing a Drive in a Drive Tray**



Ejector lever	Drive tray screws (two on each side)
Release button	Drive removed from drive tray

## Replacing HHHL Form-Factor NVMe Solid State Drives

This section is for replacing half-height, half-length (HHHL) form-factor NVMe SSDs in the PCIe risers.

## HHHL SSD Population Guidelines

Observe the following population guidelines when installing HHHL form-factor NVMe SSDs:

- Two-CPU systems—You can populate up to 6 HHHL form-factor SSDs, using PCIe slots 1 – 6.
- One-CPU systems—In a single-CPU system, PCIe riser 2 is not available. Therefore, the maximum number of HHHL form-factor SSDs you can populate is 3, using PCIe slots 1 - 3.

## HHHL Form-Factor NVMe SSD Requirements and Restrictions

Observe these requirements:

- All versions of the server support HHHL form-factor NVMe SSDs.

Observe these restrictions:

- You cannot boot from an HHHL form-factor NVMe SSD.
- You cannot control HHHL NVMe SSDs with a SAS RAID controller because NVMe SSDs interface with the server via the PCIe bus.
- You can combine NVMe SFF 2.5- or 3.5-inch SSDs and HHHL form-factor SSDs in the same system, but the same partner brand must be used. For example, two *Intel* NVMe SFF 2.5-inch SSDs and two *HGST* HHHL form-factor SSDs is an invalid configuration. A valid configuration is two HGST NVMe SFF 2.5-inch SSDs and two HGST HHHL form-factor SSDs.

## Replacing an HHHL Form-Factor NVMe SSD



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**Note** In a single-CPU server, PCIe riser 2 (PCIe slot 2) is not available.

---

### Step 1

Remove an existing HHHL form-factor NVMe SSD (or a blank filler panel) from the PCIe riser:

- a) Shut down and remove power from the server as described in [Shutting Down and Removing Power From the Server, on page 7](#).
- b) Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

**Caution** If you cannot safely view and access the component, remove the server from the rack.

- c) Remove the top cover from the server as described in [Removing the Server Top Cover, on page 9](#).
- d) Use two hands to flip up and grasp the blue riser handle and the blue fingergrasp area on the front edge of the riser, and then lift straight up.
- e) On the bottom of the riser, push the release latch that holds the securing plate, and then swing the hinged securing plate open.
- f) Open the hinged card-tab retainer that secures the rear-panel tab of the card.
- g) Pull evenly on both ends of the HHHL form-factor NVMe SSD to remove it from the socket on the PCIe riser.

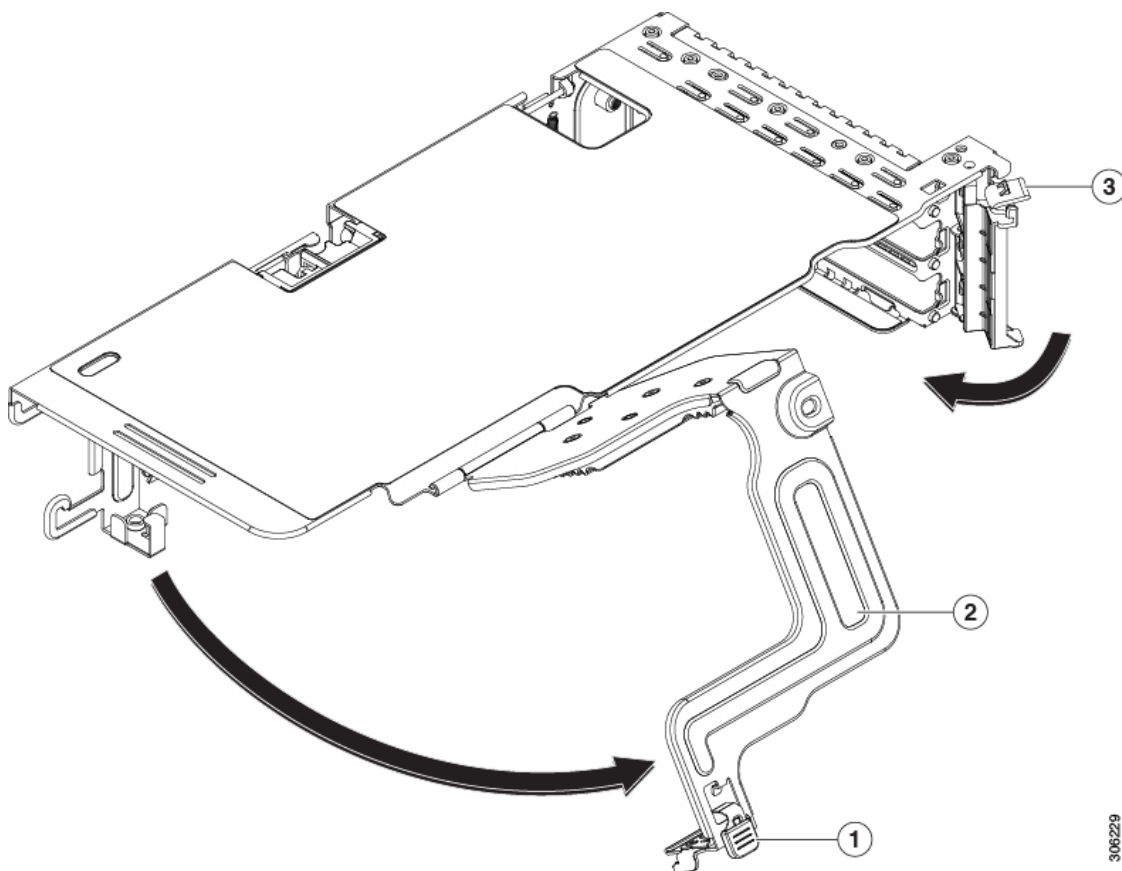
If the riser has no SSD, remove the blanking panel from the rear opening of the riser.

**Step 2**

Install a new HHHL form-factor NVMe SSD:

- a) Open the hinged, plastic card-tab retainer.
- b) Align the new SSD with the empty socket on the PCIe riser.
- c) Push down evenly on both ends of the card until it is fully seated in the socket.
- d) Ensure that the SSD's rear panel tab sits flat against the riser rear-panel opening and then close the hinged card-tab retainer over the rear-panel tab.
- e) Close the hinged securing plate.
- f) Position the PCIe riser over its socket on the motherboard and over the chassis alignment channels.
- g) Carefully push down on both ends of the PCIe riser to fully engage its connector with the sockets on the motherboard.
- h) Replace the top cover to the server.
- i) Replace the server in the rack, replace cables, and then fully power on the server by pressing the Power button.

**Figure 7: PCIe Riser Card Securing Mechanisms**



306229

Release latch on hinged securing plate	Hinged card-tab retainer
Hinged securing plate	-

# Replacing Fan Modules

The six fan modules in the server are numbered as shown in [Serviceable Component Locations](#).



**Tip** There is a fault LED on the top of each fan module. This LED lights green when the fan is correctly seated and is operating OK. The LED lights amber when the fan has a fault or is not correctly seated.



**Caution** You do not have to shut down or remove power from the server to replace fan modules because they are hot-swappable. However, to maintain proper cooling, do not operate the server for more than one minute with any fan module removed.

## Step 1

Remove an existing fan module:

- a) Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

**Caution** If you cannot safely view and access the component, remove the server from the rack.

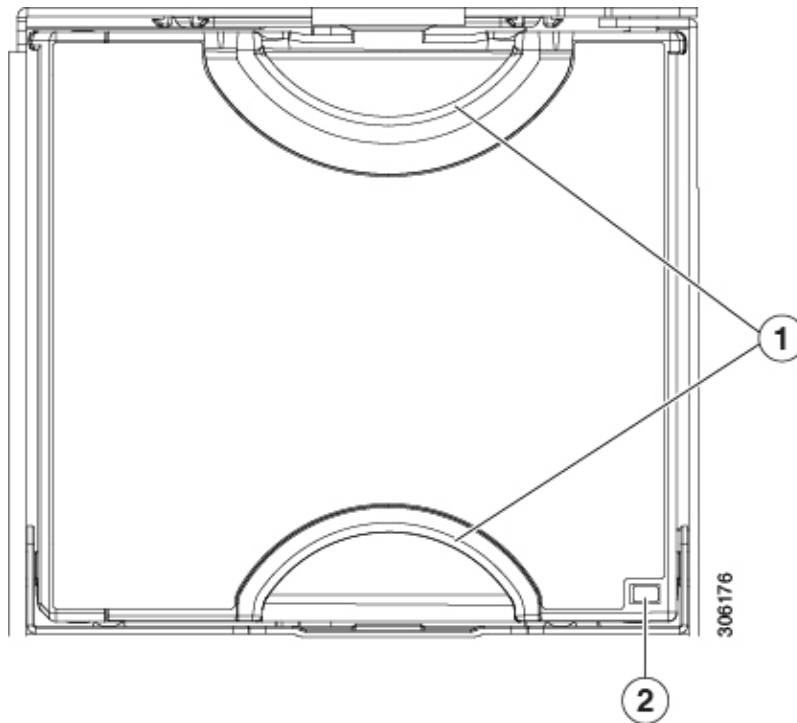
- b) Remove the top cover from the server as described in [Removing the Server Top Cover, on page 9](#).
- c) Grasp and squeeze the fan module release latches on its top. Lift straight up to disengage its connector from the motherboard.

## Step 2

Install a new fan module:

- a) Set the new fan module in place. The arrow printed on the top of the fan module should point toward the rear of the server.
- b) Press down gently on the fan module to fully engage it with the connector on the motherboard.
- c) Replace the top cover to the server.
- d) Replace the server in the rack, replace cables, and then fully power on the server by pressing the Power button.

Figure 8: Top View of Fan Module



Fan module release latches

Fan module fault LED

## Replacing CPUs and Heatsinks

This section contains the following topics:

- [CPU Configuration Rules](#), on page 24
- [Tools Required For CPU Replacement](#), on page 25
- [Replacing a CPU and Heatsink](#), on page 25
- [Additional CPU-Related Parts to Order with RMA Replacement CPUs](#), on page 31

## Special Information For *Upgrades* to Second Generation Intel Xeon Scalable Processors



### Caution

You must upgrade your server firmware to the required minimum level before you upgrade to the Second Generation Intel Xeon Scalable processors that are supported in this server. Older firmware versions cannot recognize the new CPUs and this would result in a non-bootable server.

The minimum software and firmware versions required for this server to support Second Generation Intel Xeon Scalable processors are as follows:

**Table 2: Minimum Requirements For Second Generation Intel Xeon Scalable processors**

Software or Firmware	Minimum Version
Server Cisco IMC	4.0(4)
Server BIOS	4.0(4)

## CPU Configuration Rules

This server has two CPU sockets on the motherboard. Each CPU supports six DIMM channels (12 DIMM slots). See [DIMM Population Rules and Memory Performance Guidelines](#), on page 37.

- The server can operate with one CPU or two identical CPUs installed.
- The minimum configuration is that the server must have at least CPU 1 installed. Install CPU 1 first, and then CPU 2.
- **For Intel Xeon Scalable processors (first generation):** The maximum combined memory allowed in the 12 DIMM slots controlled by any one CPU is 768 GB. To populate the 12 DIMM slots with more than 768 GB of combined memory, you must use a high-memory CPU that has a PID that ends with an "M", for example, UCS-CPU-6134M.
- **For Second Generation Intel Xeon Scalable processors:** These Second Generation CPUs have three memory tiers. These rules apply on a *per-socket* basis:
  - If the CPU socket has up to 1 TB of memory installed, a CPU with no suffix can be used (for example, Gold 6240).
  - If the CPU socket has 1 TB or more (up to 2 TB) of memory installed, you must use a CPU with an M suffix (for example, Platinum 8276M).
  - If the CPU socket has 2 TB or more (up to 4.5 TB) of memory installed, you must use a CPU with an L suffix (for example, Platinum 8270L).
- The following restrictions apply when using a single-CPU configuration:
  - Any unused CPU socket must have the socket dust cover from the factory in place.
  - The maximum number of DIMMs is 12 (only CPU 1 channels A, B, C, D, E, F).
  - PCIe riser 2 (slots 4, 5, 6) is unavailable.
  - You must use PCIe riser 1 (UCSC-RSI-1-240M5) to have support for all three slots (PCIe 1, 2, 3). In PCIe riser 1C (UCSC-RS1C-240M5SD), slot 3 is unavailable because it is controlled by CPU 2.
  - Front loading NVMe drives are unavailable (they require PCIe rise 2E or 1C).
- The following NVIDIA GPUs are not supported with Second Generation Intel Xeon Scalable processors:
  - NVIDIA Tesla P4
  - NVIDIA Tesla P100 12G



- NVIDIA Tesla P100 16G

## Tools Required For CPU Replacement

You need the following tools and equipment for this procedure:

- T-30 Torx driver—Supplied with replacement CPU.
- #1 flat-head screwdriver—Supplied with replacement CPU.
- CPU assembly tool—Supplied with replacement CPU. Orderable separately as Cisco PID UCS-CPUAT=.
- Heatsink cleaning kit—Supplied with replacement CPU. Orderable separately as Cisco PID UCSX-HSCK=.

One cleaning kit can clean up to four CPUs.

- Thermal interface material (TIM)—Syringe supplied with replacement CPU. Use only if you are reusing your existing heatsink (new heatsinks have a pre-applied pad of TIM). Orderable separately as Cisco PID UCS-CPU-TIM=.

One TIM kit covers one CPU.

See also [Additional CPU-Related Parts to Order with RMA Replacement CPUs, on page 31](#).

## Replacing a CPU and Heatsink



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**Caution** CPUs and their sockets are fragile and must be handled with extreme care to avoid damaging pins. The CPUs must be installed with heatsinks and thermal interface material to ensure cooling. Failure to install a CPU correctly might result in damage to the server.

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An instructive video is available for this procedure: [CPU and Heatsink Replacement in Cisco UCS M5 Servers](#)

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**Step 1** Remove the existing CPU/heatsink assembly from the server:

- a) Shut down and remove power from the server as described in [Shutting Down and Removing Power From the Server, on page 7](#).
- b) Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

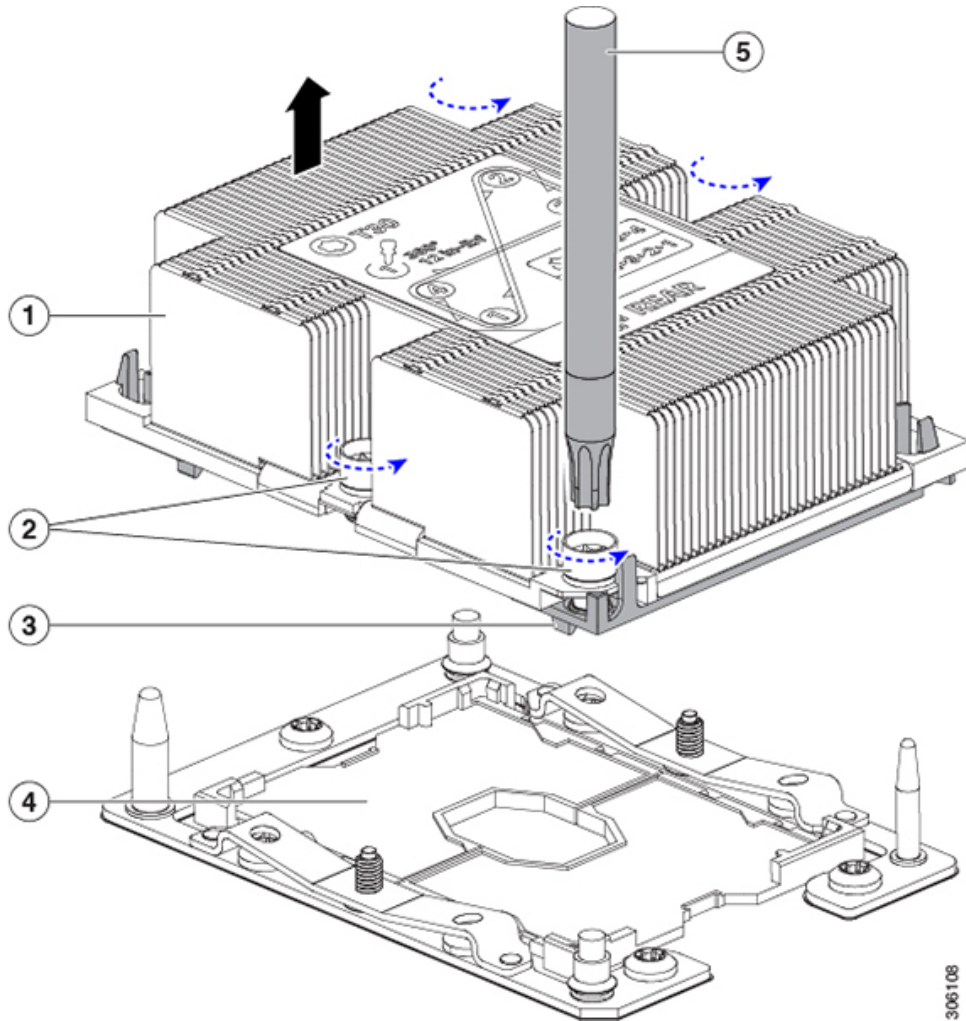
**Caution** If you cannot safely view and access the component, remove the server from the rack.

- c) Remove the top cover from the server as described in [Removing the Server Top Cover, on page 9](#).
- d) Use the T-30 Torx driver that is supplied with the replacement CPU to loosen the four captive nuts that secure the assembly to the motherboard standoffs.

**Note** Alternate loosening the heatsink nuts evenly so that the heatsink remains level as it is raised. Loosen the heatsink nuts in the order shown on the heatsink label: 4, 3, 2, 1.

- e) Lift straight up on the CPU/heatsink assembly and set it heatsink-down on an antistatic surface.

Figure 9: Removing the CPU/Heatsink Assembly



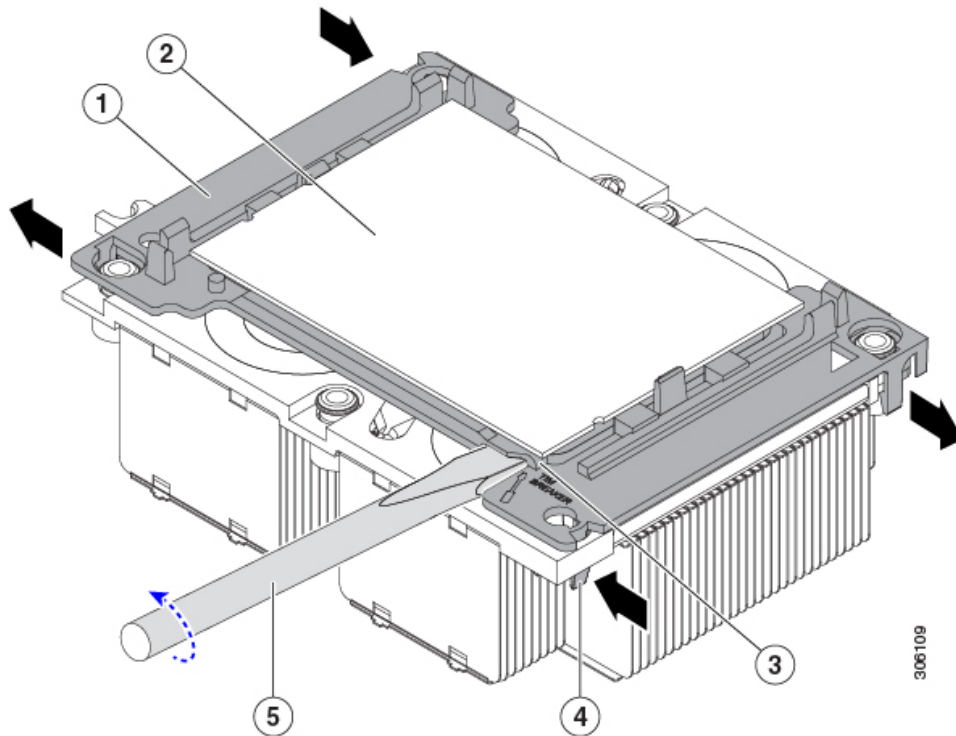
1 Heatsink	4 CPU socket on motherboard
2 Heatsink captive nuts (two on each side)	5 5-bit Torx driver
3 CPU carrier (below heatsink in this view)	-

**Step 2** Separate the heatsink from the CPU assembly (the CPU assembly includes the CPU and the plastic CPU carrier):

- a) Place the heatsink with CPU assembly so that it is oriented upside-down.

Note the thermal-interface material (TIM) breaker location. TIM BREAKER is stamped on the CPU carrier next to a small slot.

Figure 10: Separating the CPU Assembly From the Heatsink



1 CPU carrier	4 CPU-carrier inner-latch nearest to the TIM breaker slot
2 CPU	5 #1 flat-head screwdriver inserted into TIM breaker slot
3 TIM BREAKER slot in CPU carrier	-

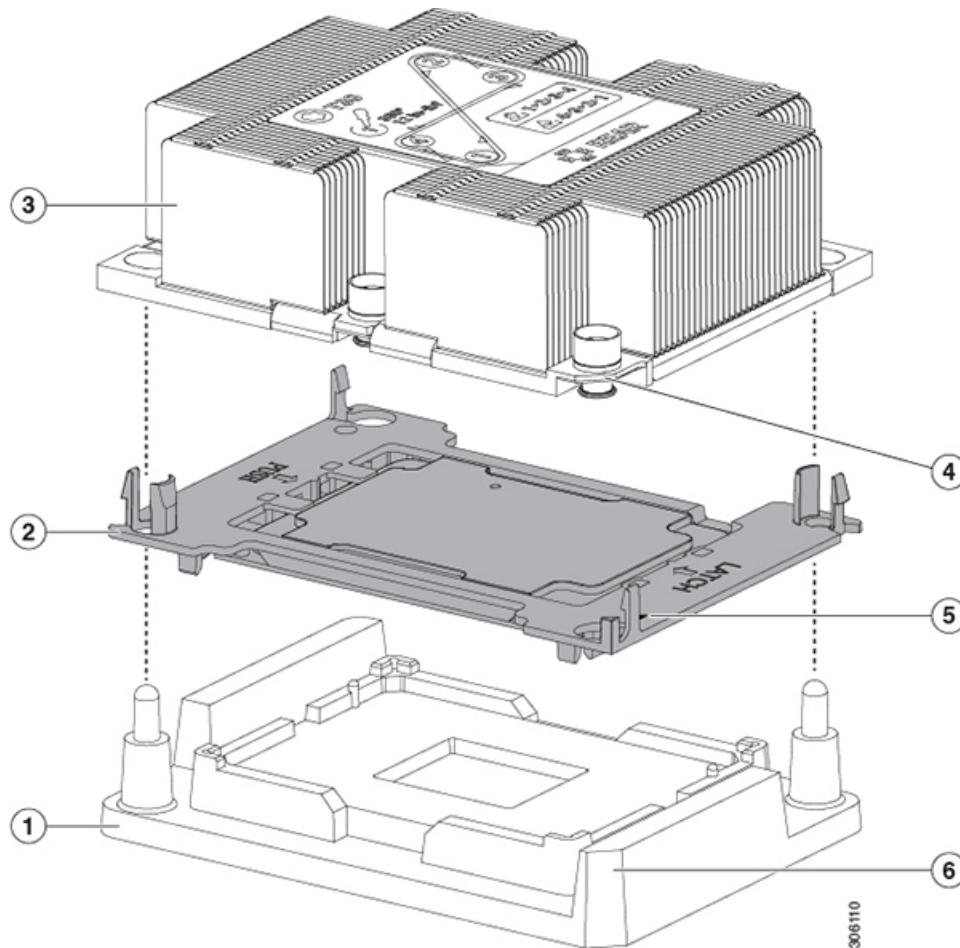
- b) Pinch inward on the CPU-carrier clip that is nearest the TIM breaker slot and then push up to disengage the clip from its slot in the heatsink corner.
- c) Insert the blade of a #1 flat-head screwdriver into the slot marked TIM BREAKER.
  - Note** In the following step, do not pry on the CPU surface. Use gentle rotation to lift on the plastic surface of the CPU carrier at the TIM breaker slot. Use caution to avoid damaging the heatsink surface.
- d) Gently rotate the screwdriver to lift up on the CPU until the TIM on the heatsink separates from the CPU.
  - Note** Do not allow the screwdriver tip to touch or damage the green CPU substrate.
- e) Pinch the CPU-carrier clip at the corner opposite the TIM breaker and push up to disengage the clip from its slot in the heatsink corner.
- f) On the remaining two corners of the CPU carrier, gently pry outward on the outer-latches and then lift the CPU-assembly from the heatsink.
  - Note** Handle the CPU-assembly by the plastic carrier only. Do not touch the CPU surface. Do not separate the CPU from the plastic carrier.

**Step 3** The new CPU assembly is shipped on a CPU assembly tool. Take the new CPU assembly and CPU assembly tool out of the carton.

If the CPU assembly and CPU assembly tool become separated, note the alignment features for correct orientation. The pin 1 triangle on the CPU carrier must be aligned with the angled corner on the CPU assembly tool.

**Caution** CPUs and their sockets are fragile and must be handled with extreme care to avoid damaging pins.

*Figure 11: CPU Assembly Tool, CPU Assembly, and Heatsink Alignment Features*



1 CPU assembly tool	4 Angled corner on heatsink (pin 1 alignment feature)
2 CPU assembly (CPU in plastic carrier frame)	5 Triangle cut into plastic carrier (pin 1 alignment feature)
3 Heatsink	6 Angled corner on CPU assembly tool (pin 1 alignment feature)

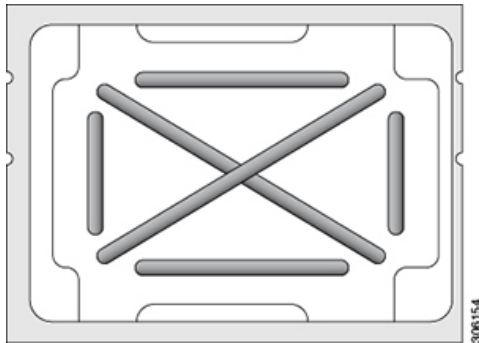
**Step 4** Apply new TIM to the heatsink:

**Note** The heatsink must have new TIM on the heatsink-to-CPU surface to ensure proper cooling and performance.

- If you are installing a new heatsink, it is shipped with a pre-applied pad of TIM. Go to step 5.

- If you are reusing a heatsink, you must remove the old TIM from the heatsink and then apply new TIM to the CPU surface from the supplied syringe. Continue with step **a** below.
- a) Apply the cleaning solution that is included with the heatsink cleaning kit (UCSX-HSCK=) to the old TIM on the heatsink and let it soak for a least 15 seconds.
- b) Wipe all of the TIM off the heatsink using the soft cloth that is included with the heatsink cleaning kit. Be careful to avoid scratching the heatsink surface.
- c) Using the syringe of TIM provided with the new CPU (UCS-CPU-TIM=), apply 4 cubic centimeters of thermal interface material to the top of the CPU. Use the pattern shown below to ensure even coverage.

**Figure 12: Thermal Interface Material Application Pattern**



- Step 5**    **Note**        Use only the correct heatsink for your CPUs to ensure proper cooling. There are two different heatsinks: UCSC-HS-C240M5 for standard-performance CPUs 150 W and less; UCSC-HS2-C240M5 for high-performance CPUs above 150 W. Note the wattage described on the heatsink label.

With the CPU assembly on the CPU assembly tool, set the heatsink onto the CPU assembly. Note the Pin 1 alignment features for correct orientation. Push down gently until you hear the corner clips of the CPU carrier click onto the heatsink corners.

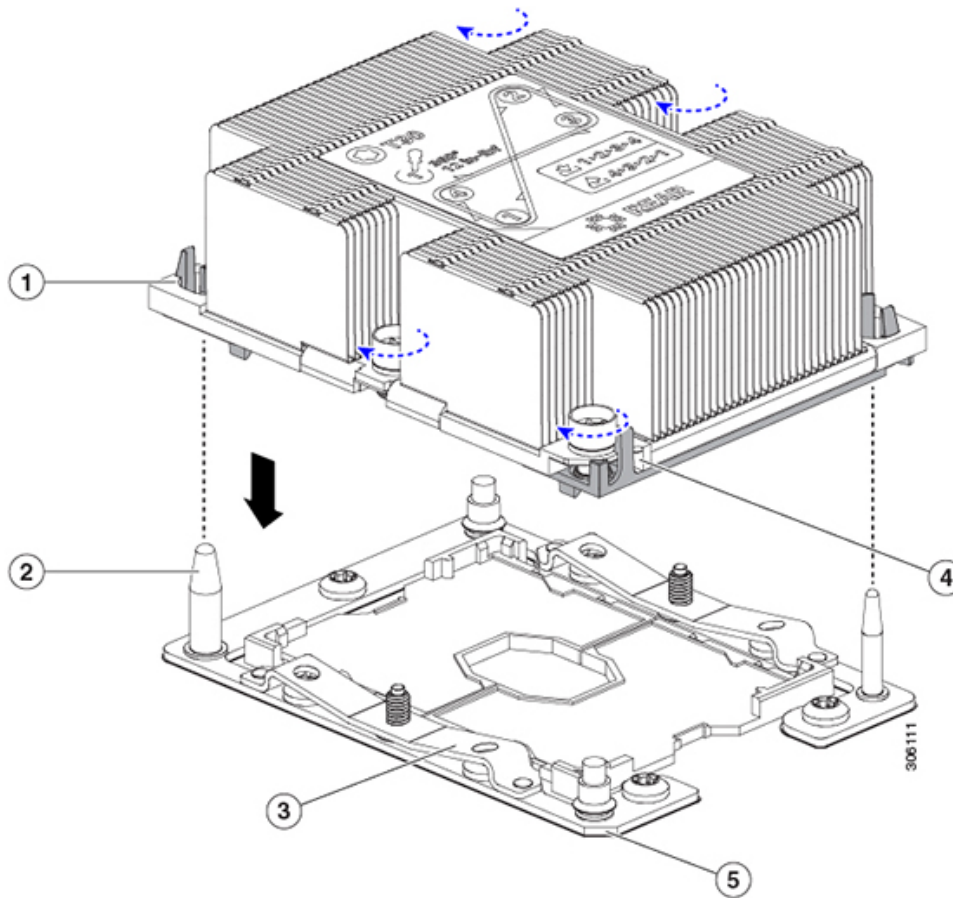
- Caution**        In the following step, use extreme care to avoid touching or damaging the CPU contacts or the CPU socket pins.

- Step 6**        Install the CPU/heatsink assembly to the server:

- a) Lift the heatsink with attached CPU assembly from the CPU assembly tool.
- b) Align the assembly over the CPU socket on the motherboard.

Note the alignment features. The pin 1 angled corner on the heatsink must align with the pin 1 angled corner on the CPU socket. The CPU-socket posts must align with the guide-holes in the assembly.

Figure 13: Installing the Heatsink/CPU Assembly to the CPU Socket



1 Guide hole in assembly (two)	4 Angled corner on heatsink (pin 1 alignment feature)
2 CPU socket alignment post (two)	5 Angled corner on socket (pin 1 alignment feature)
3 CPU socket leaf spring	-

- c) Set the heatsink with CPU assembly down onto the CPU socket.
- d) Use the T-30 Torx driver that is supplied with the replacement CPU to tighten the four captive nuts that secure the heatsink to the motherboard standoffs.

**Note** Alternate tightening the heatsink nuts evenly so that the heatsink remains level while it is lowered. Tighten the heatsink nuts in the order shown on the heatsink label: 1, 2, 3, 4. The captive nuts must be fully tightened so that the leaf springs on the CPU socket lie flat.

- e) Replace the top cover to the server.
- f) Replace the server in the rack, replace cables, and then fully power on the server by pressing the Power button.

## Additional CPU-Related Parts to Order with RMA Replacement CPUs

When a return material authorization (RMA) of the CPU is done on a Cisco UCS C-Series server, additional parts might not be included with the CPU spare. The TAC engineer might need to add the additional parts to the RMA to help ensure a successful replacement.



**Note** The following items apply to CPU *replacement* scenarios. If you are replacing a system chassis and *moving* existing CPUs to the new chassis, you do not have to separate the heatsink from the CPU. See [Additional CPU-Related Parts to Order with RMA Replacement System Chassis, on page 32](#).

- Scenario 1—You are reusing the existing heatsinks:
  - Heat sink cleaning kit (UCSX-HSCK=)  
One cleaning kit can clean up to four CPUs.
  - Thermal interface material (TIM) kit for M5 servers (UCS-CPU-TIM=)  
One TIM kit covers one CPU.
- Scenario 2—You are replacing the existing heatsinks:



**Caution** Use only the correct heatsink for your CPUs to ensure proper cooling. There are two different heatsinks: UCSC-HS-C240M5= for CPUs 150 W and less; UCSC-HS2-C240M5= for CPUs above 150 W.

- Heat sink: UCSC-HS-C240M5= for CPUs 150 W and less; UCSC-HS2-C240M5= for CPUs above 150 W  
New heatsinks have a pre-applied pad of TIM.
- Heat sink cleaning kit (UCSX-HSCK=)  
One cleaning kit can clean up to four CPUs.
- Scenario 3—You have a damaged CPU carrier (the plastic frame around the CPU):
  - CPU Carrier: UCS-M5-CPU-CAR=
  - #1 flat-head screwdriver (for separating the CPU from the heatsink)
  - Heatsink cleaning kit (UCSX-HSCK=)  
One cleaning kit can clean up to four CPUs.
  - Thermal interface material (TIM) kit for M5 servers (UCS-CPU-TIM=)  
One TIM kit covers one CPU.

A CPU heat sink cleaning kit is good for up to four CPU and heat sink cleanings. The cleaning kit contains two bottles of solution, one to clean the CPU and heat sink of old TIM and the other to prepare the surface of the heat sink.

New heat sink spares come with a pre-applied pad of TIM. It is important to clean any old TIM off of the CPU surface prior to installing the heat sinks. Therefore, even when you are ordering new heat sinks, you must order the heat sink cleaning kit.

## Additional CPU-Related Parts to Order with RMA Replacement System Chassis

When a return material authorization (RMA) of the system chassis is done on a Cisco UCS C-Series server, you move existing CPUs to the new chassis.



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**Note** Unlike previous generation CPUs, the M5 server CPUs do not require you to separate the heatsink from the CPU when you *move* the CPU-heatsink assembly. Therefore, no additional heatsink cleaning kit or thermal-interface material items are required.

---

- The only tool required for moving a CPU/heatsink assembly is a T-30 Torx driver.

To move a CPU to a new chassis, use the procedure in [Moving an M5 Generation CPU, on page 32](#).

## Moving an M5 Generation CPU

**Tool required for this procedure:** T-30 Torx driver



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**Caution** When you receive a replacement server for an RMA, it includes dust covers on all CPU sockets. These covers protect the socket pins from damage during shipping. You must transfer these covers to the system that you are returning, as described in this procedure.

---

**Step 1** When moving an M5 CPU to a new server, you do not have to separate the heatsink from the CPU. Perform the following steps:

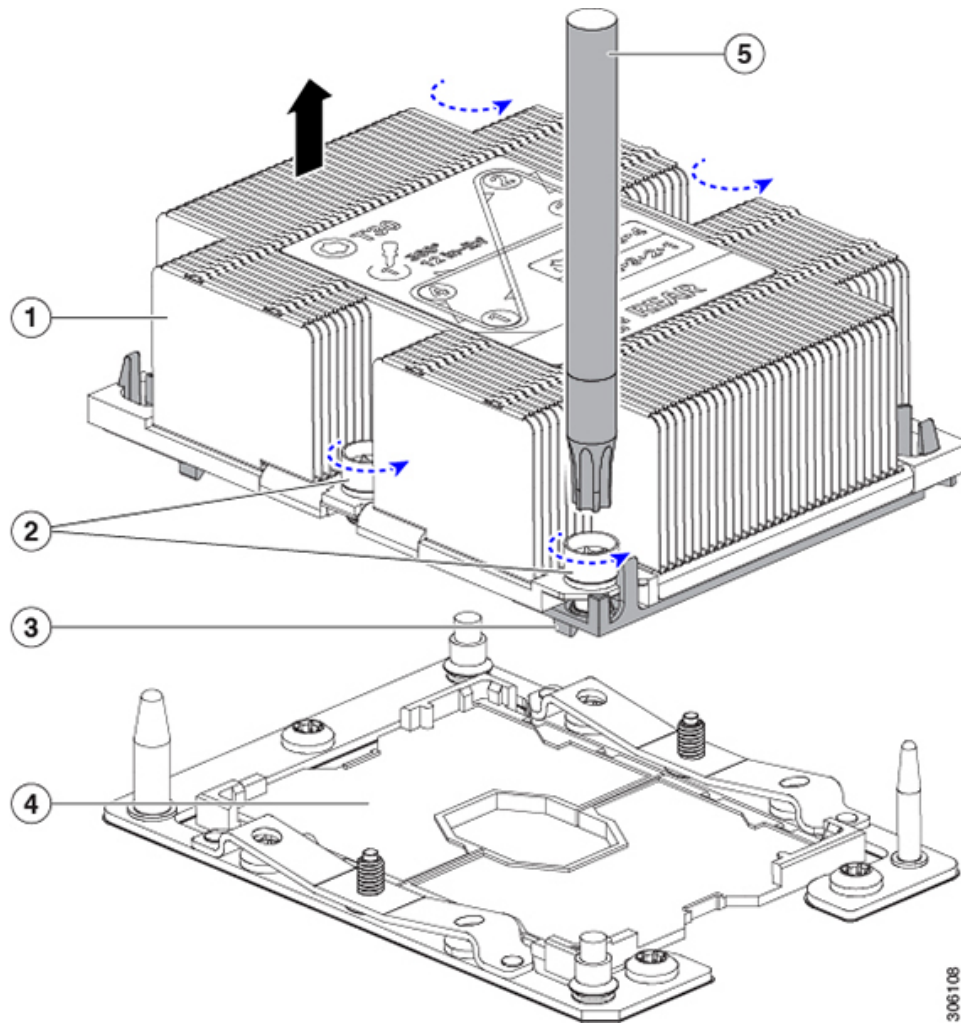
- a) Use a T-30 Torx driver to loosen the four captive nuts that secure the assembly to the board standoffs.

**Note** Alternate loosening the heatsink nuts evenly so that the heatsink remains level as it is raised. Loosen the heatsink nuts in the order shown on the heatsink label: 4, 3, 2, 1.

- b) Lift straight up on the CPU/heatsink assembly to remove it from the board.
- c) Set the CPUs with heatsinks aside on an anti-static surface.



Figure 14: Removing the CPU/Heatsink Assembly



Heatsink	5-bit Torx driver
Heatsink captive nuts (two on each side)	5-bit Torx driver
CPU carrier (below heatsink in this view)	-

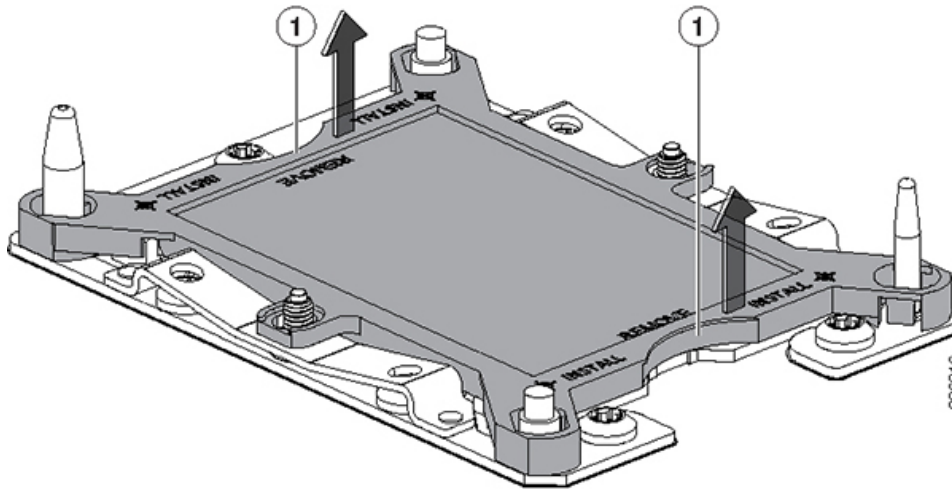
**Step 2**

Transfer the CPU socket covers from the new system to the system that you are returning:

- a) Remove the socket covers from the replacement system. Grasp the two recessed finger-grip areas marked "REMOVE" and lift straight up.

**Note** Keep a firm grasp on the finger-grip areas at both ends of the cover. Do not make contact with the CPU socket pins.

Figure 15: Removing a CPU Socket Dust Cover



Finger-grip areas marked "REMOVE"	-
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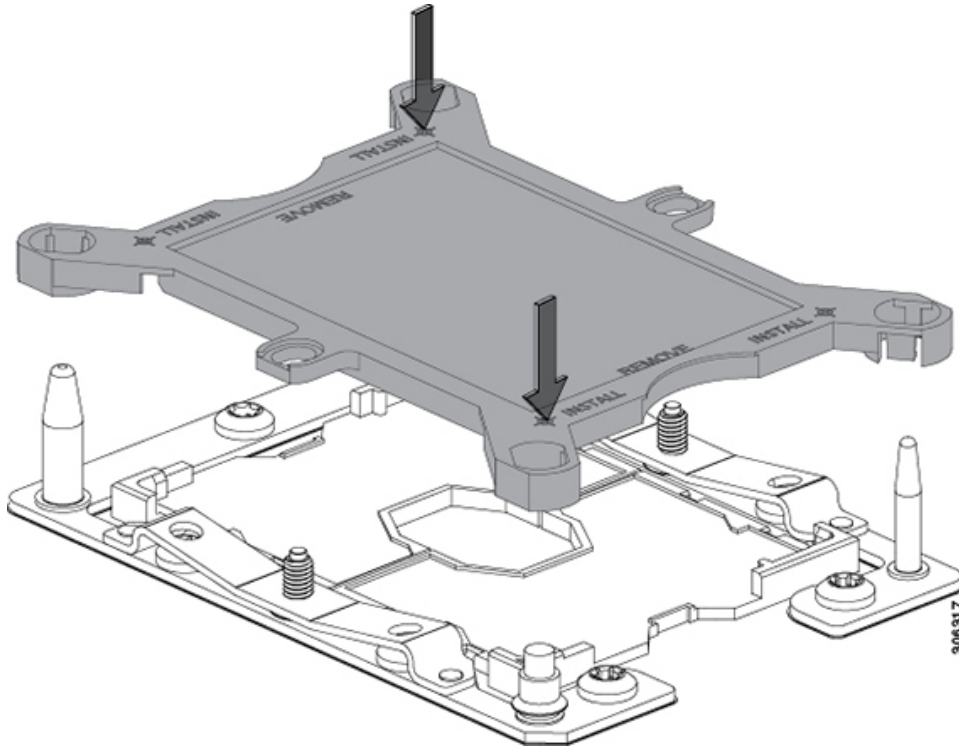
- b) With the wording on the dust cover facing up, set it in place over the CPU socket. Make sure that all alignment posts on the socket plate align with the cutouts on the cover.

**Caution** In the next step, do not press down anywhere on the cover except the two points described. Pressing elsewhere might damage the socket pins.

- c) Press down on the two circular markings next to the word "INSTALL" that are closest to the two threaded posts (see the following figure). Press until you feel and hear a click.

**Note** You must press until you feel and hear a click to ensure that the dust covers do not come loose during shipping.

Figure 16: Installing a CPU Socket Dust Cover



Press down on the two circular marks next to the word INSTALL.	-
--	---

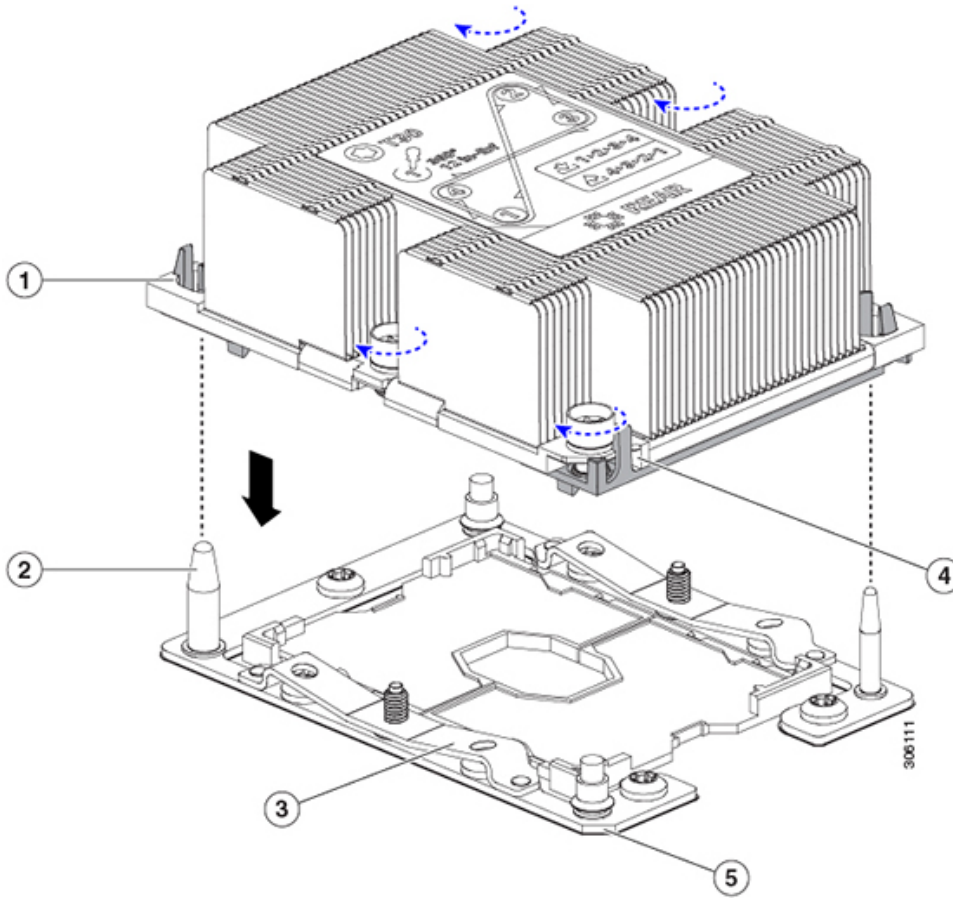
### Step 3

Install the CPUs to the new system:

- a) On the new board, align the assembly over the CPU socket, as shown below.

Note the alignment features. The pin 1 angled corner on the heatsink must align with the pin 1 angled corner on the CPU socket. The CPU-socket posts must align with the guide-holes in the assembly.

Figure 17: Installing the Heatsink/CPU Assembly to the CPU Socket



1 Guide hole in assembly (two)	4 Angled corner on heatsink (pin 1 alignment feature)
2 CPU socket alignment post (two)	5 Angled corner on socket (pin 1 alignment feature)
3 CPU socket leaf spring	-

- b) On the new board, set the heatsink with CPU assembly down onto the CPU socket.
- c) Use a T-30 Torx driver to tighten the four captive nuts that secure the heatsink to the board standoffs.

**Note** Alternate tightening the heatsink nuts evenly so that the heatsink remains level while it is lowered. Tighten the heatsink nuts in the order shown on the heatsink label: 1, 2, 3, 4. The captive nuts must be fully tightened so that the leaf springs on the CPU socket lie flat.

# Replacing Memory DIMMs



**Caution** DIMMs and their sockets are fragile and must be handled with care to avoid damage during installation.



**Caution** Cisco does not support third-party DIMMs. Using non-Cisco DIMMs in the server might result in system problems or damage to the motherboard.



**Note** To ensure the best server performance, it is important that you are familiar with memory performance guidelines and population rules before you install or replace DIMMs.

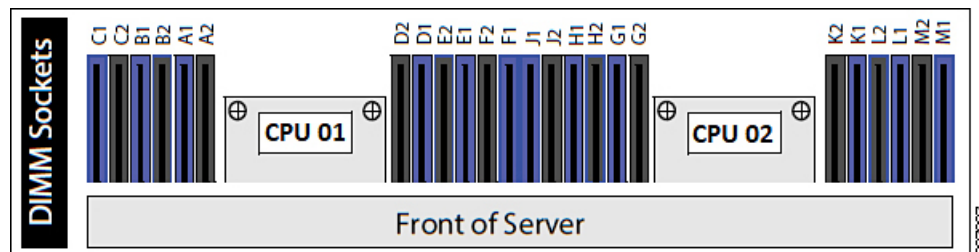
## DIMM Population Rules and Memory Performance Guidelines

This topic describes the rules and guidelines for maximum memory performance.

### DIMM Slot Numbering

The following figure shows the numbering of the DIMM slots on the motherboard.

*Figure 18: DIMM Slot Numbering*



### DIMM Population Rules

Observe the following guidelines when installing or replacing DIMMs for maximum performance:

- Each CPU supports six memory channels.
  - CPU 1 supports channels A, B, C, D, E, F.
  - CPU 2 supports channels G, H, J, K, L, M.
- Each channel has two DIMM sockets (for example, channel A = slots A1, A2).
- In a single-CPU configuration, populate the channels for CPU1 only (A, B, C, D, E, F).

- For optimal performance, populate DIMMs in the order shown in the following table, depending on the number of CPUs and the number of DIMMs per CPU. If your server has two CPUs, balance DIMMs evenly across the two CPUs as shown in the table.



**Note** The table below lists recommended configurations. Using 5, 7, 9, 10, or 11 DIMMs per CPU is not recommended.

**Table 3: DIMM Population Order**

Number of DIMMs per CPU (Recommended Configurations)	Populate CPU 2 Slot		Populate CPU 1 Slots	
	Blue #1 Slots	Black #2 Slots	Blue #1 Slots	Black #2 Slots
1	(K1)	-	(D1)	-
2	(K1, L1)	-	(D1, E1)	-
3	(K1, L1, M1)	-	(D1, E1, F1)	-
4	(K1, L1); (G1, H1)	-	(D1, E1); (A1, B1)	-
6	(K1, L1); (M1, G1); (H1, J1)	-	(D1, E1); (F1, A1); (B1, C1)	-
8	(K1, L1); (G1, H1)	(K2, L2); (G2, H2)	(D1, E1); (A1, B1)	(D2, E2); (A2, B2)
12	(K1, L1); (M1, G1); (H1, J1)	(K2, L2); (M2, G2); (H2, J2)	(D1, E1); (F1, A1); (B1, C1)	(D2, E2); (F2, A2); (B2, C2)

- The maximum combined memory allowed in the 12 DIMM slots controlled by any one CPU is 768 GB. To populate the 12 DIMM slots with more than 768 GB of combined memory, you must use a high-memory CPU that has a PID that ends with an "M", for example, UCS-CPU-6134M.
- Memory mirroring reduces the amount of memory available by 50 percent because only one of the two populated channels provides data. When memory mirroring is enabled, you must install DIMMs in even numbers of channels.
- NVIDIA M-Series GPUs can support only less-than 1 TB memory in the server.
- NVIDIA P-Series GPUs can support 1 TB or more memory in the server.
- AMD FirePro S7150 X2 GPUs can support only less-than 1 TB memory in the server.
- Observe the DIMM mixing rules shown in the following table.

**Table 4: DIMM Mixing Rules**

DIMM Parameter	DIMMs in the Same Channel	DIMMs in the Same Bank
----------------	---------------------------	------------------------

DIMM Capacity For example, 8GB, 16GB, 32GB, 64GB, 128GB	You can mix different capacity DIMMs in the same channel (for example, A1, A2).	You cannot mix DIMM capacities in a bank (for example A1, B1). Pairs of DIMMs must be identical (same PID and revision).
DIMM speed For example, 2666 GHz	You can mix speeds, but DIMMs will run at the speed of the slowest DIMMs/CPU's installed in the channel.	You cannot mix DIMM speeds in a bank (for example A1, B1). Pairs of DIMMs must be identical (same PID and revision).
DIMM type RDIMMs or LRDIMMs	You cannot mix DIMM types in a channel.	You cannot mix DIMM types in a bank.

### Memory Mirroring

The CPUs in the server support memory mirroring only when an even number of channels are populated with DIMMs. If one or three channels are populated with DIMMs, memory mirroring is automatically disabled.

Memory mirroring reduces the amount of memory available by 50 percent because only one of the two populated channels provides data. The second, duplicate channel provides redundancy.

## Replacing DIMMs

### Identifying a Faulty DIMM

Each DIMM socket has a corresponding DIMM fault LED, directly in front of the DIMM socket. See [Internal Diagnostic LEDs, on page 5](#) for the locations of these LEDs. When the server is in standby power mode, these LEDs light amber to indicate a faulty DIMM.

#### Step 1

Remove an existing DIMM:

- a) Shut down and remove power from the server as described in [Shutting Down and Removing Power From the Server, on page 7](#).
- b) Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

**Caution** If you cannot safely view and access the component, remove the server from the rack.

- c) Remove the top cover from the server as described in [Removing the Server Top Cover, on page 9](#).
- d) Remove the air baffle that covers the front ends of the DIMM slots to provide clearance.
- e) Locate the DIMM that you are removing, and then open the ejector levers at each end of its DIMM slot.

#### Step 2

Install a new DIMM:

**Note** Before installing DIMMs, see the memory population rules for this server: [DIMM Population Rules and Memory Performance Guidelines , on page 37](#).

- a) Align the new DIMM with the empty slot on the motherboard. Use the alignment feature in the DIMM slot to correctly orient the DIMM.
- b) Push down evenly on the top corners of the DIMM until it is fully seated and the ejector levers on both ends lock into place.
- c) Replace the top cover to the server.

- d) Replace the server in the rack, replace cables, and then fully power on the server by pressing the Power button.

---

## Replacing Intel Optane DC Persistent Memory Modules

This topic contains information for replacing Intel Optane Data Center Persistent memory modules (DCPMMs), including population rules and methods for verifying functionality. DCPMMs have the same form-factor as DDR4 DIMMs and they install to DIMM slots.



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**Caution** DCPMMs and their sockets are fragile and must be handled with care to avoid damage during installation.

---



---

**Note** To ensure the best server performance, it is important that you are familiar with memory performance guidelines and population rules before you install or replace DCPMMs.

---



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**Note** Intel Optane DC persistent memory modules require Second Generation Intel Xeon Scalable processors. You must upgrade the server firmware and BIOS to version 4.0(4) or later and install the supported Second Generation Intel Xeon Scalable processors before installing DCPMMs.

---

DCPMMs can be configured to operate in one of three modes:

- **Memory Mode:** The module operates as 100% memory module. Data is volatile and DRAM acts as a cache for DCPMMs.
- **App Direct Mode:** The module operates as a solid-state disk storage device. Data is saved and is non-volatile.
- **Mixed Mode (25% Memory Mode + 75% App Direct):** The module operates with 25% capacity used as volatile memory and 75% capacity used as non-volatile storage.

## Intel Optane DC Persistent Memory Module Population Rules and Performance Guidelines

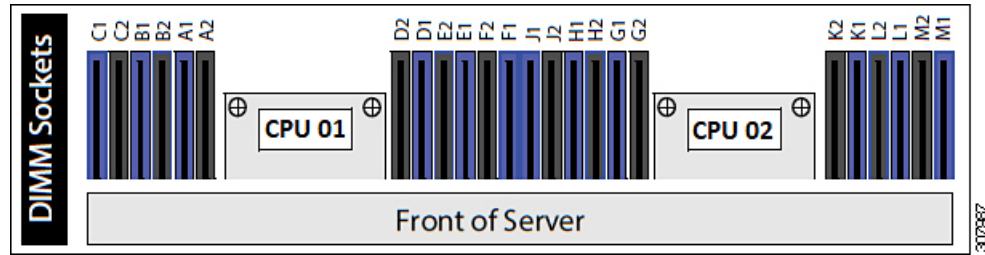
This topic describes the rules and guidelines for maximum memory performance when using Intel Optane DC persistent memory modules (DCPMMs) with DDR4 DRAM DIMMs.

### DIMM Slot Numbering

The following figure shows the numbering of the DIMM slots on the server motherboard.



Figure 19: DIMM Slot Numbering



### Configuration Rules

Observe the following rules and guidelines:

- To use DCPMMs in this server, two CPUs must be installed.
- Intel Optane DC persistent memory modules require Second Generation Intel Xeon Scalable processors. You must upgrade the server firmware and BIOS to version 4.0(4) or later and then install the supported Second Generation Intel Xeon Scalable processors before installing DCPMMs.
- The DCPMMs run at 2666 MHz. If you have 2933 MHz RDIMMs or LRDIMMs in the server and you add DCPMMs, the main memory speed clocks down to 2666 MHz to match the speed of the DCPMMs.
- Each DCPMM draws 18 W sustained, with a 20 W peak.
- When using DCPMMs in a server:
  - The DDR4 DIMMs installed in the server must all be the same size.
  - The DCPMMs installed in the server must all be the same size and must have the same SKU.
- The following table shows supported DCPMM configurations for this server. Fill the DIMM slots for CPU 1 and CPU2 as shown, depending on which DCPMM:DRAM ratio you want to populate.

Figure 20: Supported DCPMM Configurations for Dual-CPU Configurations

DIMM to DCPMM Count	CPU 1											
	IMC1						IMC0					
	Channel 2		Channel 1		Channel 0		Channel 2		Channel 1		Channel 0	
	F2	F1	E2	E1	D2	D1	C2	C1	B2	B1	A2	A1
6 to 2		DIMM		DIMM	DCPMM	DIMM		DIMM		DIMM	DCPMM	DIMM
6 to 4		DIMM	DCPMM	DIMM	DCPMM	DIMM		DIMM	DCPMM	DIMM	DCPMM	DIMM
6 to 6	DCPMM	DIMM	DCPMM	DIMM	DCPMM	DIMM	DCPMM	DIMM	DCPMM	DIMM	DCPMM	DIMM

DIMM to DCPMM Count	CPU 2											
	IMC1						IMC0					
	Channel 2		Channel 1		Channel 0		Channel 2		Channel 1		Channel 0	
	M2	M1	L2	L1	K2	K1	J2	J1	H2	H1	G2	G1
6 to 2		DIMM		DIMM	DCPMM	DIMM		DIMM		DIMM	DCPMM	DIMM
6 to 4		DIMM	DCPMM	DIMM	DCPMM	DIMM		DIMM	DCPMM	DIMM	DCPMM	DIMM
6 to 6	DCPMM	DIMM	DCPMM	DIMM	DCPMM	DIMM	DCPMM	DIMM	DCPMM	DIMM	DCPMM	DIMM

# Installing Intel Optane DC Persistent Memory Modules



**Note** DCPMM configuration is always applied to all DCPMMs in a region, including a replacement DCPMM. You cannot provision a specific replacement DCPMM on a preconfigured server.

Understand which mode your DCPMM is operating in. App Direct mode has some additional considerations in this procedure.



**Caution** Replacing a DCPMM in App-Direct mode requires all data to be wiped from the DCPMM. Make sure to backup or offload data before attempting this procedure.

- Step 1** For App Direct mode, backup the existing data stored in all Optane DIMMs to some other storage.
- Step 2** For App Direct mode, remove the Persistent Memory policy which will remove goals and namespaces automatically from all Optane DIMMs.
- Step 3** Remove an existing DCPMM:
- Shut down and remove power from the server as described in [Shutting Down and Removing Power From the Server, on page 7](#).
  - Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.  
**Caution** If you cannot safely view and access the component, remove the server from the rack.
  - Remove the top cover from the server as described in [Removing the Server Top Cover, on page 9](#).
  - Remove the air baffle that covers the front ends of the DIMM slots to provide clearance.  
**Caution** If you are moving DCPMMs with active data (persistent memory) from one server to another as in an RMA situation, each DCPMM must be installed to the identical position in the new server. Note the positions of each DCPMM or temporarily label them when removing them from the old server.
  - Locate the DCPMM that you are removing, and then open the ejector levers at each end of its DIMM slot.
- Step 4** Install a new DCPMM:
- Note** Before installing DCPMMs, see the population rules for this server: [Intel Optane DC Persistent Memory Module Population Rules and Performance Guidelines, on page 40](#).
- Align the new DCPMM with the empty slot on the motherboard. Use the alignment feature in the DIMM slot to correctly orient the DCPMM.
  - Push down evenly on the top corners of the DCPMM until it is fully seated and the ejector levers on both ends lock into place.
  - Reinstall the air baffle.
  - Replace the top cover to the server.
  - Replace the server in the rack, replace cables, and then fully power on the server by pressing the Power button.
- Step 5** Perform post-installation actions:

**Note** If your Persistent Memory policy is Host Controlled, you must perform the following actions from the OS side.

- If the existing configuration is in 100% Memory mode, and the new DCPMM is also in 100% Memory mode (the factory default), the only action is to ensure that all DCPMMs are at the latest, matching firmware level.
- If the existing configuration is fully or partly in App-Direct mode and new DCPMM is also in App-Direct mode, then ensure that all DCPMMs are at the latest matching firmware level and also re-provision the DCPMMs by creating a new goal.
  - For App Direct mode, reapply the Persistent Memory policy.
  - For App Direct mode, restore all the offloaded data to the DCPMMs.
- If the existing configuration and the new DCPMM are in different modes, then ensure that all DCPMMs are at the latest matching firmware level and also re-provision the DCPMMs by creating a new goal.

There are a number of tools for configuring goals, regions, and namespaces.

- To use the server's BIOS Setup Utility, see [Server BIOS Setup Utility Menu for DCPMM, on page 43](#).
- To use Cisco IMC or Cisco UCS Manager, see the [Cisco UCS: Configuring and Managing Intel Optane DC Persistent Memory Modules](#) guide.

---

## Server BIOS Setup Utility Menu for DCPMM



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**Caution** Potential data loss: If you change the mode of a currently installed DCPMM from App Direct or Mixed Mode to Memory Mode, any data in persistent memory is deleted.

---

DCPMMs can be configured by using the server's BIOS Setup Utility, Cisco IMC, Cisco UCS Manager, or OS-related utilities.

- To use the BIOS Setup Utility, see the section below.
- To use Cisco IMC, see the configuration guides for Cisco IMC 4.0(4) or later: [Cisco IMC CLI and GUI Configuration Guides](#)
- To use Cisco UCS Manager, see the configuration guides for Cisco UCS Manager 4.0(4) or later: [Cisco UCS Manager CLI and GUI Configuration Guides](#)

The server BIOS Setup Utility includes menus for DCPMMs. They can be used to view or configure DCPMM regions, goals, and namespaces, and to update DCPMM firmware.

To open the BIOS Setup Utility, press **F2** when prompted onscreen during a system boot.

The DCPMM menu is on the Advanced tab of the utility:

```
Advanced > Intel Optane DC Persistent Memory Configuration
```

From this tab, you can access other menus:

- **DIMMs:** Displays the installed DCPMMs. From this page, you can update DCPMM firmware and configure other DCPMM parameters.

- Monitor health
- Update firmware
- Configure security

You can enable security mode and set a password so that the DCPMM configuration is locked. When you set a password, it applies to all installed DCPMMs. Security mode is disabled by default.

- Configure data policy

- **Regions:** Displays regions and their persistent memory types. When using App Direct mode with interleaving, the number of regions is equal to the number of CPU sockets in the server. When using App Direct mode without interleaving, the number of regions is equal to the number of DCPMMs in the server.

From the Regions page, you can configure memory goals that tell the DCPMM how to allocate resources.

- Create goal config

- **Namespaces:** Displays namespaces and allows you to create or delete them when persistent memory is used. Namespaces can also be created when creating goals. A namespace provisioning of persistent memory applies only to the selected region.

Existing namespace attributes such as the size cannot be modified. You can only add or delete namespaces.

- **Total capacity:** Displays the total DCPMM resource allocation across the server.

### Updating the DCPMM Firmware Using the BIOS Setup Utility

You can update the DCPMM firmware from the BIOS Setup Utility if you know the path to the .bin files. The firmware update is applied to all installed DCPMMs.

1. Navigate to **Advanced > Intel Optane DC Persistent Memory Configuration > DIMMs > Update firmware**
2. Under **File:** , provide the file path to the .bin file.
3. Select **Update** .

## Replacing a Micro SD Card

There is one socket for a Micro SD card on the top of PCIe riser 1.



### Caution

To avoid data loss, we do not recommend that you hot-swap the Micro SD card while it is operating, as indicated by its activity LED turning amber. The activity LED turns amber when the Micro SD card is updating or deleting.

- Step 1** Remove an existing Micro SD card:

- a) Shut down and remove power from the server as described in [Shutting Down and Removing Power From the Server, on page 7](#).
- b) Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

**Caution** If you cannot safely view and access the component, remove the server from the rack.

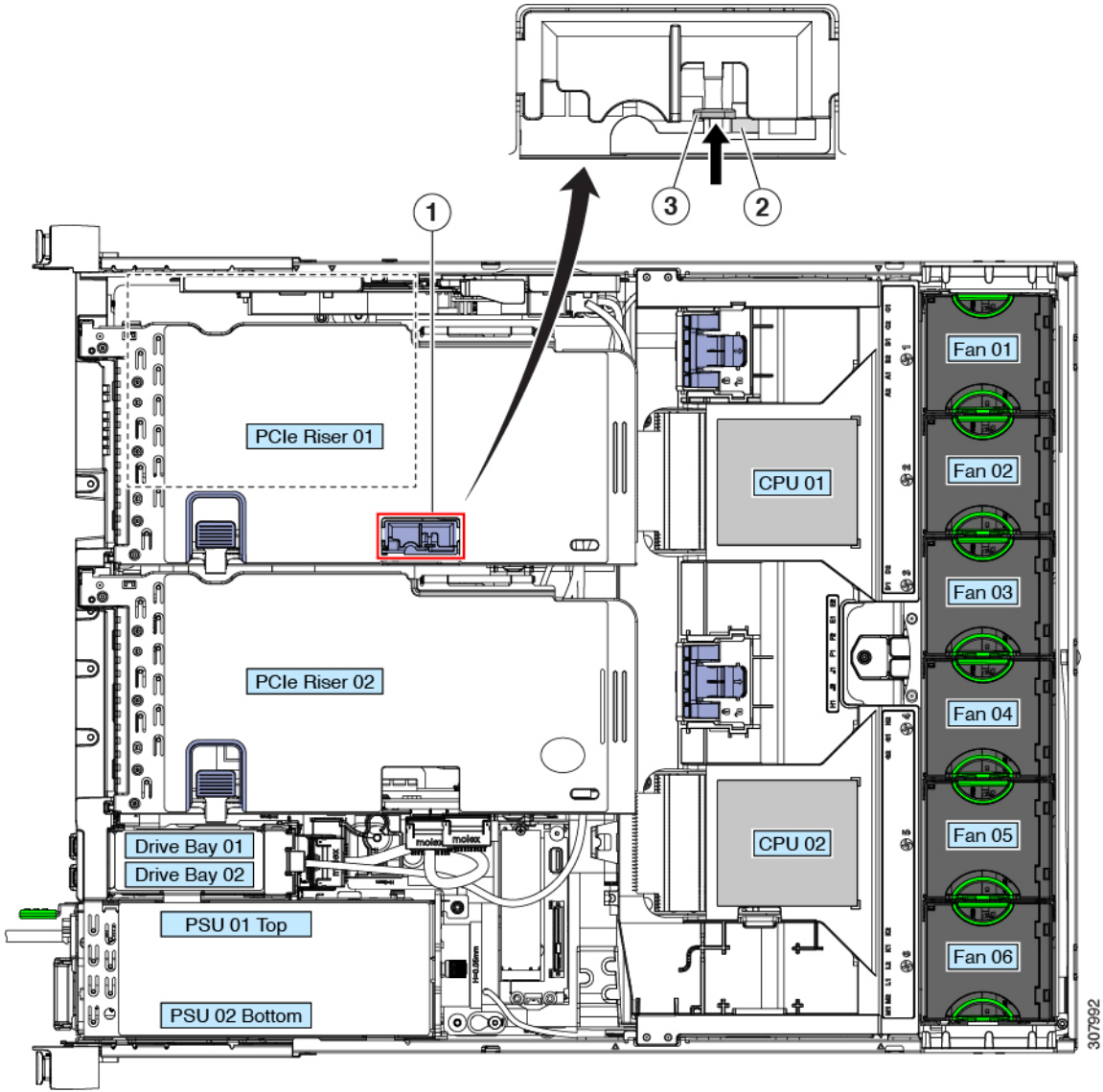
- c) Remove the top cover from the server as described in [Removing the Server Top Cover, on page 9](#).
- d) Locate the Micro SD card. The socket is on the top of PCIe riser 1, under a plastic cover.
- e) Use your fingertip to push the retainer on the plastic socket cover open far enough to provide access to the Micro SD card, then push down and release the Micro SD card to make it spring up.
- f) Grasp the Micro SD card and lift it from the socket.

## Step 2

Install a new Micro SD card:

- a) While holding the retainer on the plastic cover open with your fingertip, align the new Micro SD card with the socket.
- b) Gently push down on the card until it clicks and locks in place in the socket.
- c) Replace the top cover to the server.
- d) Replace the server in the rack, replace cables, and then fully power on the server by pressing the Power button.

Figure 21: Location of Internal Micro SD Card Socket



<p>Location of Micro SD card socket on the top of PCIe riser 1</p>	<p>Plastic retainer (push aside to access socket)</p>
<p>Micro SD card socket under plastic retainer</p>	

# Replacing a USB Drive



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**Caution** We do not recommend that you hot-swap the internal USB drive while the server is powered on because of the potential for data loss.

---

## Step 1

Remove an existing internal USB drive:

- a) Shut down and remove power from the server as described in [Shutting Down and Removing Power From the Server, on page 7](#).
- b) Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

**Caution** If you cannot safely view and access the component, remove the server from the rack.

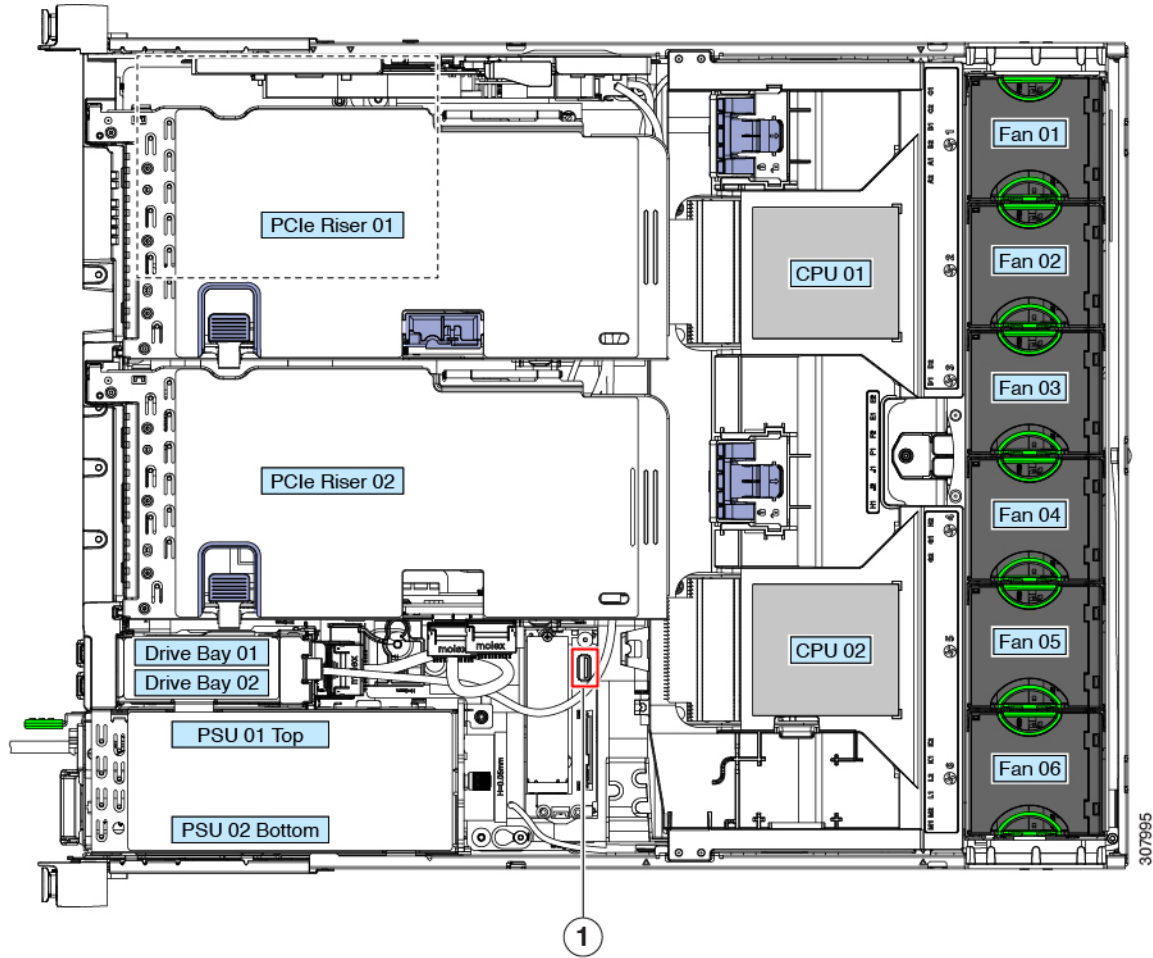
- c) Remove the top cover from the server as described in [Removing the Server Top Cover, on page 9](#).
- d) Locate the USB socket on the motherboard, in front of the power supplies.
- e) Grasp the USB drive and pull it vertically to free it from the socket.

## Step 2

Install a new internal USB drive:

- a) Align the USB drive with the socket.
- b) Push the USB drive vertically to fully engage it with the socket.
- c) Replace the top cover to the server.
- d) Replace the server in the rack, replace cables, and then fully power on the server by pressing the Power button.

Figure 22: Location of Internal USB Port



Location of vertical USB socket on motherboard	-
--	---

## Enabling or Disabling the Internal USB Port

The factory default is that all USB ports on the server are enabled. However, the internal USB port can be enabled or disabled in the server BIOS.

- Step 1** Enter the BIOS Setup Utility by pressing the **F2** key when prompted during bootup.
- Step 2** Navigate to the **Advanced** tab.
- Step 3** On the Advanced tab, select **USB Configuration**.
- Step 4** On the USB Configuration page, select **USB Ports Configuration**.
- Step 5** Scroll to **USB Port: Internal**, press **Enter**, and then choose either **Enabled** or **Disabled** from the dialog box.



**Step 6** Press **F10** to save and exit the utility.

---

## Replacing the RTC Battery



**Warning** There is danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

[Statement 1015]

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**Warning Recyclers:** Do not shred the battery! Make sure you dispose of the battery according to appropriate regulations for your country or locale.

---

The real-time clock (RTC) battery retains system settings when the server is disconnected from power. The battery type is CR2032. Cisco supports the industry-standard CR2032 battery, which can be ordered from Cisco (PID N20-MBLIBATT) or purchased from most electronic stores.

Removing the RTC battery impacts the following:

- Real clock time gets reset to default value.
  - CMOS setting of the server is lost. You should reset the system setting after replacing the RTC battery.
- 

**Step 1** Remove the RTC battery:

- a) Shut down and remove power from the server as described in [Shutting Down and Removing Power From the Server, on page 7](#).
- b) Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the front panel to provide clearance.

**Caution** If you cannot safely view and access the component, remove the server from the rack.

- c) Remove the top cover from the server as described in [Removing the Server Top Cover, on page 9](#).
- d) Remove PCIe riser 1 from the server to provide clearance to the RTC battery socket that is on the motherboard. See [Replacing a PCIe Riser, on page 55](#).
- e) Locate the horizontal RTC battery socket.
- f) Remove the battery from the socket on the motherboard. Gently pry the securing clip to the side to provide clearance, then lift up on the battery.

**Step 2** Install a new RTC battery:

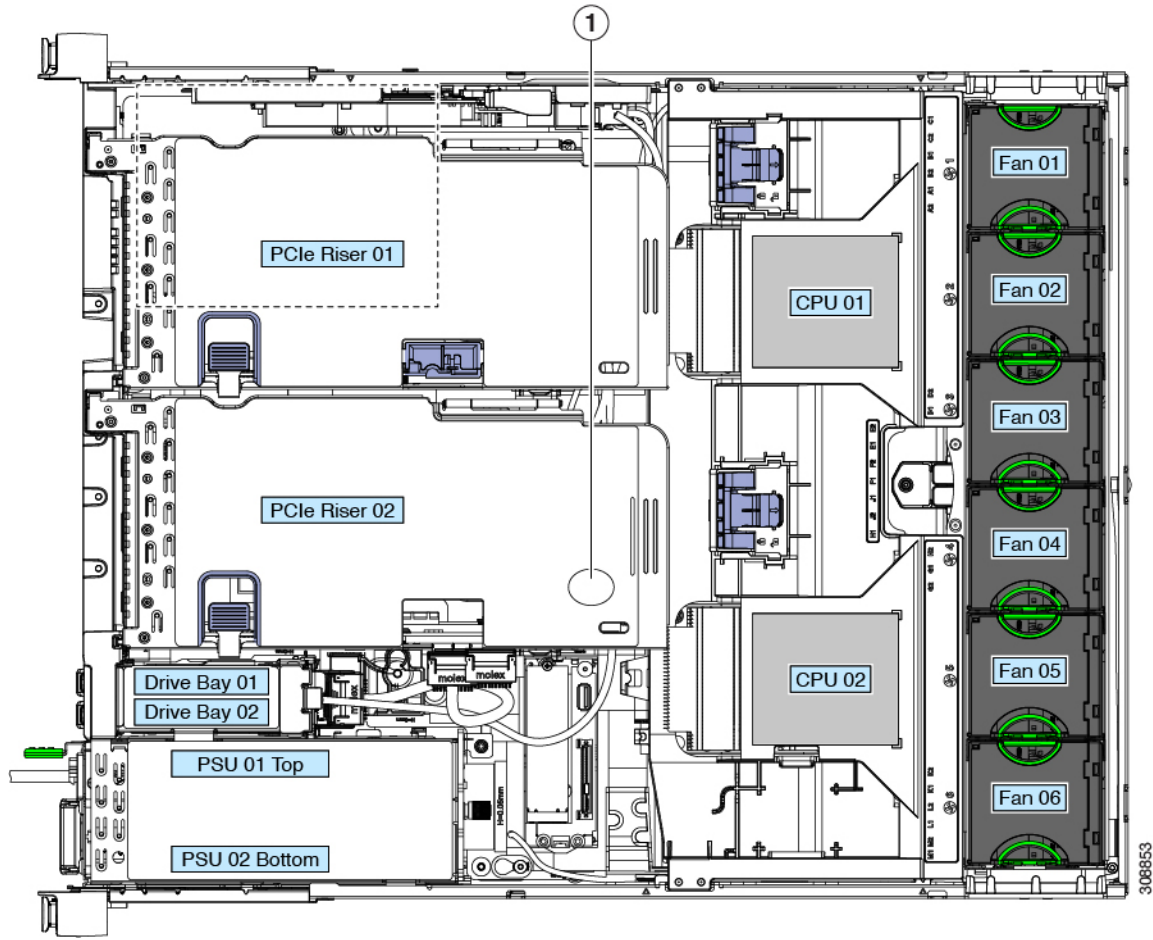
- a) Insert the battery into its socket and press down until it clicks in place under the clip.

**Note** The positive side of the battery marked “3V+” should face up.

- b) Replace PCIe riser 1 to the server. See [Replacing a PCIe Riser, on page 55](#).
- c) Replace the top cover to the server.

d) Replace the server in the rack, replace cables, and then fully power on the server by pressing the Power button.

Figure 23: RTC Battery Location on Motherboard



RTC battery in horizontal socket on motherboard	-
---	---

## Replacing Power Supplies

The server can have one or two power supplies. When two power supplies are installed they are redundant as 1+1.

- See also [Power Specifications](#) for more information about the supported power supplies.
- See also [Front-Panel LEDs, on page 2](#) for information about the power supply LEDs.

This section includes procedures for replacing AC and DC power supply units.

# Replacing AC Power Supplies



**Note** If you have ordered a server with power supply redundancy (two power supplies), you do not have to power off the server to replace a power supply because they are redundant as 1+1.



**Note** Do not mix power supply types or wattages in the server. Both power supplies must be identical.



**Caution** DO NOT interchange power supplies of Cisco UCS C240 M5 servers and Cisco UCS C240 SD M5 servers.

## Step 1

Remove the power supply that you are replacing or a blank panel from an empty bay:

a) Perform one of the following actions:

- If your server has only one power supply, shut down and remove power from the server as described in [Shutting Down and Removing Power From the Server, on page 7](#).
- If your server has two power supplies, you do not have to shut down the server.

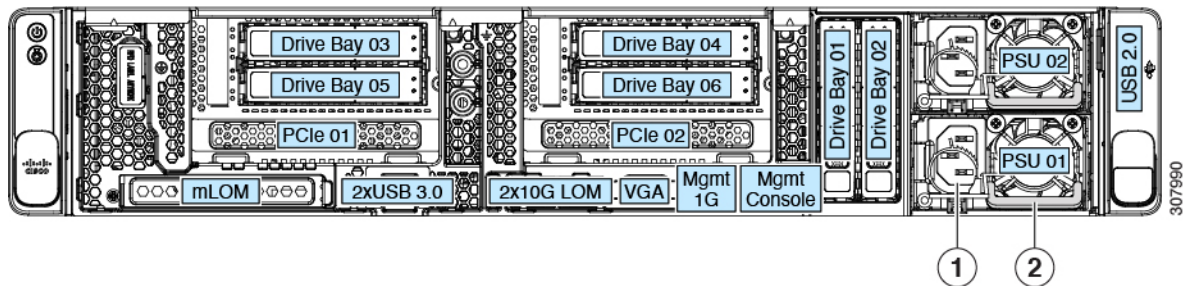
- b) Remove the power cord from the power supply that you are replacing.
- c) Grasp the power supply handle while pinching the release lever toward the handle.
- d) Pull the power supply out of the bay.

## Step 2

Install a new power supply:

- a) Grasp the power supply handle and insert the new power supply into the empty bay.
- b) Push the power supply into the bay until the release lever locks.
- c) Connect the power cord to the new power supply.
- d) Only if you shut down the server, press the Power button to boot the server to main power mode.

**Figure 24: Replacing AC Power Supplies**



Power supply release lever	Power supply handle
----------------------------	---------------------

## Replacing DC Power Supplies



**Note** This procedure is for replacing DC power supplies in a server that already has DC power supplies installed. If you are installing DC power supplies to the server for the first time, see [Installing DC Power Supplies \(First Time Installation\)](#), on page 53.



**Warning** A readily accessible two-poled disconnect device must be incorporated in the fixed wiring.

Statement 1022



**Warning** This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations.

Statement 1045



**Warning** Installation of the equipment must comply with local and national electrical codes.

Statement 1074



**Note** If you are replacing DC power supplies in a server with power supply redundancy (two power supplies), you do not have to power off the server to replace a power supply because they are redundant as 1+1.



**Note** Do not mix power supply types or wattages in the server. Both power supplies must be identical.

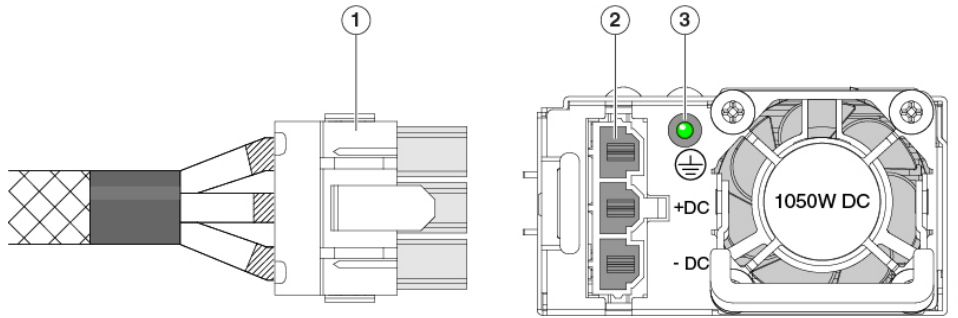
**Step 1** Remove the DC power supply that you are replacing or a blank panel from an empty bay:

- a) Perform one of the following actions:
  - If you are replacing a power supply in a server that has only one DC power supply, shut down and remove power from the server as described in [Shutting Down and Removing Power From the Server](#), on page 7.
  - If you are replacing a power supply in a server that has two DC power supplies, you do not have to shut down the server.
- b) Remove the power cord from the power supply that you are replacing. Lift the connector securing clip slightly and then pull the connector from the socket on the power supply.
- c) Grasp the power supply handle while pinching the release lever toward the handle.
- d) Pull the power supply out of the bay.

**Step 2** Install a new DC power supply:

- a) Grasp the power supply handle and insert the new power supply into the empty bay.
- b) Push the power supply into the bay until the release lever locks.
- c) Connect the power cord to the new power supply. Press the connector into the socket until the securing clip clicks into place.
- d) Only if you shut down the server, press the Power button to boot the server to main power mode.

Figure 25: Replacing DC Power Supplies



Keyed cable connector (CAB-48DC-40A-8AWG)	PSU status LED
Keyed DC input socket	-

## Installing DC Power Supplies (First Time Installation)



**Note** This procedure is for installing DC power supplies to the server for the first time. If you are replacing DC power supplies in a server that already has DC power supplies installed, see [Replacing DC Power Supplies, on page 52](#).



**Warning** A readily accessible two-poled disconnect device must be incorporated in the fixed wiring.  
Statement 1022



**Warning** This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations.  
Statement 1045



**Warning** Installation of the equipment must comply with local and national electrical codes.  
Statement 1074



**Note** Do not mix power supply types or wattages in the server. Both power supplies must be identical.



**Caution** As instructed in the first step of this wiring procedure, turn off the DC power source from your facility’s circuit breaker to avoid electric shock hazard.

**Step 1** Turn off the DC power source from your facility’s circuit breaker to avoid electric shock hazard.

**Note** The required DC input cable is Cisco part CAB-48DC-40A-8AWG. This 3-meter cable has a 3-pin connector on one end that is keyed to the DC input socket on the power supply. The other end of the cable has no connector so that you can wire it to your facility’s DC power.

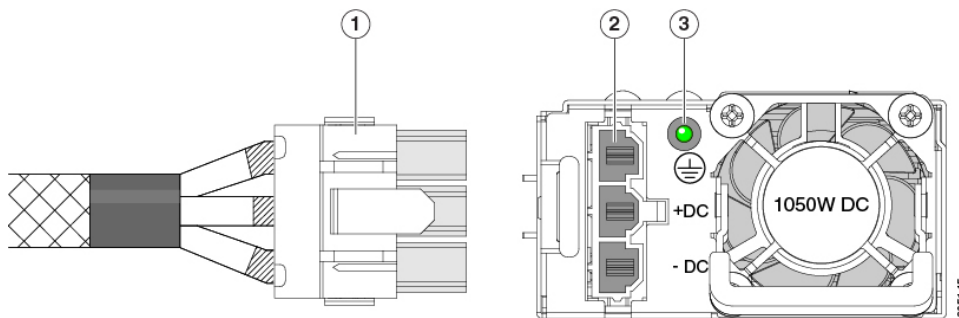
**Step 2** Wire the non-terminated end of the cable to your facility’s DC power input source.

**Step 3** Connect the terminated end of the cable to the socket on the power supply. The connector is keyed so that the wires align for correct polarity and ground.

**Step 4** Return DC power from your facility’s circuit breaker.

**Step 5** Press the Power button to boot the server to main power mode.

*Figure 26: Replacing DC Power Supplies*



Keyed cable connector (CAB-48DC-40A-8AWG)	PSU status LED
Keyed DC input socket	-

**Step 6** See [Grounding for DC Power Supplies, on page 54](#) for information about additional chassis grounding.

## Grounding for DC Power Supplies

AC power supplies have internal grounding and so no additional grounding is required when the supported AC power cords are used.

When using a DC power supply, additional grounding of the server chassis to the earth ground of the rack is available. Two screw holes for use with your dual-hole grounding lug and grounding wire are supplied on the chassis rear panel.



**Note** The grounding points on the chassis are sized for M5 screws. You must provide your own screws, grounding lug, and grounding wire. The grounding lug must be dual-hole lug that fits M5 screws. The grounding cable that you provide must be 14 AWG (2 mm), minimum 60° C wire, or as permitted by the local code.

## Replacing a PCIe Riser

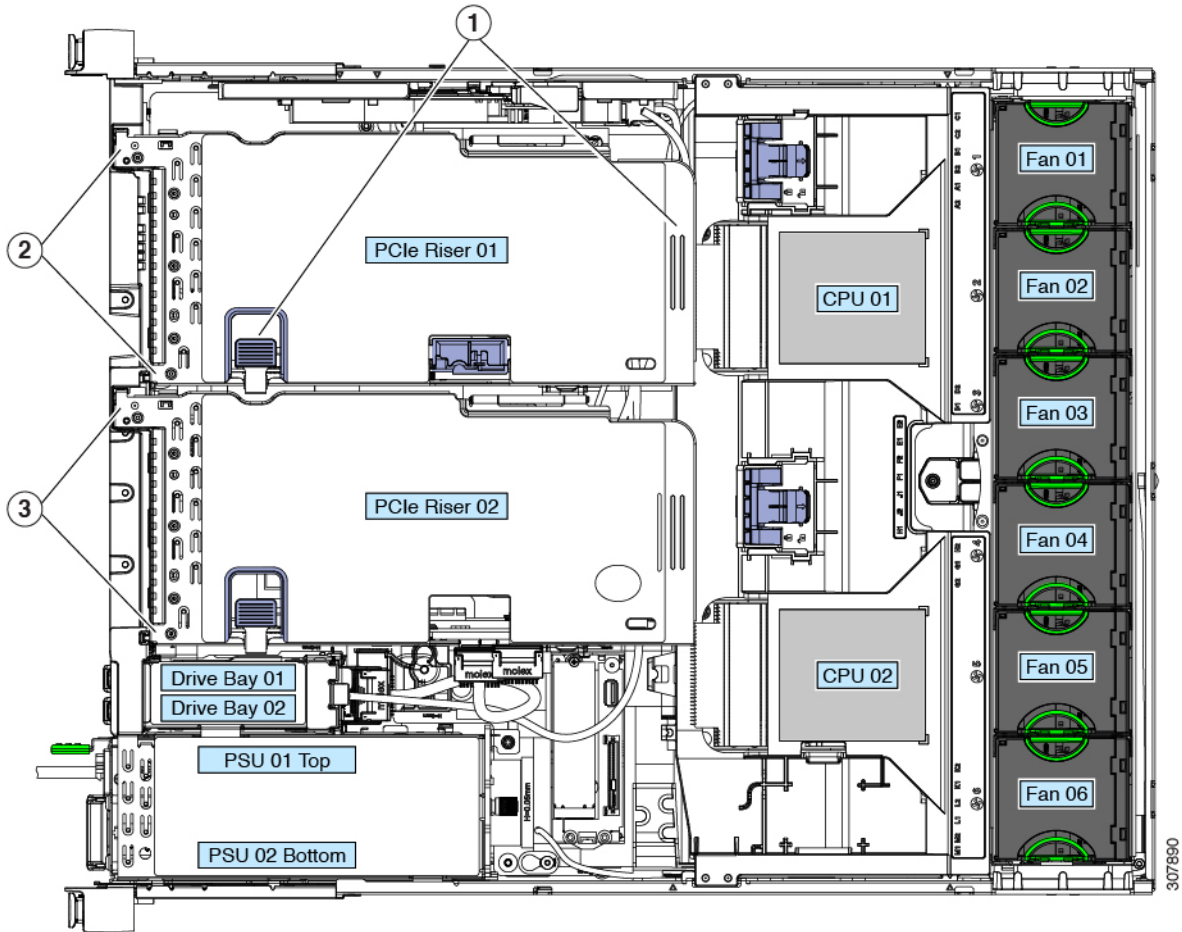
This server has two toolless PCIe risers for horizontal installation of PCIe cards and SAS/SATA/NVMe SSDs. Each riser is available in two versions. See [PCIe Slot Specifications, on page 59](#) for detailed descriptions of the slots and features in each riser version.

### Before you begin

Ensure that you disconnect any cable from the riser, which you wish to remove, to avoid damaging the cables.

- Step 1** Shut down and remove power from the server as described in [Shutting Down and Removing Power From the Server, on page 7](#).
- Step 2** Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.
- Caution** If you cannot safely view and access the component, remove the server from the rack.
- Step 3** Remove the top cover from the server as described in [Removing the Server Top Cover, on page 9](#).
- Step 4** Remove the PCIe riser that you are replacing:
- Grasp the flip-up handle on the riser and the blue forward edge, and then lift up evenly to disengage its circuit board from the socket on the motherboard. Set the riser on an antistatic surface.
  - If the riser has a card installed, remove the card from the riser. See [Replacing a PCIe Card, on page 62](#).
- Step 5** Install a new PCIe riser:
- Note** The PCIe risers are not interchangeable. If you plug a PCIe riser into the wrong socket, the server will not boot. Riser 1 must plug into the motherboard socket labeled “RISER1.” Riser 2 must plug into the motherboard socket labeled “RISER2.”
- If you removed a card from the old PCIe riser, install the card to the new riser. See [Replacing a PCIe Card, on page 62](#).
  - Position the PCIe riser over its socket on the motherboard and over its alignment slots in the chassis.
  - Carefully push down on both ends of the PCIe riser to fully engage its circuit board connector with the socket on the motherboard.
- Step 6** Replace the top cover to the server.
- Step 7** Replace the server in the rack, replace cables, and then fully power on the server by pressing the Power button.

Figure 27: PCIe Riser Alignment Features



<p>Riser handling points (flip-up handle and blue forward edge)</p>	<p>Riser 2 alignment features in chassis</p>
<p>Riser 1 alignment features in chassis</p>	

## Installing PCIe Risers 1C and 2E

Each riser is available in two versions. See [PCIe Slot Specifications, on page 59](#) for detailed descriptions of the slots and features in each riser version.

This procedure explains how to install risers 1C and 2E, which support NVMe SSDs, after removing risers 1 and 2B, which do not support NVMe SSDs.

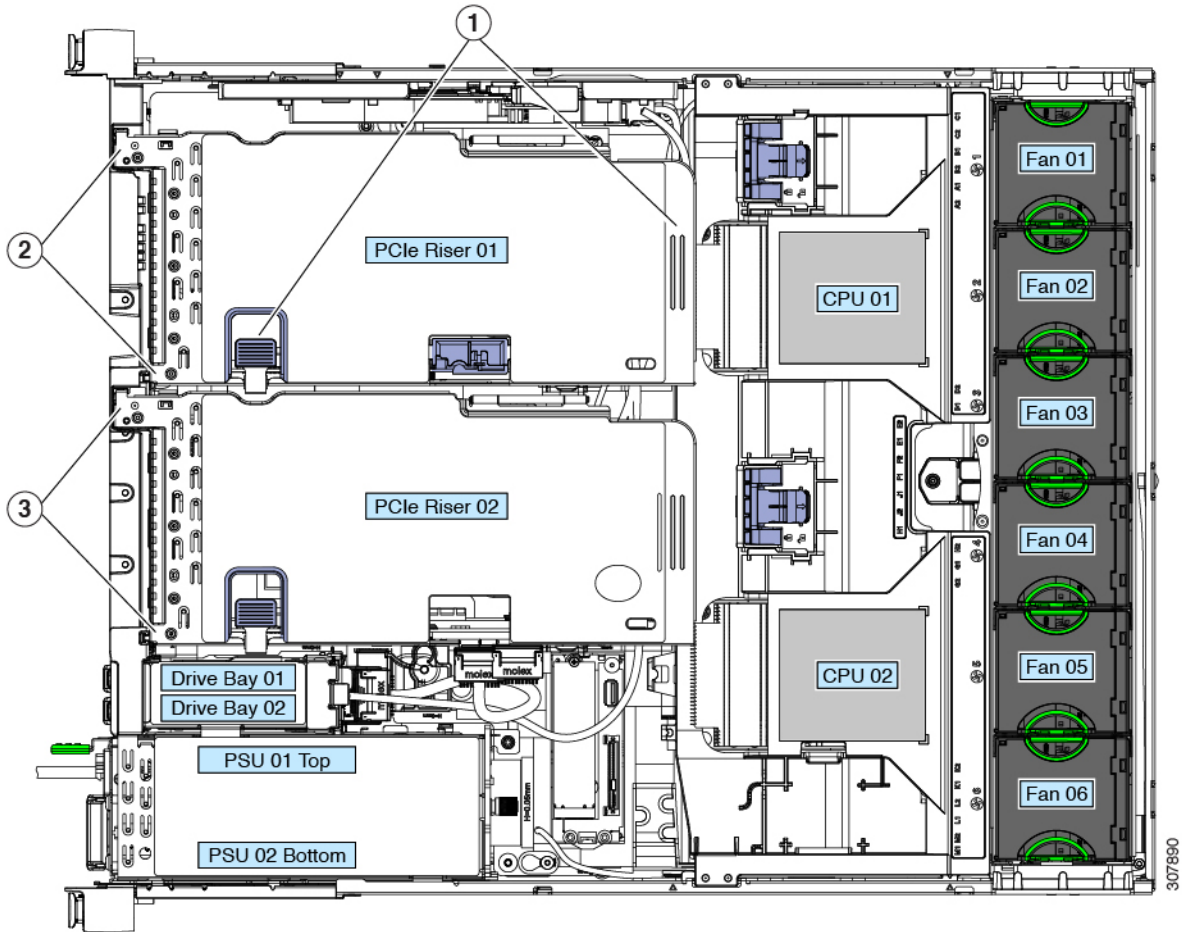
### Before you begin

Ensure that you disconnect any cable from the riser, which you wish to remove, to avoid damaging the cables.



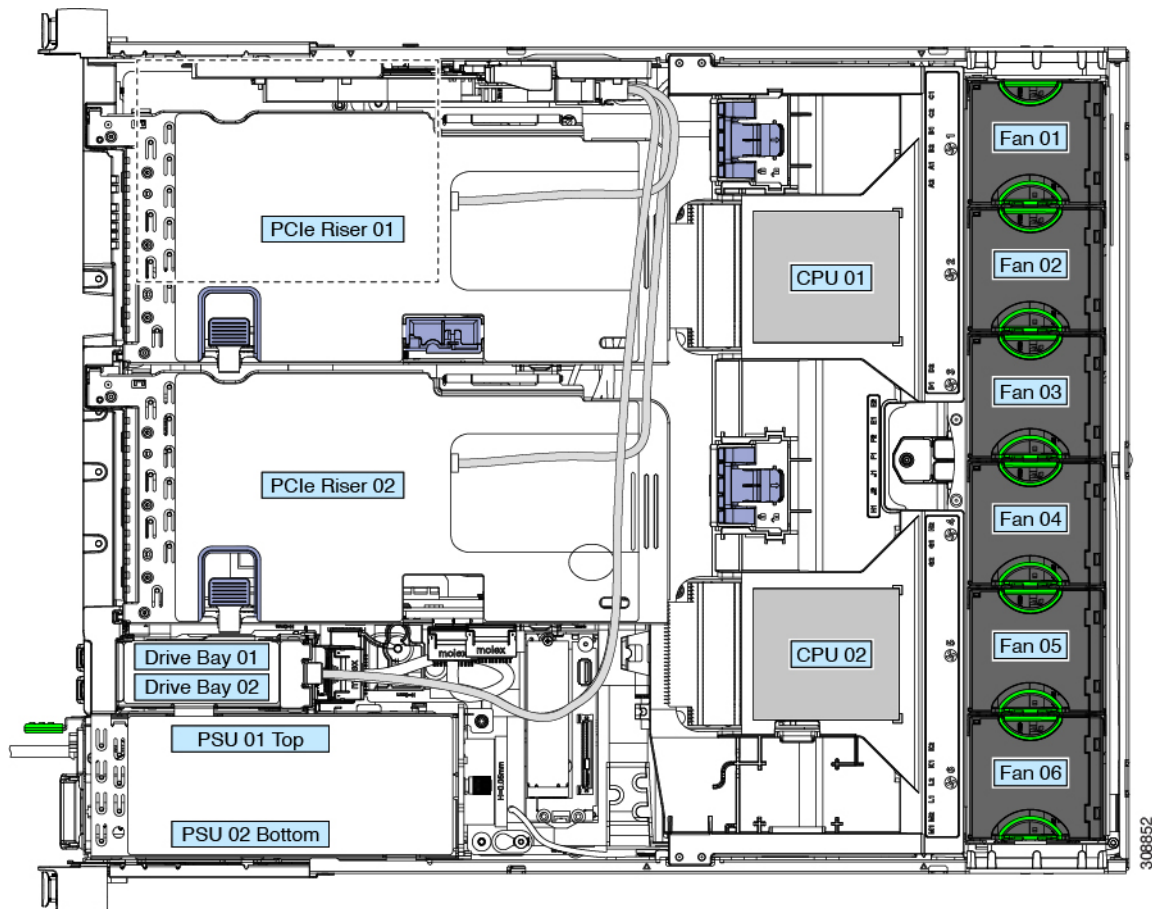
- 
- Step 1** Shut down and remove power from the server as described in [Shutting Down and Removing Power From the Server, on page 7](#).
- Step 2** Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.
- Caution** If you cannot safely view and access the component, remove the server from the rack.
- Step 3** Remove the top cover from the server as described in [Removing the Server Top Cover, on page 9](#).
- Step 4** Remove the PCIe risers 1 and 2B:
- Grasp the flip-up handle on the riser and the blue forward edge, and then lift up evenly to disengage its circuit board from the socket on the motherboard. Set the riser on an antistatic surface.
  - If the riser has a card installed, remove the card from the riser. See [Replacing a PCIe Card, on page 62](#).
- Step 5** Install new PCIe risers:
- Note** The PCIe risers are not interchangeable. If you plug a PCIe riser into the wrong socket, the server will not boot. Riser 1 must plug into the motherboard socket labeled “RISER1.” Riser 2 must plug into the motherboard socket labeled “RISER2.”
- If you removed a card from the old PCIe riser, install the card to the new riser. See [Replacing a PCIe Card, on page 62](#).
  - Position the PCIe riser over its socket on the motherboard and over its alignment slots in the chassis.
  - Carefully push down on both ends of the PCIe riser to fully engage its circuit board connector with the socket on the motherboard.
  - Connect the cable from the mother board to riser 2E (connector CN6).
  - Connect the cable from riser 1C (connector CFG1) to 2E (connector CN9).
  - (Optional) If you have HBA (UCSC-SAS-M5), connect the cable from vertical backplane to the HBA connector labeled as B1.
  - (Optional) If SAS is required for horizontal drives (UCSC-RSAS-C240M5) in riser 1, connect the cable from horizontal drive backplane to the HBA connector labeled as A1.
  - (Optional) If SAS is required for horizontal drives (UCSC-RSAS-C240M5) in riser 2, connect the cable from horizontal drive backplane to the HBA connector labeled as A2.
- Step 6** Replace the top cover to the server.
- Step 7** Replace the server in the rack, replace cables, and then fully power on the server by pressing the Power button.

Figure 28: PCIe Riser Alignment Features



<p>Riser handling points (flip-up handle and blue forward edge)</p>	<p>Riser 2 alignment features in chassis</p>
<p>Riser 1 alignment features in chassis</p>	

Figure 29: PCIe Riser Cabling



## Replacing a PCIe Card



**Note** Cisco supports all PCIe cards qualified and sold by Cisco. PCIe cards not qualified or sold by Cisco are the responsibility of the customer. Although Cisco will always stand behind and support the C-Series rack-mount servers, customers using standard, off-the-shelf, third-party cards must go to the third-party card vendor for support if any issue with that particular card occurs.

## PCIe Slot Specifications

The server contains two toolless PCIe risers for horizontal installation of PCIe cards. Each riser is orderable in two versions.

- Riser 1 is available in two different options:

- Option 1 (UCSC-RIS-1-240M5)—Slots 1 (x8), 2 (x16), and 3 (x8). Slots 1 and 2 are controlled by CPU 1; slot 3 is controlled by CPU 2 and is unavailable in a single-CPU configuration.
- Option 1C (UCSC-RS1C-240M5SD)—With Drive Bay 3 (x4), Drive Bay 5 (x4), and PCIe Slot 1 (x16). All slots are controlled by CPU 1.
- In addition, Riser 1 has Micro-SD card slot.
- Riser 2 is available in two different options:
  - Option 2B (UCSC-RIS-2B-240M5)—With slots 4 (x8), 5 (x16), and 6 (x8); includes one PCIe cable connector for front-loading NVMe SSDs.
  - Option 2E (UCSC-RS2E-240M5SD)—With Drive Bay 4 (x4), Drive Bay 6 (x4), and PCIe Slot 2 (x16); includes one PCIe cable connector for front-loading NVMe SSDs.

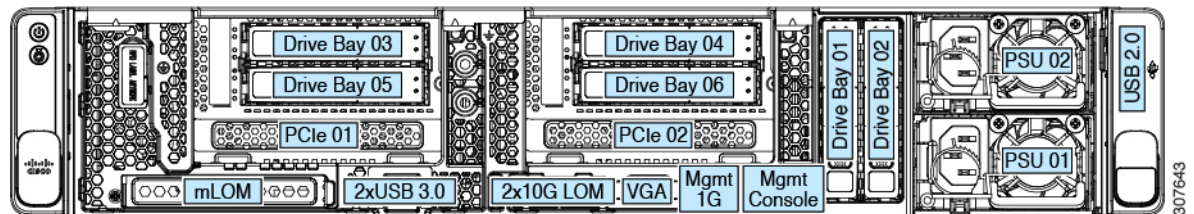
The server is orderable with two possible PCIe riser combinations:

- PCIe Riser 1 and PCIe Riser 2B
- PCIe Riser 1C and PCIe Riser 2E



**Note** Any other combination is not supported.

**Figure 30: Front Panel, Showing PCIe Slot Numbering**



The following tables describe the specifications for the slots.

**Table 5: PCIe Riser 1 (UCSC-RIS-1-240M5) PCIe Expansion Slots**

Slot Number	Electrical Lane Width	Connector Length	Maximum Card Length	Card Height (Rear Panel Opening)	NCSI Support	Double-Wide GPU Card Support
1	Gen-3 x8	x24 connector	¾ length	Full height	Yes	No
2	Gen-3 x16	x24 connector	Full length	Full height	Yes	Yes
3 <sup>1</sup>	Gen-3 x8	x16 connector	Full length	Full height	No	No
Micro SD card slot	One socket for Micro SD card on the top of the riser.					

<sup>1</sup> Slot 3 is not available in a single-CPU system.

**Table 6: PCIe Riser 2B (UCSC-RIS-2B-240M5) PCIe Expansion Slots**

Slot Number	Electrical Lane Width	Connector Length	Maximum Card Length	Card Height (Rear Panel Opening)	NCSI Support	Double-Wide GPU Card Support
4	Gen-3 x8	x24 connector	¾ length	Full height	Yes	No
5	Gen-3 x16	x24 connector	Full length	Full height	Yes	No
6	Gen-3 x8	x16 connector	Full length	Full height	No	No
Vertical NVMe Connector	Gen-3 x8	To front drive backplane; supports front-loading NVMe SSDs.				

**Table 7: PCIe Riser 1C (UCSC-RS1C-C240M5SD) PCIe Expansion Slots**

Slot Number	Electrical Lane Width	Connector Length	Maximum Card Length	Card Height (Rear Panel Opening)	NCSI Support	Double-Wide GPU Card Support
Drive Bay 3	Gen-3 x4	Drive Bay Connector	NA	2.5"	NA	No
Drive Bay 5	Gen-3 x4	Drive Bay Connector	NA	2.5"	NA	No
PCIe 1	Gen-3 x16	x24	¾ length	Full height	Yes	No
Micro SD card slot	One socket for Micro SD card on the top of the riser.					

**Table 8: PCIe Riser 2E (UCSC-RS2E-240M5SD) PCIe Expansion Slots**

Slot Number	Electrical Lane Width	Connector Length	Maximum Card Length	Card Height (Rear Panel Opening)	NCSI Support	Double-Wide GPU Card Support
Drive Bay 4	Gen-3 x4	Drive Bay Connector	NA	2.5"	NA	No
Drive Bay 6	Gen-3 x4	Drive Bay Connector	NA	2.5"	NA	No
PCIe 2	Gen-3 x16	x24	¾ length	Full height	Yes	No
Vertical NVMe Connector	Gen-3 x8	To front vertical drive backplane; supports two PCIe NVMe drives.				

## Replacing a PCIe Card



**Note** If you are installing a Cisco UCS Virtual Interface Card, there are prerequisite considerations. See [Cisco Virtual Interface Card \(VIC\) Considerations, on page 63](#).



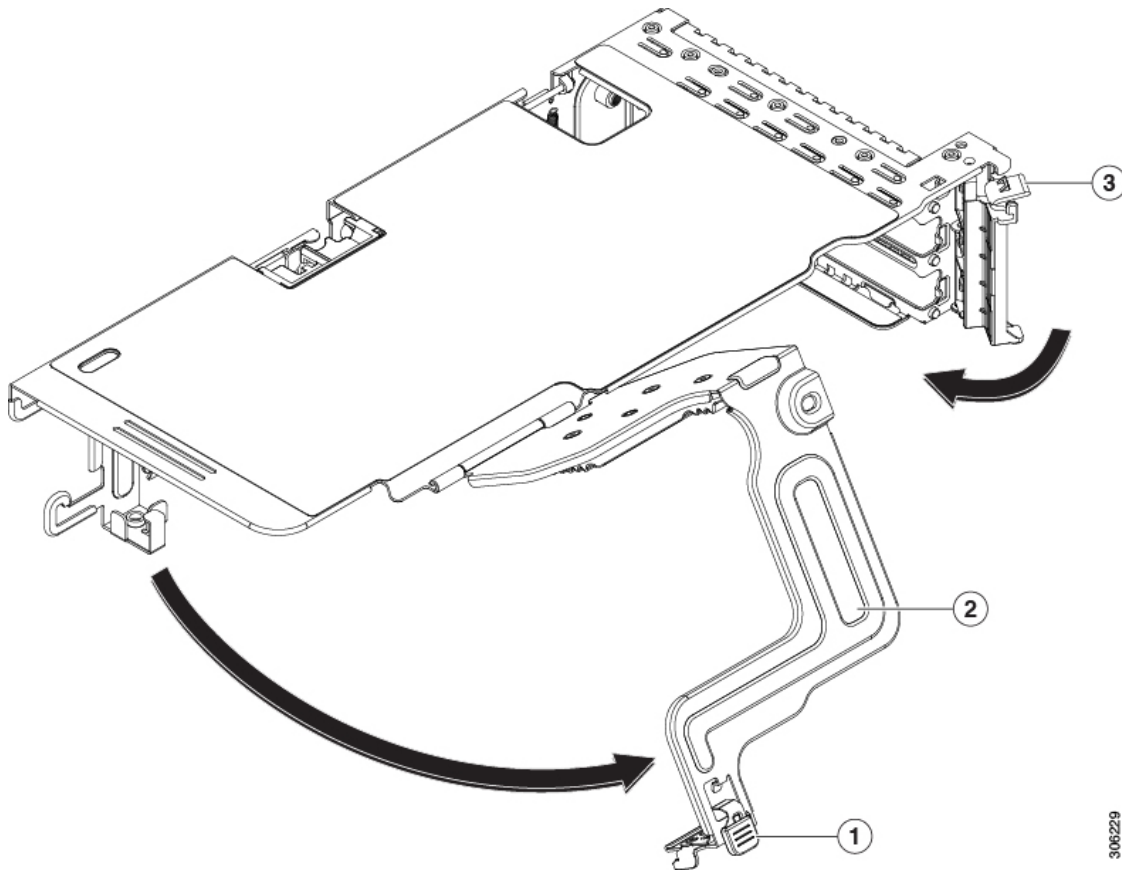
**Note** RAID controller cards install into a dedicated motherboard socket. See [Replacing a SAS Storage Controller Card \(RAID or HBA\), on page 66](#).



**Note** For instructions on installing or replacing double-wide GPU cards, see [GPU Card Installation](#).

- Step 1** Shut down and remove power from the server as described in [Shutting Down and Removing Power From the Server, on page 7](#).
- Step 2** Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.
- Caution** If you cannot safely view and access the component, remove the server from the rack.
- Step 3** Remove the top cover from the server as described in [Removing the Server Top Cover, on page 9](#).
- Step 4** Remove the PCIe card that you are replacing:
- Remove any cables from the ports of the PCIe card that you are replacing.
  - Use two hands to flip up and grasp the blue riser handle and the blue fingergrip area on the front edge of the riser, and then lift straight up.
  - On the bottom of the riser, push the release latch that holds the securing plate, and then swing the hinged securing plate open.
  - Open the hinged card-tab retainer that secures the rear-panel tab of the card.
  - Pull evenly on both ends of the PCIe card to remove it from the socket on the PCIe riser.
- If the riser has no card, remove the blanking panel from the rear opening of the riser.
- Step 5** Install a new PCIe card:
- With the hinged card-tab retainer open, align the new PCIe card with the empty socket on the PCIe riser.
  - Push down evenly on both ends of the card until it is fully seated in the socket.
  - Ensure that the card's rear panel tab sits flat against the riser rear-panel opening and then close the hinged card-tab retainer over the card's rear-panel tab.
  - Swing the hinged securing plate closed on the bottom of the riser. Ensure that the clip on the plate clicks into the locked position.
  - Position the PCIe riser over its socket on the motherboard and over the chassis alignment channels.
  - Carefully push down on both ends of the PCIe riser to fully engage its connector with the sockets on the motherboard.
- Step 6** Replace the top cover to the server.
- Step 7** Replace the server in the rack, replace cables, and then fully power on the server by pressing the Power button.

Figure 31: PCIe Riser Card Securing Mechanisms



Release latch on hinged securing plate	Hinged card-tab retainer
Hinged securing plate	-

## Cisco Virtual Interface Card (VIC) Considerations

This section describes VIC card support and special considerations for this server.



**Note** If you use the *Cisco Card* NIC mode, you must also make a *VIC Slot* setting that matches where your VIC is installed. The options are Riser1, Riser2, and Flex-LOM. See [NIC Mode and NIC Redundancy Settings](#) for more information about NIC modes.

If you want to use the Cisco UCS VIC card for Cisco UCS Manager integration, see also the [Cisco UCS C-Series Server Integration with Cisco UCS Manager Guides](#) for details about supported configurations, cabling, and other requirements.

Table 9: VIC Support and Considerations in This Server

VIC	How Many Supported in Server	Slots That Support VICs	Primary Slot For Cisco UCS Manager Integration	Primary Slot For Cisco Card NIC Mode	Minimum Cisco IMC Firmware
Cisco UCS VIC 1455 UCSC-PCIE-C25Q-04	2 PCIe	PCIe 2 PCIe 5	PCIe 2	PCIe 2	4.0(1)
Cisco UCS VIC 1495 UCSC-PCIE-C100-04	2 PCIe	PCIe 2 PCIe 5	PCIe 2	PCIe 2	4.0(2)
Cisco UCS VIC 1457 UCSC-MLOM-C25Q-04	1 mLOM	mLOM	mLOM	mLOM	4.0(1)
Cisco UCS VIC 1497 UCSC-MLOM-C100-04	1 mLOM	mLOM	mLOM	mLOM	4.0(2)

- A total of 3 VICs are supported in Riser 1 and Riser 2B combination server: 2 PCIe style, and 1 mLOM style.



**Note** Single wire management is supported on only one VIC at a time. If multiple VICs are installed on a server, only one slot has NCSI enabled at a time. For single wire management, priority goes to the MLOM slot, then slot 2, then slot 5 for NCSI management traffic. When multiple cards are installed, connect the single-wire management cables in the priority order mentioned above.

- The primary slot for a VIC card in PCIe riser 1 is slot 2. The secondary slot for a VIC card in PCIe riser 1 is slot 1.



**Note** The NCSI protocol is supported in only one slot at a time in each riser. If a GPU card is present in slot 2, NCSI automatically shifts from slot 2 to slot 1.

- The primary slot for a VIC card in PCIe riser 2 is slot 5. The secondary slot for a VIC card in PCIe riser 2 is slot 4.



**Note** The NCSI protocol is supported in only one slot at a time in each riser. If a GPU card is present in slot 5, NCSI automatically shifts from slot 5 to slot 4.



**Note** PCIe riser 2 is not available in a single-CPU system.



## Replacing an mLOM Card

The server supports a modular LOM (mLOM) card to provide additional rear-panel connectivity. The mLOM socket is on the motherboard, under the storage controller card.

The mLOM socket provides a Gen-3 x16 PCIe lane. The socket remains powered when the server is in 12 V standby power mode and it supports the network communications services interface (NCSI) protocol.



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**Note** If your mLOM card is a Cisco UCS Virtual Interface Card (VIC), see [Cisco Virtual Interface Card \(VIC\) Considerations, on page 63](#) for more information and support details.

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**Step 1** Remove any existing mLOM card (or a blanking panel):

- a) Shut down and remove power from the server as described in [Shutting Down and Removing Power From the Server, on page 7](#).
- b) Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

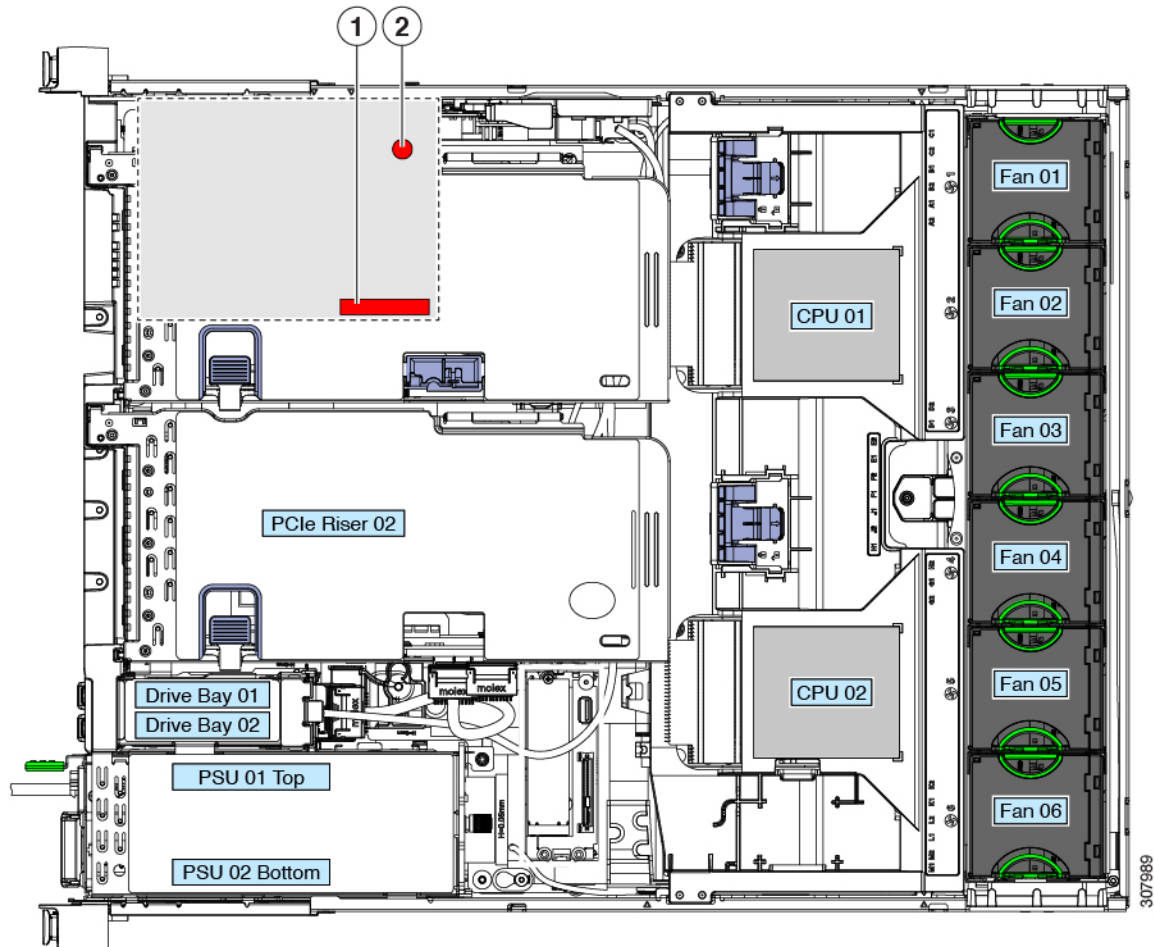
**Caution** If you cannot safely view and access the component, remove the server from the rack.

- c) Remove the top cover from the server as described in [Removing the Server Top Cover, on page 9](#).
- d) Remove any storage controller (RAID or HBA card) to provide clearance to the mLOM socket on the motherboard. See [Replacing a SAS Storage Controller Card \(RAID or HBA\), on page 66](#).
- e) Loosen the single captive thumbscrew that secures the mLOM card to the threaded standoff on the chassis floor.
- f) Slide the mLOM card horizontally to free it from the socket, then lift it out of the server.

**Step 2** Install a new mLOM card:

- a) Set the mLOM card on the chassis floor so that its connector is aligned with the motherboard socket.
- b) Push the card horizontally to fully engage the card's edge connector with the socket.
- c) Tighten the captive thumbscrew to secure the card to the chassis floor.
- d) Return the storage controller card to the server. See [Replacing a SAS Storage Controller Card \(RAID or HBA\), on page 66](#).
- e) Replace the top cover to the server.
- f) Replace the server in the rack, replace cables, and then fully power on the server by pressing the Power button.

Figure 32: Location of the mLOM Card Socket Below the Storage Controller Card



Position of horizontal mLOM card socket	Position of mLOM card thumbscrew
---	----------------------------------

## Replacing a SAS Storage Controller Card (RAID or HBA)

For hardware-based storage control, the server can use a Cisco modular SAS RAID controller or SAS HBA that plugs into a dedicated, vertical socket on the motherboard.

### Storage Controller Card Firmware Compatibility

Firmware on the storage controller (RAID or HBA) must be verified for compatibility with the current Cisco IMC and BIOS versions that are installed on the server. If not compatible, upgrade or downgrade the storage controller firmware using the Host Upgrade Utility (HUU) for your firmware release to bring it to a compatible level.



**Note** For servers running in standalone mode only: After you replace controller hardware (UCSC-SAS-M5) you must run the Cisco UCS Host Upgrade Utility (HUU) to update the controller firmware, even if the firmware Current Version is the same as the Update Version. This is necessary to program the controller's suboem-id to the correct value for the server SKU. If you do not do this, drive enumeration might not display correctly in the software. This issue does not affect servers controlled in UCSM mode.

See the HUU guide for your Cisco IMC release for instructions on downloading and using the utility to bring server components to compatible levels: [HUU Guides](#).

## Replacing a SAS Storage Controller Card (RAID or HBA)

For detailed information about storage controllers in this server, see [Supported Storage Controllers and Cables](#).

The chassis includes a plastic mounting bracket that the card must be attached to before installation.

**Step 1** Prepare the server for component installation:

- Shut down and remove power from the server as described in [Shutting Down and Removing Power From the Server, on page 7](#).
- Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

**Caution** If you cannot safely view and access the component, remove the server from the rack.

- Remove the top cover from the server as described in [Removing the Server Top Cover, on page 9](#).

**Step 2** Remove any existing storage controller card from the server:

**Note** The chassis includes a plastic mounting bracket that the card must be attached to before installation. During replacement, you must remove the old card from the bracket and then install the new card to the bracket before installing this assembly to the server.

- Disconnect SAS/SATA cables and any supercap cable from the existing card.
- Lift up on the card's blue ejector lever to unseat it from the motherboard socket.
- Lift straight up on the card's carrier frame to disengage the card from the motherboard socket and to disengage the frame from two pegs on the chassis wall.
- Remove the existing card from its plastic carrier bracket. Carefully push the retainer tabs aside and then lift the card from the bracket.

**Step 3** Install a new storage controller card:

- Install the new card to the plastic carrier bracket. Make sure that the retainer tabs close over the edges of the card.
- Position the assembly over the chassis and align the card edge with the motherboard socket. At the same time, align the two slots on the back of the carrier bracket with the pegs on the chassis inner wall.
- Push on both corners of the card to seat its connector in the riser socket. At the same time, ensure that the slots on the carrier frame engage with the pegs on the inner chassis wall.
- Fully close the blue ejector lever on the card to lock the card into the socket.
- Connect SAS/SATA cables and any supercap cable to the new card.

**Step 4** Replace the top cover to the server.

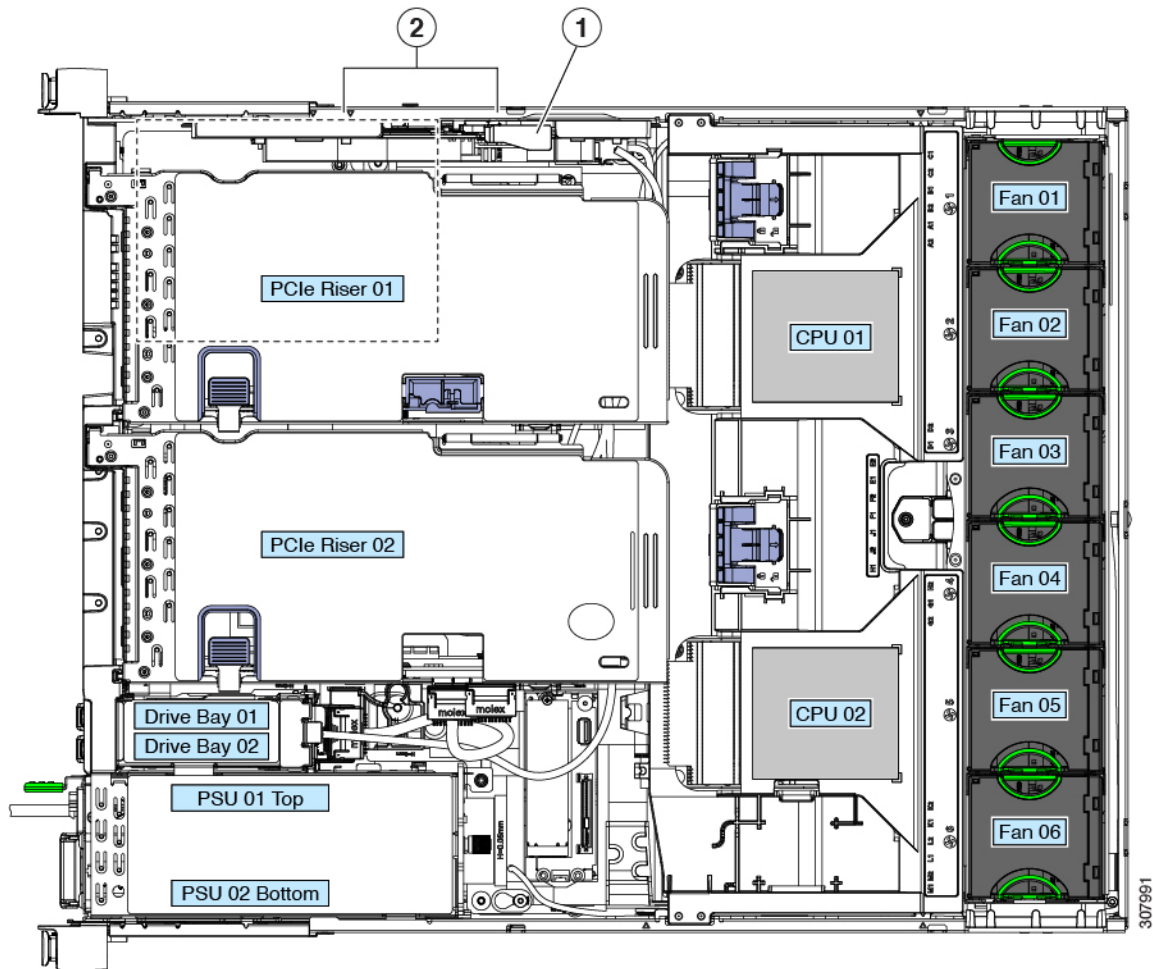
**Step 5** Replace the server in the rack, replace cables, and then fully power on the server by pressing the Power button.

**Step 6** If your server is running in standalone mode, use the Cisco UCS Host Upgrade Utility to update the controller firmware and program the correct suboem-id for the controller.

**Note** **For servers running in standalone mode only:** After you replace controller hardware (UCSC-SAS-M5), you must run the Cisco UCS Host Upgrade Utility (HUU) to update the controller firmware, even if the firmware Current Version is the same as the Update Version. This is necessary to program the controller's suboem-id to the correct value for the server SKU. If you do not do this, drive enumeration might not display correctly in the software. This issue does not affect servers controlled in UCSM mode.

See the HUU guide for your Cisco IMC release for instructions on downloading and using the utility to bring server components to compatible levels: [HUU Guides](#).

Figure 33: Replacing a Storage Controller Card



Blue ejector lever on card top edge	Pegs on inner chassis wall (two)
-------------------------------------	----------------------------------

# Replacing a Boot-Optimized M.2 RAID Controller Module

The Cisco Boot-Optimized M.2 RAID Controller module connects to the mini-storage module socket on the motherboard. It includes slots for two SATA M.2 drives, plus an integrated 6-Gbps SATA RAID controller that can control the SATA M.2 drives in a RAID 1 array.

## Cisco Boot-Optimized M.2 RAID Controller Considerations

Review the following considerations:

- The minimum version of Cisco IMC and Cisco UCS Manager that support this controller is 4.0(4) and later.
- This controller supports RAID 1 (single volume) and JBOD mode.



**Note** Do not use the server's embedded SW MegaRAID controller to configure RAID settings when using this controller module. Instead, you can use the following interfaces:

- Cisco IMC 4.0(4a) and later
  - BIOS HII utility, BIOS 4.0(4a) and later
  - Cisco UCS Manager 4.0(4a) and later (UCS Manager-integrated servers)
- 
- A SATA M.2 drive in slot 1 (the top) is the first SATA device; a SATA M.2 drive in slot 2 (the underside) is the second SATA device.
    - The name of the controller in the software is MSTOR-RAID.
    - A drive in Slot 1 is mapped as drive 253; a drive in slot 2 is mapped as drive 254.
  - When using RAID, we recommend that both SATA M.2 drives are the same capacity. If different capacities are used, the smaller capacity of the two drives is used to create a volume and the rest of the drive space is unusable.

JBOD mode supports mixed capacity SATA M.2 drives.
  - Hot-plug replacement is *not* supported. The server must be powered off.
  - Monitoring of the controller and installed SATA M.2 drives can be done using Cisco IMC and Cisco UCS Manager. They can also be monitored using other utilities such as UEFI HII, PMCLI, XMLAPI, and Redfish.
  - Updating firmware of the controller and the individual drives:
    - For standalone servers, use the Cisco Host Upgrade Utility (HUU). Refer to the [HUU Documentation](#).
    - For servers integrated with Cisco UCS Manager, refer to the [Cisco UCS Manager Firmware Management Guide](#).
  - The SATA M.2 drives can boot in UEFI mode only. Legacy boot mode is not supported.

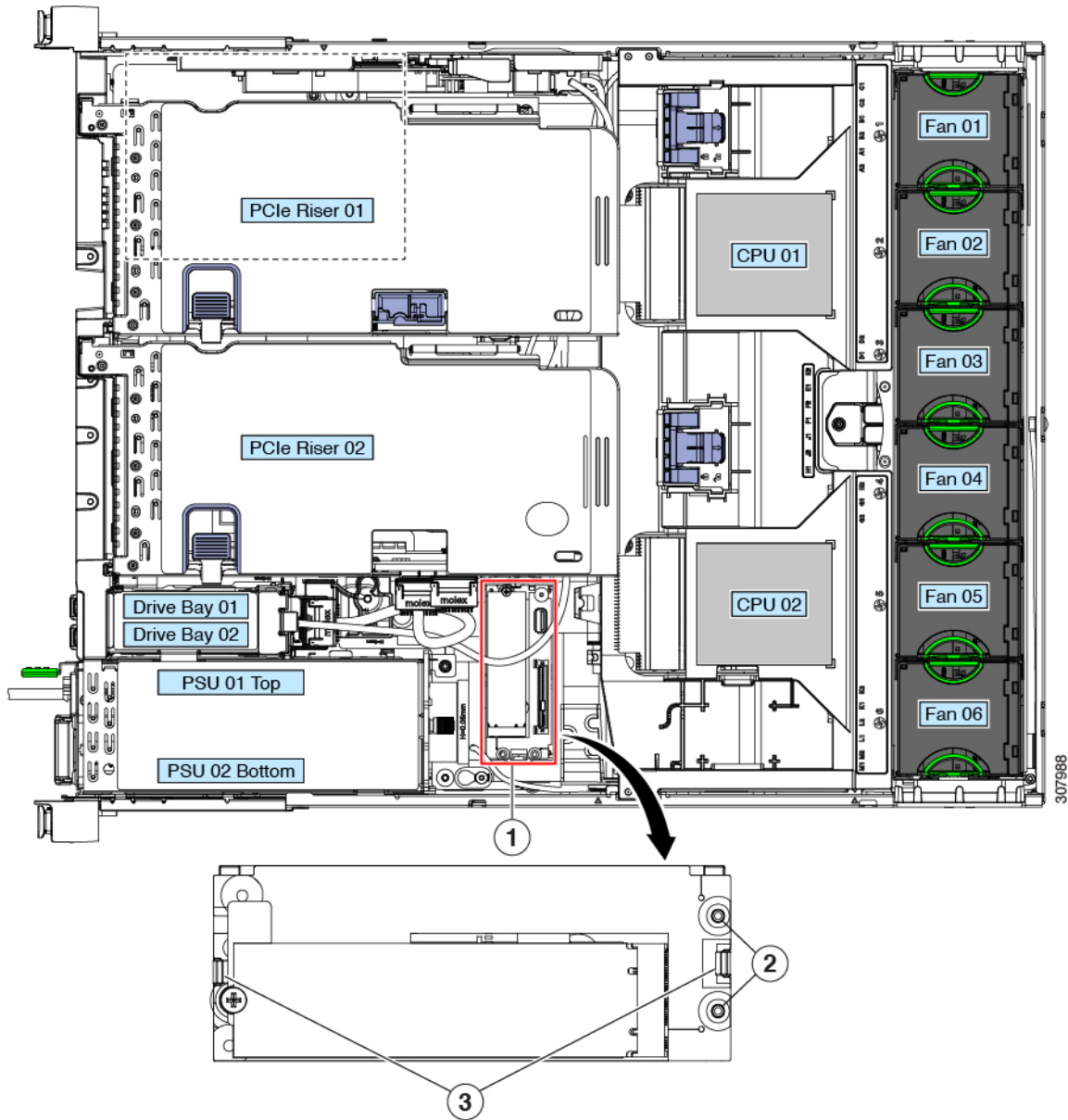
- If you replace a single SATA M.2 drive that was part of a RAID volume, rebuild of the volume is auto-initiated after the user accepts the prompt to import the configuration. If you replace both drives of a volume, you must create a RAID volume and manually reinstall any OS.
- We recommend that you erase drive contents before creating volumes on used drives from another server. The configuration utility in the server BIOS includes a SATA secure-erase function.
- The server BIOS includes a configuration utility specific to this controller that you can use to create and delete RAID volumes, view controller properties, and erase the physical drive contents. Access the utility by pressing **F2** when prompted during server boot. Then navigate to **Advanced > Cisco Boot Optimized M.2 RAID Controller**.

## Replacing a Cisco Boot-Optimized M.2 RAID Controller

This topic describes how to remove and replace a Cisco Boot-Optimized M.2 RAID Controller. The controller board has one M.2 socket on its top (Slot 1) and one M.2 socket on its underside (Slot 2).

- 
- Step 1** Shut down and remove power from the server as described in [Shutting Down and Removing Power From the Server, on page 7](#).
- Step 2** Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.
- Caution** If you cannot safely view and access the component, remove the server from the rack.
- Step 3** Remove the top cover from the server as described in [Removing the Server Top Cover, on page 9](#).
- Step 4** Remove a controller from its motherboard socket:
- a) Locate the controller in its socket just in front of power supply 1.
  - b) At each end of the controller board, push outward on the clip that secures the carrier.
  - c) Lift both ends of the controller to disengage it from the socket on the motherboard.
  - d) Set the carrier on an anti-static surface.

Figure 34: Cisco Boot-Optimized M.2 RAID Controller on Motherboard



Location of socket on motherboard	Securing clips
Alignment pegs	-

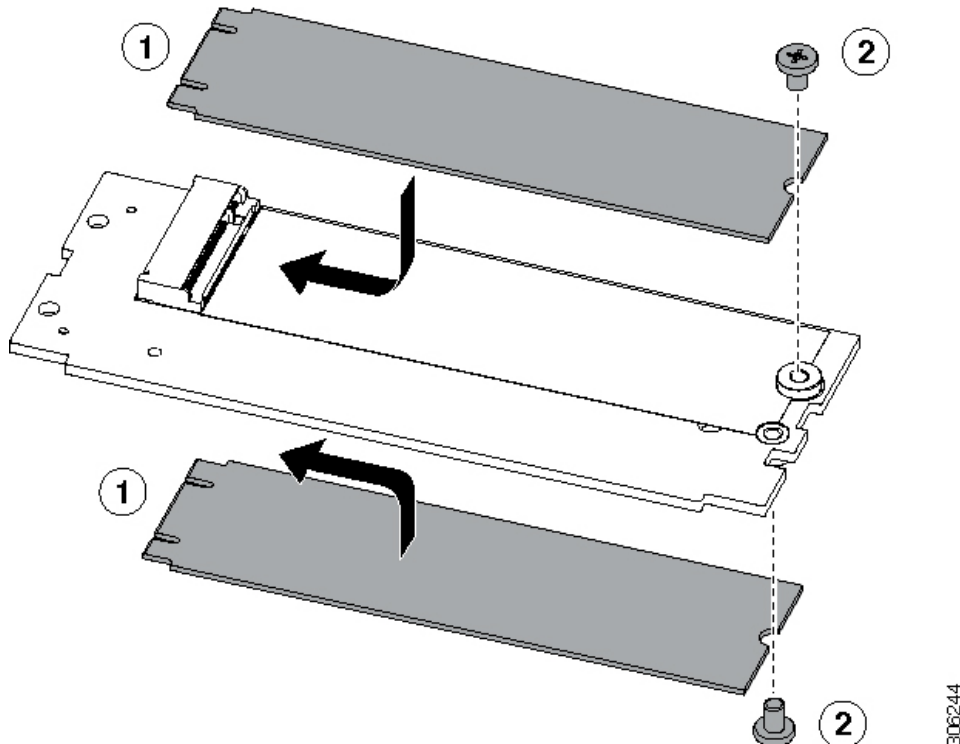
**Step 5** If you are transferring SATA M.2 drives from the old controller to the replacement controller, do that before installing the replacement controller:

**Note** Any previously configured volume and data on the drives are preserved when the M.2 drives are transferred to the new controller. The system will boot the existing OS that is installed on the drives.

- a) Use a #1 Phillips-head screwdriver to remove the single screw that secures the M.2 drive to the carrier.

- b) Lift the M.2 drive from its socket on the carrier.
- c) Position the replacement M.2 drive over the socket on the controller board.
- d) Angle the M.2 drive downward and insert the connector-end into the socket on the carrier. The M.2 drive's label must face up.
- e) Press the M.2 drive flat against the carrier.
- f) Install the single screw that secures the end of the M.2 SSD to the carrier.
- g) Turn the controller over and install the second M.2 drive.

**Figure 35: Cisco Boot-Optimized M.2 RAID Controller, Showing M.2 Drive Installation**



**Step 6** Install the controller to its socket on the motherboard:

- a) Position the controller over the socket, with the controller's connector facing down and at the same end as the motherboard socket. Two alignment pegs must match with two holes on the controller.
- b) Gently push down the socket end of the controller so that the two pegs go through the two holes on the controller.
- c) Push down on the controller so that the securing clips click over it at both ends.

**Step 7** Replace the top cover to the server.

**Step 8** Replace the server in the rack, replace cables, and then fully power on the server by pressing the Power button.

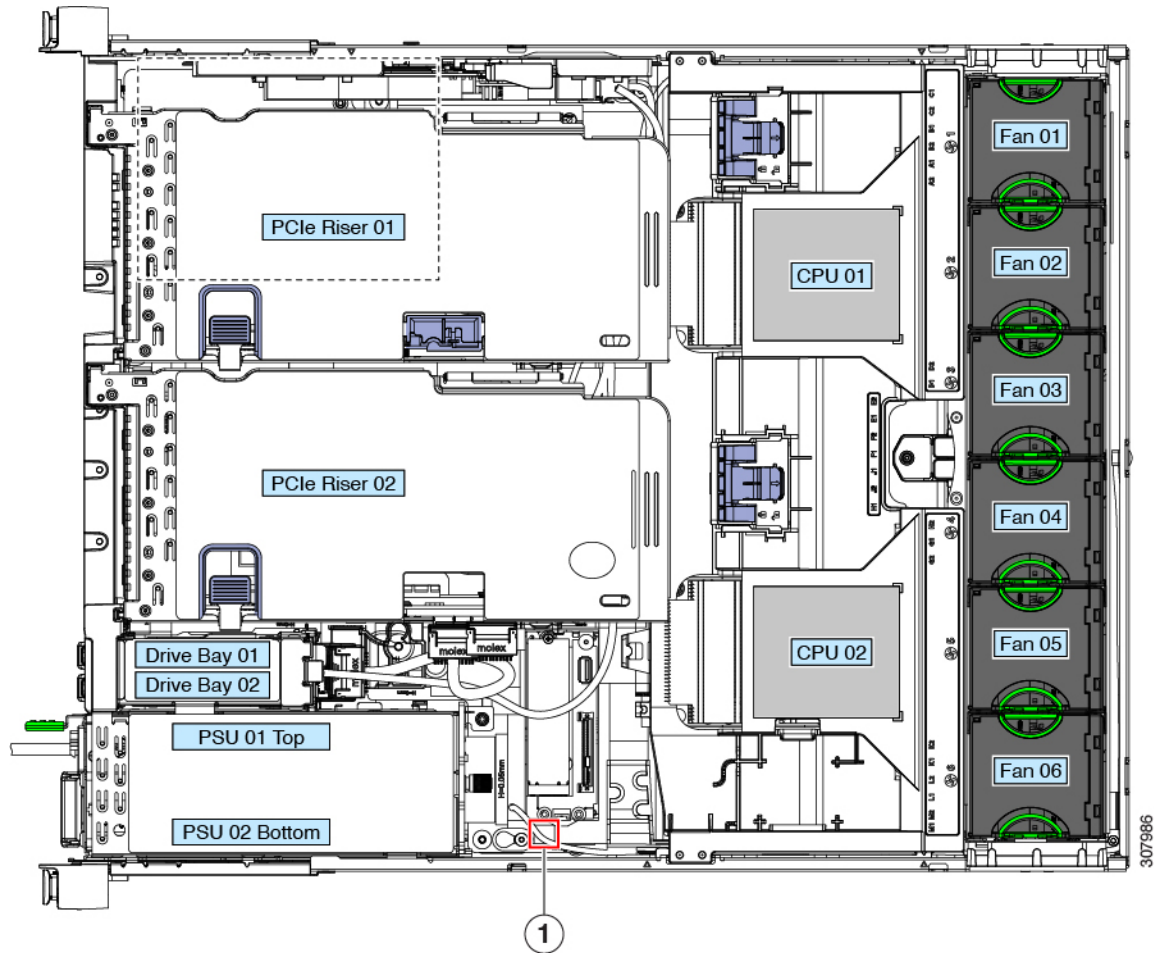
## Replacing a Chassis Intrusion Switch

The chassis intrusion switch is an optional security feature that logs an event in the system event log (SEL) whenever the cover is removed from the chassis.



- 
- Step 1** Prepare the server for component installation:
- Shut down and remove power from the server as described in [Shutting Down and Removing Power From the Server, on page 7](#).
  - Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.  
**Caution** If you cannot safely view and access the component, remove the server from the rack.
  - Remove the top cover from the server as described in [Removing the Server Top Cover, on page 9](#).
- Step 2** Remove an existing intrusion switch:
- Disconnect the intrusion switch cable from the socket on the motherboard.
  - Use a #1 Phillips-head screwdriver to loosen and remove the single screw that holds the switch mechanism to the chassis wall.
  - Slide the switch mechanism straight up to disengage it from the clips on the chassis.
- Step 3** Install a new intrusion switch:
- Slide the switch mechanism down into the clips on the chassis wall so that the screwholes line up.
  - Use a #1 Phillips-head screwdriver to install the single screw that secures the switch mechanism to the chassis wall.
  - Connect the switch cable to the socket on the motherboard.
- Step 4** Replace the cover to the server.
- Step 5** Replace the server in the rack, replace cables, and then fully power on the server by pressing the Power button.

Figure 36: Replacing a Chassis Intrusion Switch



Intrusion switch location	-
---------------------------	---

## Installing a Trusted Platform Module (TPM)

The trusted platform module (TPM) is a small circuit board that plugs into a motherboard socket and is then permanently secured with a one-way screw. The socket location is on the motherboard below PCIe riser 2.

### TPM Considerations

- This server supports either TPM version 1.2 or TPM version 2.0. The TPM 2.0, UCSX-TPM2-002B(=), is compliant with Federal Information Processing (FIPS) Standard 140-2. FIPS support has existed, but FIPS 140-2 is now supported.
- Field replacement of a TPM is not supported; you can install a TPM after-factory only if the server does not already have a TPM installed.

- If there is an existing TPM 1.2 installed in the server, you cannot upgrade to TPM 2.0. If there is no existing TPM in the server, you can install TPM 2.0.
- If the TPM 2.0 becomes unresponsive, reboot the server.

## Installing and Enabling a TPM



---

**Note** Field replacement of a TPM is not supported; you can install a TPM after-factory only if the server does not already have a TPM installed.

---

This topic contains the following procedures, which must be followed in this order when installing and enabling a TPM:

1. Installing the TPM Hardware
2. Enabling the TPM in the BIOS
3. Enabling the Intel TXT Feature in the BIOS

## Installing TPM Hardware



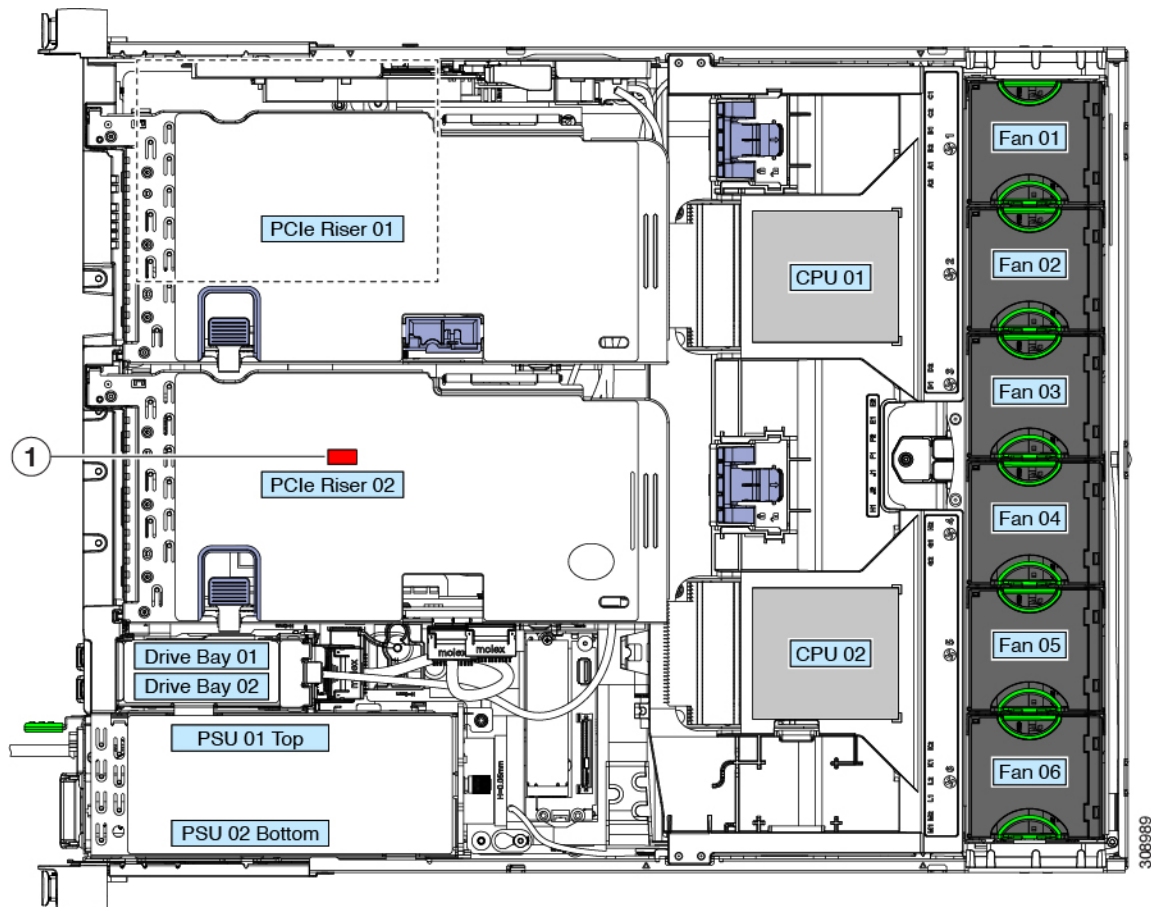
---

**Note** For security purposes, the TPM is installed with a one-way screw. It cannot be removed with a standard screwdriver.

---

- 
- Step 1** Prepare the server for component installation:
- a) Shut down and remove power from the server as described in [Shutting Down and Removing Power From the Server, on page 7](#).
  - b) Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.  
**Caution** If you cannot safely view and access the component, remove the server from the rack.
  - c) Remove the top cover from the server as described in [Removing the Server Top Cover, on page 9](#).
- Step 2** Remove PCIe riser 2 from the server to provide clearance to the TPM socket on the motherboard.
- Step 3** Install a TPM:
- a) Locate the TPM socket on the motherboard.
  - b) Align the connector that is on the bottom of the TPM circuit board with the motherboard TPM socket. Align the screw hole on the TPM board with the screw hole that is adjacent to the TPM socket.
  - c) Push down evenly on the TPM to seat it in the motherboard socket.
  - d) Install the single one-way screw that secures the TPM to the motherboard.
- Step 4** Replace PCIe riser 2 to the server. See [Replacing a PCIe Riser, on page 55](#).
- Step 5** Replace the cover to the server.
- Step 6** Replace the server in the rack, replace cables, and then fully power on the server by pressing the Power button.

**Step 7** Continue with [Enabling the TPM in the BIOS, on page 76](#).



TPM socket location on motherboard, below PCIe riser 2 -

## Enabling the TPM in the BIOS

After hardware installation, you must enable TPM support in the BIOS.



**Note** You must set a BIOS Administrator password before performing this procedure. To set this password, press the **F2** key when prompted during system boot to enter the BIOS Setup utility. Then navigate to **Security > Set Administrator Password** and enter the new password twice as prompted.

**Step 1** Enable TPM Support:

- a) Watch during bootup for the F2 prompt, and then press **F2** to enter BIOS setup.
- b) Log in to the BIOS Setup Utility with your BIOS Administrator password.
- c) On the BIOS Setup Utility window, choose the **Advanced** tab.

- d) Choose **Trusted Computing** to open the TPM Security Device Configuration window.
- e) Change TPM SUPPORT to **Enabled**.
- f) Press **F10** to save your settings and reboot the server.

**Step 2** Verify that TPM support is now enabled:

- a) Watch during bootup for the F2 prompt, and then press **F2** to enter BIOS setup.
- b) Log into the BIOS Setup utility with your BIOS Administrator password.
- c) Choose the **Advanced** tab.
- d) Choose **Trusted Computing** to open the TPM Security Device Configuration window.
- e) Verify that TPM SUPPORT and TPM State are Enabled.

**Step 3** Continue with [Enabling the Intel TXT Feature in the BIOS, on page 77](#).

---

## Enabling the Intel TXT Feature in the BIOS

Intel Trusted Execution Technology (TXT) provides greater protection for information that is used and stored on the business server. A key aspect of that protection is the provision of an isolated execution environment and associated sections of memory where operations can be conducted on sensitive data, invisibly to the rest of the system. Intel TXT provides for a sealed portion of storage where sensitive data such as encryption keys can be kept, helping to shield them from being compromised during an attack by malicious code.

---

**Step 1** Reboot the server and watch for the prompt to press F2.

**Step 2** When prompted, press **F2** to enter the BIOS Setup utility.

**Step 3** Verify that the prerequisite BIOS values are enabled:

- a) Choose the **Advanced** tab.
- b) Choose **Intel TXT(LT-SX) Configuration** to open the Intel TXT(LT-SX) Hardware Support window.
- c) Verify that the following items are listed as Enabled:
  - VT-d Support (default is Enabled)
  - VT Support (default is Enabled)
  - TPM Support
  - TPM State
- d) Do one of the following:
  - If VT-d Support and VT Support are already enabled, skip to step 4.
  - If VT-d Support and VT Support are not enabled, continue with the next steps to enable them.
- e) Press **Escape** to return to the BIOS Setup utility **Advanced** tab.
- f) On the Advanced tab, choose **Processor Configuration** to open the Processor Configuration window.
- g) Set Intel (R) VT and Intel (R) VT-d to **Enabled**.

**Step 4** Enable the Intel Trusted Execution Technology (TXT) feature:

- a) Return to the Intel TXT(LT-SX) Hardware Support window if you are not already there.
- b) Set TXT Support to **Enabled**.

**Step 5** Press **F10** to save your changes and exit the BIOS Setup utility.

---

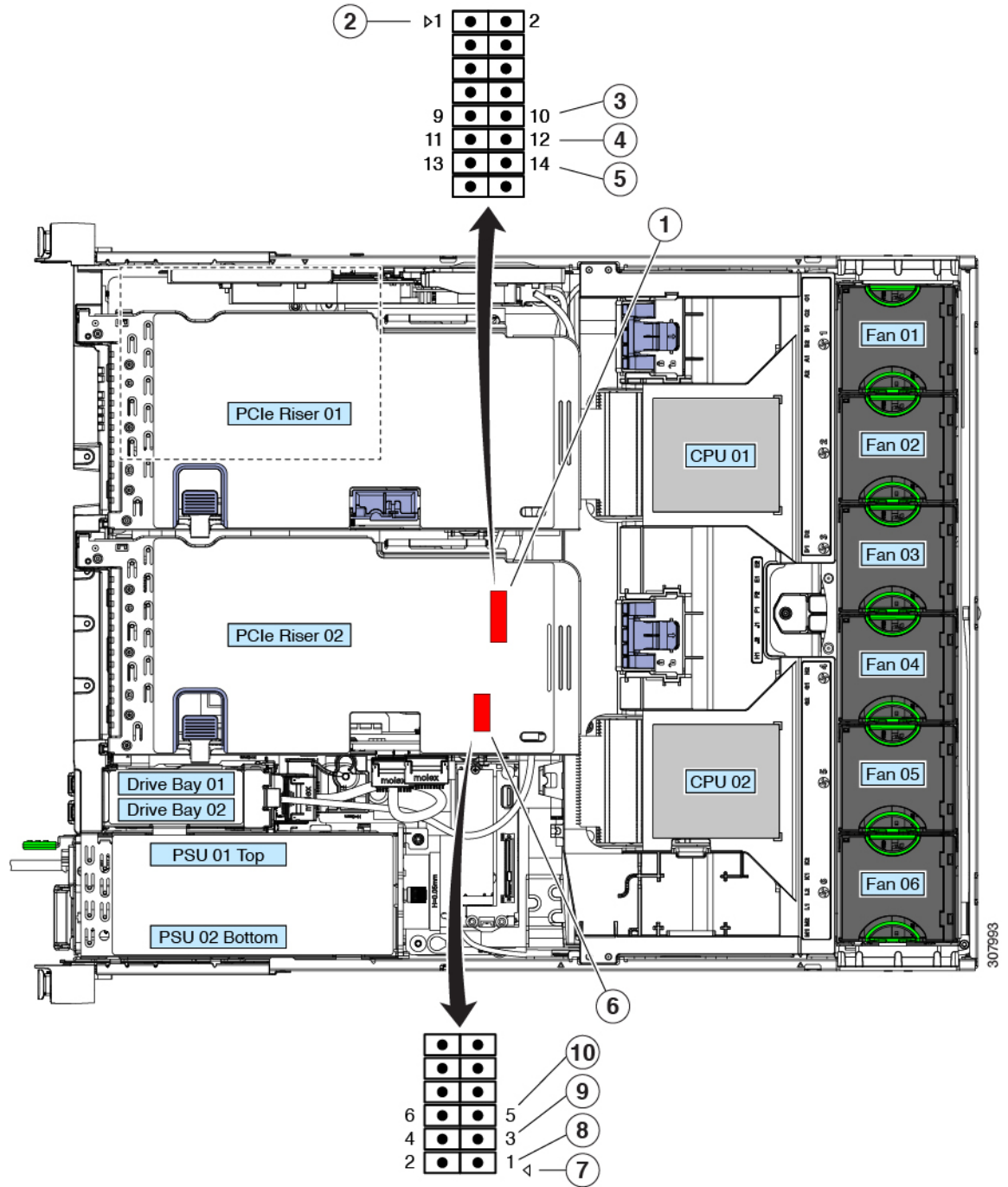
## Service Headers and Jumpers

This server includes two blocks of headers (J38, J39) that you can jumper for certain service and debug functions.

This section contains the following topics:

- [Using the Clear CMOS Header \(J38, Pins 9 - 10\), on page 80](#)
- [Using the BIOS Recovery Header \(J38, Pins 11 - 12\), on page 80](#)
- [Using the Clear Password Header \(J38, Pins 13 - 14\), on page 82](#)
- [Using the Boot Alternate Cisco IMC Image Header \(J39, Pins 1 - 2\), on page 83](#)
- [Using the Reset Cisco IMC Password to Default Header \(J39, Pins 3 - 4\), on page 84](#)
- [Using the Reset Cisco IMC to Defaults Header \(J39, Pins 5 - 6\), on page 84](#)

Figure 37: Location of Service Header Blocks J38 and J39



Location of header block J38	Location of header block J39
J38 pin 1 arrow printed on motherboard	J39 pin 1 arrow printed on motherboard
Clear CMOS: J38 pins 9 - 10	Boot Cisco IMC from alternate image: J39 pins 1 - 2

Recover BIOS: J38 pins 11 - 12	Reset Cisco IMC password to default: J39 pins 3 - 4
Clear password: J38 pins 13 - 14	Reset Cisco IMC to defaults: J39 pins 5 - 6

## Using the Clear CMOS Header (J38, Pins 9 - 10)

You can use this switch to clear the server's CMOS settings in the case of a system hang. For example, if the server hangs because of incorrect settings and does not boot, use this jumper to invalidate the settings and reboot with defaults.



**Caution** Clearing the CMOS removes any customized settings and might result in data loss. Make a note of any necessary customized settings in the BIOS before you use this clear CMOS procedure.

- 
- Step 1** Shut down and remove power from the server as described in [Shutting Down and Removing Power From the Server, on page 7](#).
- Step 2** Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.
- Caution** If you cannot safely view and access the component, remove the server from the rack.
- Step 3** Remove the top cover from the server as described in [Removing the Server Top Cover, on page 9](#).
- Step 4** Install a two-pin jumper across J38 pins 9 and 10.
- Step 5** Reinstall the top cover and reconnect AC power cords to the server. The server powers up to standby power mode, indicated when the Power LED on the front panel is amber.
- Step 6** Return the server to main power mode by pressing the Power button on the front panel. The server is in main power mode when the Power LED is green.
- Note** You must allow the entire server to reboot to main power mode to complete the reset. The state of the jumper cannot be determined without the host CPU running.
- Step 7** Press the Power button to shut down the server to standby power mode, and then remove AC power cords from the server to remove all power.
- Step 8** Remove the top cover from the server.
- Step 9** Remove the jumper that you installed.
- Note** If you do not remove the jumper, the CMOS settings are reset to the defaults every time you power-cycle the server.
- Step 10** Replace the top cover, replace the server in the rack, replace power cords and any other cables, and then power on the server by pressing the Power button.
- 

## Using the BIOS Recovery Header (J38, Pins 11 - 12)

Depending on which stage the BIOS becomes corrupted, you might see different behavior.

- If the BIOS BootBlock is corrupted, you might see the system get stuck on the following message:



Initializing and configuring memory/hardware

- If it is a non-BootBlock corruption, a message similar to the following is displayed:

```
****BIOS FLASH IMAGE CORRUPTED****
Flash a valid BIOS capsule file using Cisco IMC WebGUI or CLI interface.
IF Cisco IMC INTERFACE IS NOT AVAILABLE, FOLLOW THE STEPS MENTIONED BELOW.
1. Connect the USB stick with bios.cap file in root folder.
2. Reset the host.
IF THESE STEPS DO NOT RECOVER THE BIOS
1. Power off the system.
2. Mount recovery jumper.
3. Connect the USB stick with bios.cap file in root folder.
4. Power on the system.
Wait for a few seconds if already plugged in the USB stick.
REFER TO SYSTEM MANUAL FOR ANY ISSUES.
```



**Note** As indicated by the message shown above, there are two procedures for recovering the BIOS. Try procedure 1 first. If that procedure does not recover the BIOS, use procedure 2.

## Procedure 1: Reboot With bios.cap Recovery File

**Step 1** Download the BIOS update package and extract it to a temporary location.

**Step 2** Copy the contents of the extracted recovery folder to the root directory of a USB drive. The recovery folder contains the bios.cap file that is required in this procedure.

**Note** The bios.cap file must be in the root directory of the USB drive. Do not rename this file. The USB drive must be formatted with either the FAT16 or FAT32 file system.

**Step 3** Insert the USB drive into a USB port on the server.

**Step 4** Reboot the server.

**Step 5** Return the server to main power mode by pressing the Power button on the front panel.

The server boots with the updated BIOS boot block. When the BIOS detects a valid bios.cap file on the USB drive, it displays this message:

```
Found a valid recovery file...Transferring to Cisco IMC
System would flash the BIOS image now...
System would restart with recovered image after a few seconds...
```

**Step 6** Wait for server to complete the BIOS update, and then remove the USB drive from the server.

**Note** During the BIOS update, Cisco IMC shuts down the server and the screen goes blank for about 10 minutes. Do not unplug the power cords during this update. Cisco IMC powers on the server after the update is complete.

## Procedure 2: Use BIOS Recovery Header and bios.cap File

**Step 1** Download the BIOS update package and extract it to a temporary location.

- Step 2** Copy the contents of the extracted recovery folder to the root directory of a USB drive. The recovery folder contains the bios.cap file that is required in this procedure.
- Note** The bios.cap file must be in the root directory of the USB drive. Do not rename this file. The USB drive must be formatted with either the FAT16 or FAT32 file system.
- Step 3** Shut down and remove power from the server as described in [Shutting Down and Removing Power From the Server, on page 7](#). Disconnect power cords from all power supplies.
- Step 4** Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.
- Caution** If you cannot safely view and access the component, remove the server from the rack.
- Step 5** Remove the top cover from the server as described in [Removing the Server Top Cover, on page 9](#).
- Step 6** Install a two-pin jumper across J38 pins 11 and 12.
- Step 7** Reconnect AC power cords to the server. The server powers up to standby power mode.
- Step 8** Insert the USB thumb drive that you prepared in Step 2 into a USB port on the server.
- Step 9** Return the server to main power mode by pressing the Power button on the front panel.
- The server boots with the updated BIOS boot block. When the BIOS detects a valid bios.cap file on the USB drive, it displays this message:
- ```
Found a valid recovery file...Transferring to Cisco IMC
System would flash the BIOS image now...
System would restart with recovered image after a few seconds...
```
- Step 10** Wait for server to complete the BIOS update, and then remove the USB drive from the server.
- Note** During the BIOS update, Cisco IMC shuts down the server and the screen goes blank for about 10 minutes. Do not unplug the power cords during this update. Cisco IMC powers on the server after the update is complete.
- Step 11** After the server has fully booted, power off the server again and disconnect all power cords.
- Step 12** Remove the jumper that you installed.
- Note** If you do not remove the jumper, after recovery completion you see the prompt, “Please remove the recovery jumper.”
- Step 13** Replace the top cover, replace the server in the rack, replace power cords and any other cables, and then power on the server by pressing the Power button.

---

## Using the Clear Password Header (J38, Pins 13 - 14)

You can use this switch to clear the administrator password.

---

- Step 1** Shut down and remove power from the server as described in [Shutting Down and Removing Power From the Server, on page 7](#). Disconnect power cords from all power supplies.
- Step 2** Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.
- Caution** If you cannot safely view and access the component, remove the server from the rack.

- Step 3** Remove the top cover from the server as described in [Removing the Server Top Cover, on page 9](#).
- Step 4** Install a two-pin jumper across J38 pins 13 and 14.
- Step 5** Reinstall the top cover and reconnect AC power cords to the server. The server powers up to standby power mode, indicated when the Power LED on the front panel is amber.
- Step 6** Return the server to main power mode by pressing the Power button on the front panel. The server is in main power mode when the Power LED is green.
- Note** You must allow the entire server to reboot to main power mode to complete the reset. The state of the jumper cannot be determined without the host CPU running.
- Step 7** Press the Power button to shut down the server to standby power mode, and then remove AC power cords from the server to remove all power.
- Step 8** Remove the top cover from the server.
- Step 9** Remove the jumper that you installed.
- Note** If you do not remove the jumper, the password is cleared every time you power-cycle the server.
- Step 10** Replace the top cover, replace the server in the rack, replace power cords and any other cables, and then power on the server by pressing the Power button.
- 

## Using the Boot Alternate Cisco IMC Image Header (J39, Pins 1 - 2)

You can use this Cisco IMC debug header to force the system to boot from an alternate Cisco IMC image.

---

- Step 1** Shut down and remove power from the server as described in [Shutting Down and Removing Power From the Server, on page 7](#). Disconnect power cords from all power supplies.
- Step 2** Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.
- Caution** If you cannot safely view and access the component, remove the server from the rack.
- Step 3** Remove the top cover from the server as described in [Removing the Server Top Cover, on page 9](#).
- Step 4** Install a two-pin jumper across J39 pins 1 and 2.
- Step 5** Reinstall the top cover and reconnect AC power cords to the server. The server powers up to standby power mode, indicated when the Power LED on the front panel is amber.
- Step 6** Return the server to main power mode by pressing the Power button on the front panel. The server is in main power mode when the Power LED is green.
- Note** When you next log in to Cisco IMC, you see a message similar to the following:
- ```
'Boot from alternate image' debug functionality is enabled.  
CIMC will boot from alternate image on next reboot or input power cycle.
```
- Note** If you do not remove the jumper, the server will boot from an alternate Cisco IMC image every time that you power cycle the server or reboot Cisco IMC.
- Step 7** To remove the jumper, press the Power button to shut down the server to standby power mode, and then remove AC power cords from the server to remove all power.
- Step 8** Remove the top cover from the server.

- Step 9** Remove the jumper that you installed.
- Step 10** Replace the top cover, replace the server in the rack, replace power cords and any other cables, and then power on the server by pressing the Power button.
- 

## Using the Reset Cisco IMC Password to Default Header (J39, Pins 3 - 4)

You can use this Cisco IMC debug header to force the Cisco IMC password back to the default.

---

- Step 1** Shut down and remove power from the server as described in [Shutting Down and Removing Power From the Server, on page 7](#). Disconnect power cords from all power supplies.
- Step 2** Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.
- Caution** If you cannot safely view and access the component, remove the server from the rack.
- Step 3** Remove the top cover from the server as described in [Removing the Server Top Cover, on page 9](#).
- Step 4** Install a two-pin jumper across J39 pins 3 and 4.
- Step 5** Reinstall the top cover and reconnect AC power cords to the server. The server powers up to standby power mode, indicated when the Power LED on the front panel is amber.
- Step 6** Return the server to main power mode by pressing the Power button on the front panel. The server is in main power mode when the Power LED is green.
- Note** When you next log in to Cisco IMC, you see a message similar to the following:
- ```
'Reset to default CIMC password' debug functionality is enabled.  
On input power cycle, CIMC password will be reset to defaults.
```
- Note** If you do not remove the jumper, the server will reset the Cisco IMC password to the default every time that you power cycle the server. The jumper has no effect if you reboot Cisco IMC.
- Step 7** To remove the jumper, press the Power button to shut down the server to standby power mode, and then remove AC power cords from the server to remove all power.
- Step 8** Remove the top cover from the server.
- Step 9** Remove the jumper that you installed.
- Step 10** Replace the top cover, replace the server in the rack, replace power cords and any other cables, and then power on the server by pressing the Power button.
- 

## Using the Reset Cisco IMC to Defaults Header (J39, Pins 5 - 6)

You can use this Cisco IMC debug header to force the Cisco IMC settings back to the defaults.

---

- Step 1** Shut down and remove power from the server as described in [Shutting Down and Removing Power From the Server, on page 7](#). Disconnect power cords from all power supplies.
- Step 2** Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

**Caution** If you cannot safely view and access the component, remove the server from the rack.

- Step 3** Remove the top cover from the server as described in [Removing the Server Top Cover, on page 9](#).
- Step 4** Install a two-pin jumper across J39 pins 5 and 6.
- Step 5** Reinstall the top cover and reconnect AC power cords to the server. The server powers up to standby power mode, indicated when the Power LED on the front panel is amber.
- Step 6** Return the server to main power mode by pressing the Power button on the front panel. The server is in main power mode when the Power LED is green.
- Note** When you next log in to Cisco IMC, you see a message similar to the following:
- ```
'CIMC reset to factory defaults' debug functionality is enabled.  
On input power cycle, CIMC will be reset to factory defaults.
```
- Note** If you do not remove the jumper, the server will reset the Cisco IMC to the default settings every time that you power cycle the server. The jumper has no effect if you reboot Cisco IMC.
- Step 7** To remove the jumper, press the Power button to shut down the server to standby power mode, and then remove AC power cords from the server to remove all power.
- Step 8** Remove the top cover from the server.
- Step 9** Remove the jumper that you installed.
- Step 10** Replace the top cover, replace the server in the rack, replace power cords and any other cables, and then power on the server by pressing the Power button.

---

## Recycling the PCB Assembly (PCBA)

The PCBA is secured to the server by external and internal screws. Additional parts must be removed to expose the mounting screws that connect the PCBA to its sheet metal tray. You must disconnect the PCBA from the tray before recycling the PCBA. The PCBA is secured by M3.5x0.6mm screws.

### Before you begin



---

**Note** **For Recyclers Only!** This procedure is not a standard field-service option. This procedure is for recyclers who will be reclaiming the electronics for proper disposal to comply with local eco design and e-waste regulations.

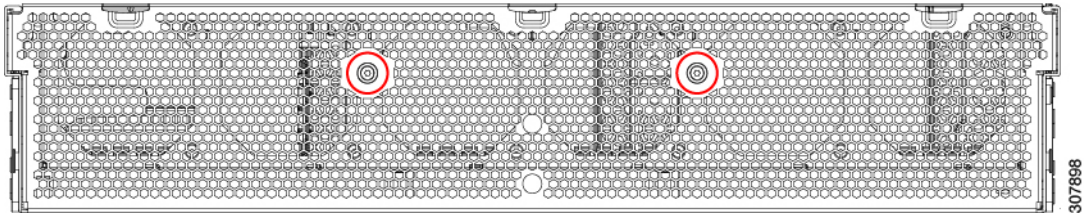
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To remove the printed circuit board assembly (PCBA), the following requirements must be met:

- The server must be disconnected from facility power.
- The server must be removed from the equipment rack.
- The server's top cover must be removed. See [Removing the Server Top Cover, on page 9](#).

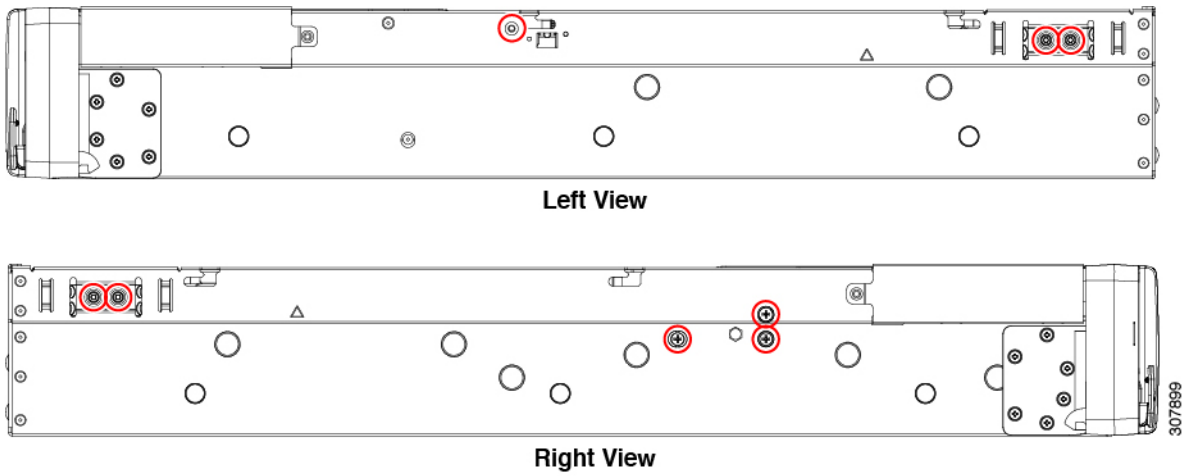
- 
- Step 1** Remove the external screws.
- a) Using a screwdriver, remove the face plate screws.

**Figure 38: Location of PCBA Faceplate Screws**



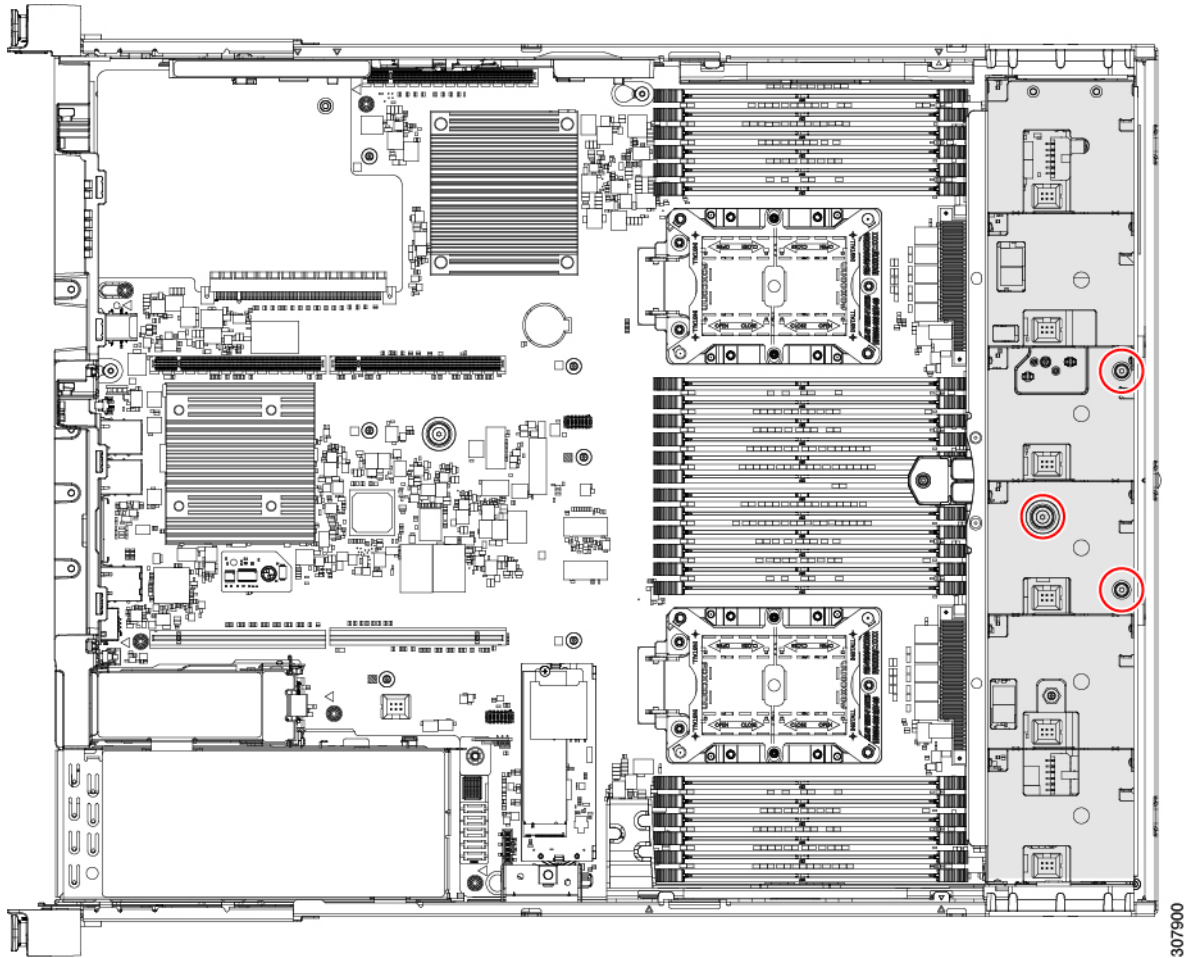
- b) Using a screwdriver, remove the screws from each side of the chassis.

**Figure 39: Location of PCBA Chassis Screws**



**Step 2** Remove the fan cage screws.

Figure 40: Location of Fan Cage Screws

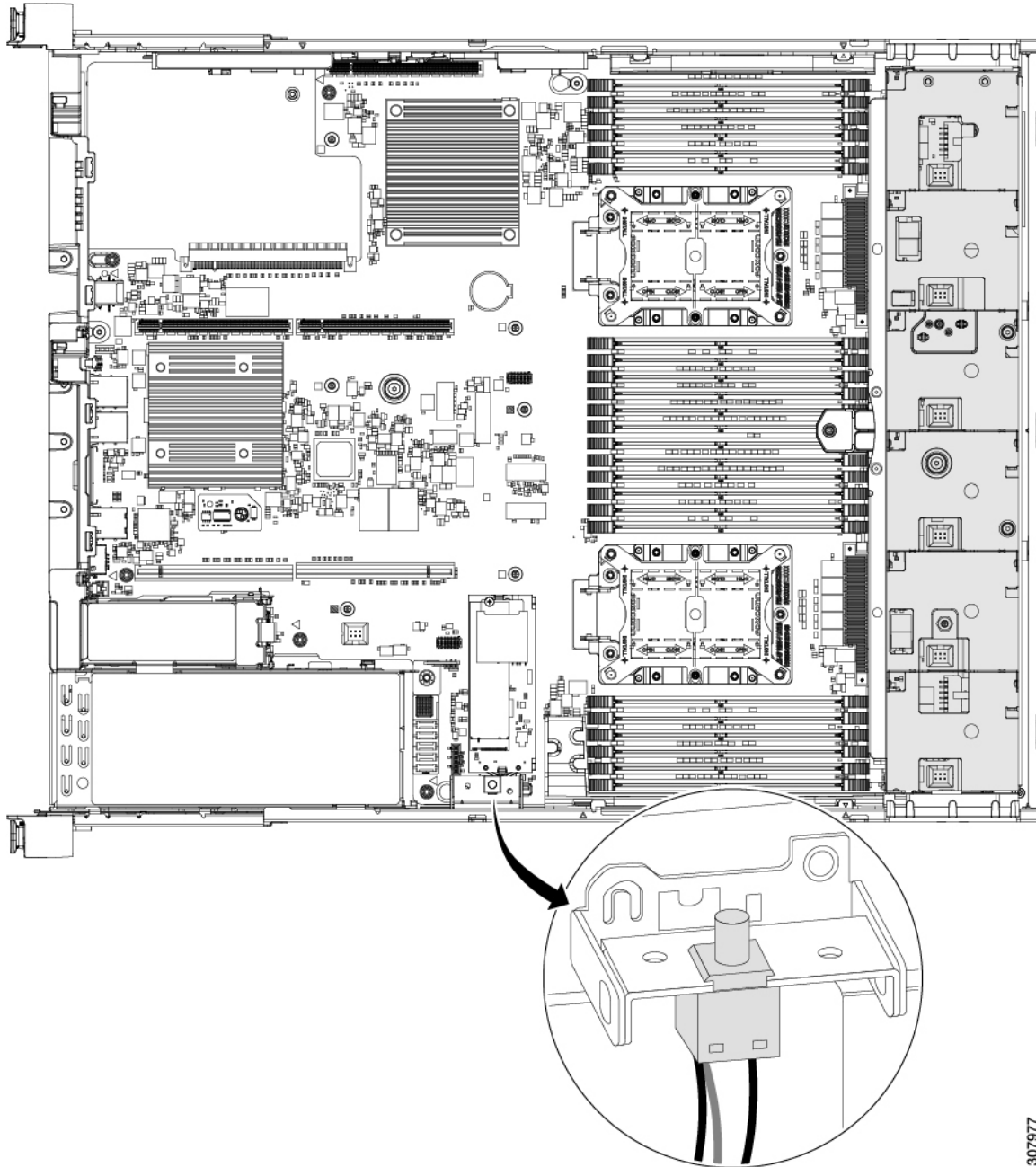


**Step 3** Grasp the Fan cage and remove it.

**Step 4** Disconnect the intrusion protection switch (IPS), which is shown in the following figure.

- a) On the motherboard, break the IPS locking tab off the connector.
- b) Grasp the IPS cables and disconnect them from the motherboard.

Figure 41: Location of Intrusion Protection Switch

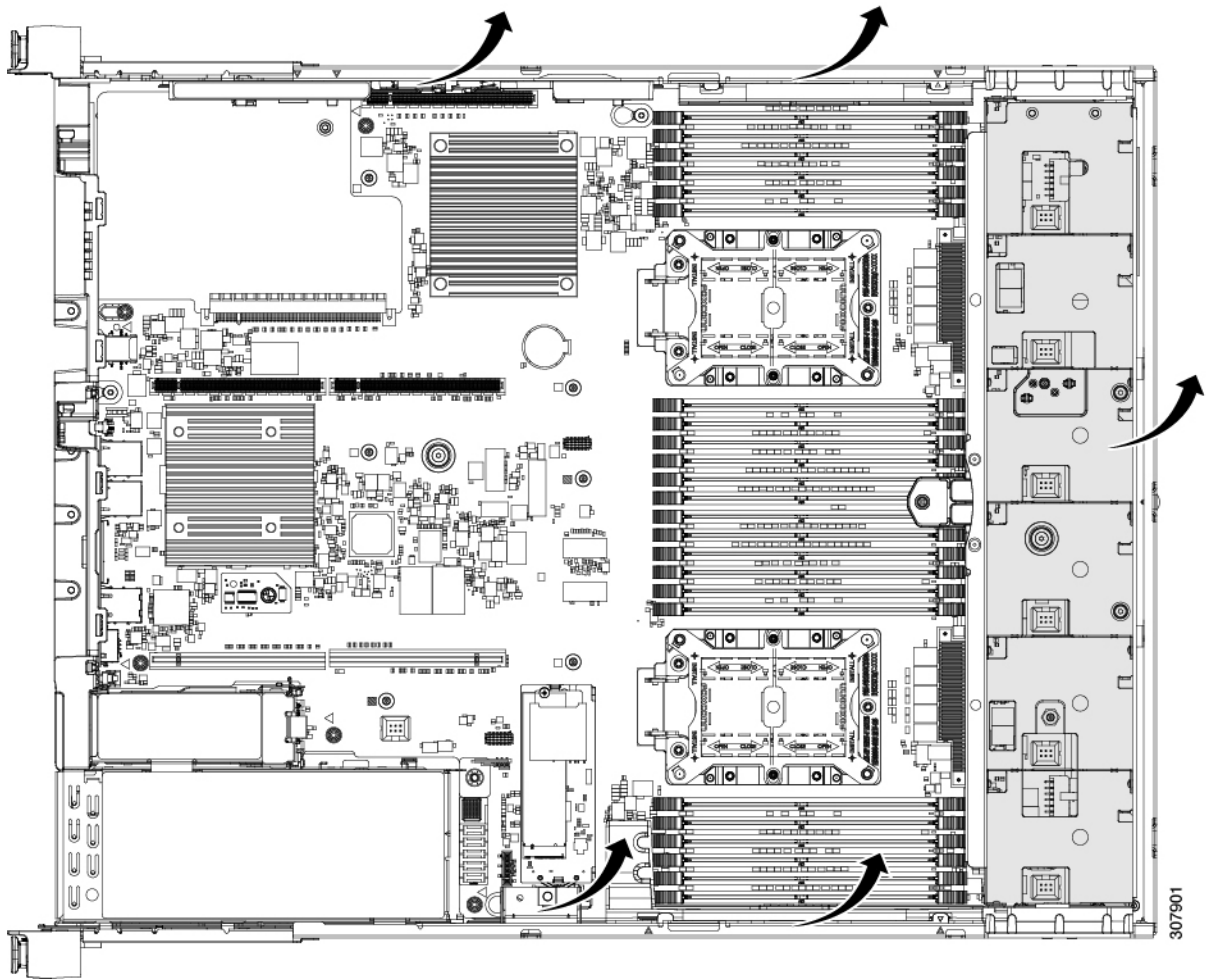


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- Step 5** Continue removing the internal components.
- a) Grasp the cable holders and remove them.
  - b) Grasp the RAID card bracket and remove it.



Figure 42: Locations of Internal Components



**Step 6**

Remove the PCBA.

- a) Grasp each of the ribbon cables and disconnect it.
- b) Using a screwdriver, remove all the PCBA mounting screws.
- c) Disconnect the PCBA from the sheet metal tray and dispose of the PCBA properly.

Figure 43: Locations of PCBA Cables and Mounting Screws

