Intel® Server Chassis P4304XXMFEN2 & P4304XXMUXX Product Family

System Integration and Service Guide

A guide providing instructions for the installation and replacement of system components, and available Intel accessories and spares for the following Intel server products: Intel® Server Chassis P4304XXMFEN2, Intel® Server Chassis P4304XXMUXX, Intel® Server Board S2600CW family, and Intel® Server Board S2600ST family

Revision 2.1

January 2020

Intel® Server Products and Solutions

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Document Revision History

Date	Revision Number	Modifications
July 2017	2.0	Production Release – Added content to support Intel® Server Board S2600ST
January 2020	2.1	• Updated Product Safety and Warnings section • Updated Preface section •

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Safety Information

For supported product regulatory, product safety, and certification information, reference the *Intel Server Products Safety and Regulatory Compliance* document, rev 1.5 or later. The Intel® Server Chassis P4000 product family will be identified and referenced as **Pr4000** in all product regulatory test reports, certificates, and compliance collaterals. Product family regulatory test reports, certificates, and compliance collaterals are available upon request. Contact your local Intel representative.

Important Safety Instructions

Read all caution and safety statements in this document before performing any of the instructions. See *Intel® Server Boards and Server Chassis Safety Information* at https://www.intel.com/content/www/us/en/support/server-products/000007675.html

Perchlorate Material - special handling may apply. See http://www.dtsc.ca.gov/hazardouswaste/perchlorate

Wichtige Sicherheitshinweise

Lesen Sie zunächst sämtliche Warn- und Sicherheitshinweise in diesem Dokument, bevor Sie eine der Anweisungen ausführen. Beachten Sie hierzu auch die Sicherheitshinweise zu Intel®-Serverplatinen und -Servergehäusen unter https://www.intel.com/content/www/us/en/support/server-products/000007675.html

重要安全指导

在执行任何指令之前，请阅读本文件中的所有注意事项及安全声明。并参阅 https://www.intel.com/content/www/us/en/support/server-products/000007675.html 上的 *Intel® Server Boards and Server Chassis Safety Information*（《Intel 服务器主板与服务器机箱安全信息》）。

Consignes de sécurité

Lisez attention toutes les consignes de sécurité et les mises en garde indiquées dans ce document avant de suivre toute instruction. Consultez *Intel® Server Boards and Server Chassis Safety Information* rendez-vous sur le. Site https://www.intel.com/content/www/us/en/support/server-products/000007675.html

Instrucciones de seguridad importantes

Lea todas las declaraciones de seguridad y precaución de este documento antes de realizar cualquiera de las instrucciones. Vea *Intel® Server Boards and Server Chassis Safety Information* en https://www.intel.com/content/www/us/en/support/server-products/000007675.html

Warnings

Heed safety instructions: Before working with your server product, whether you are using this guide or any other resource as a reference, pay close attention to the safety instructions. You must adhere to the assembly instructions in this guide to ensure and maintain compliance with existing product certifications and approvals. Use only the described, regulated components specified in this guide. Use of other products/components will void the UL listing and other regulatory approvals of the product and will most likely result in noncompliance with product regulations in the region(s) in which the product is sold.

System power on/off: The power button DOES NOT turn off the Server Chassis AC power. To remove power from the Server Chassis, you must unplug the AC power cord from the wall outlet. Make sure the AC power cord is unplugged before you open the Server Chassis.

Power down the Compute Module and remove it from the Server Chassis before performing any integration or service. Remove power feeds from the Server Board.

Hazardous conditions, devices and cables: Hazardous electrical conditions may be present on power, telephone, and communication cables. Turn off the Compute Module remove it from the Server Chassis and disconnect all telecommunications systems, networks, and modems attached to the Server Board before servicing it. Otherwise, personal injury or equipment damage can result.

Installing or removing jumpers: A jumper is a small plastic encased conductor that slips over two jumper pins. Some jumpers have a small tab on top that you can grip with your fingertips or with a pair of fine needle nosed pliers. If your jumpers do not have such a tab, take care when using needle nosed pliers to remove or install a jumper; grip the narrow sides of the jumper with the pliers, never the wide sides. Gripping the wide sides can damage the contacts inside the jumper, causing intermittent problems with the function controlled by that jumper. Take care to grip with, but not squeeze, the pliers or other tool you use to remove a jumper, or you may bend or break the pins on the board.

Electrostatic Discharge (ESD)

Electrostatic discharge can cause damage to your computer or the components within it. ESD can occur without the user feeling a shock while working inside the system chassis or while improperly handling electronic devices like processors, memory or other storage devices, and add-in cards.

Intel recommends the following steps be taken when performing any procedures described within this document or while performing service to any computer system.

- Where available, all system integration and/or service should be performed at a properly equipped ESD workstation.
- Wear ESD protective gear like a grounded antistatic wrist strap, sole grounders, and/or conductive shoes.
- Wear an anti-static smock or gown to cover any clothing that may generate an electrostatic charge.
- Remove all jewelry.
- Disconnect all power cables and cords before opening the Sever Chassis
- Power down the Compute Module and remove it from the Server Chassis, remove power feed from the Server Board before performing any integration or service
- Touch any unpainted metal surface of the chassis before performing any integration or service.
- Hold all circuit boards and other electronic components by their edges only.

- After removing electronic devices from the system or from their protective packaging, place them component side up on to a grounded anti-static surface or conductive foam pad. **Do not** place electronic devices on to the outside of any protective packaging.

Caution: Slide/rail mounted equipment is not to be used as a shelf or a work space.

Intel warranties that this product will perform to its published specifications. However, all computer systems are inherently subject to unpredictable system behavior under various environmental and other conditions.

This product is not intended to be the sole source for any critical data and the user must maintain a verified backup. Failure to do so or to comply with other user notices in the product user guide and specification documents may result in loss of or access to data.

Preface

About this document

This document is written for system integrators and service technicians who are responsible for system assembly, server upgrades, server repair, and component replacement.

This document is specifically written to support the following Intel server products:

- Intel® Server Chassis P4304XXMFEN2
- Intel® Server Chassis P4304XXMUXX
- Intel® Server Board S2600CW family
- Intel® Server Board S2600ST family
- Supported Intel spares and accessories

Important: Due to differences between the Intel Server Board S2600CW and S2600ST families, some sections of this guide may have specific procedures for each. When no specific procedure is provided, that procedure is common to both board families.

This document is divided into two major sections. The first half of the document provides detailed instructions on how to assemble a system from the bare chassis to a functional server. It guides you through the installation of system components and available accessories. The second half of the document is focused on system service. It provides many reference diagrams used to identify all key physical features of the system. It also provides detailed instructions for the replacement of field replaceable components.

For the latest revision of this document, go to http://www.intel.com/support.

Document Organization

System Integration

Chapter 1 – Server Building Block System Integration and Service**–**Provides grounds-up assembly instructions for the integration of individual server building blocks, starting with a bare chassis and installing all the system boards and major server components, including power supply and system fans. (**NOTE**: Skip this chapter if the server board and other major components are pre-installed in the system.)

Chapter 2 – Essential System Component Integration –Provides instructions for adding essential system components required to complete the integration of the server chassis. This includes installation of processors, memory, add-in cards, and Hot-Swap storage devices.

Chapter 3 – Options and Accessory Kit Integration and Service –Provides instructions for adding and removing various system options and available accessory option kits that may be installed in the system.

Chapter 4 – System Software Update and Configuration – Provides instructions for completing the integration of the server chassis by updating the system software and navigating through the BIOS Setup screens.

Chapter 5 – **System Packaging Assembly** – Provides package assembly instructions when re-using the Intel packaging in which the system was originally shipped.

System Service

Chapter 6 – System Features Overview –Provides a high-level overview of the supported Intel® Server Boards and Intel® Server Chassis P4304XXMFEN2/P4304XXMUXX Product Family, featuring a list of the server chassis features and illustrations identifying the major system components.

Chapter 7 – FRU Replacement – Provides guidance for the replacement of system components considered as field replaceable units (FRUs).
Appendix A – Getting Help
Appendix B – System Cable Routing Diagrams
Appendix C – System Status LED Operating States and Definition
Appendix D – POST Code Diagnostic LED Decoder Table for S2600CW Server Board Family
Appendix E – POST Code Diagnostic LED Decoder Table for S2600ST Server Board Family
Appendix F – POST Code Errors

Additional Information and Software

Access the following Intel web sites for the latest revision of this document, and to download additional Intel product documentation, specs, on-board device drivers, utility software, and system firmware updates:

https://www.intel.com/content/www/us/en/support/products/1201/server-products.html

Table 1. Server System References

For this information or software	Use this or Software Document
For in-depth technical information about this product.	• Intel® Server Board S2600CW Technical Product Specification • Intel® Server Board S2600ST Technical Product Specification • Intel® Server Chassis P4000M Family Technical Product Specification
For a list of available systems within the product family and supported Intel spares and accessories	• Intel® Server Board S2600CW Product Family Configuration Guide • Intel® Server Board S2600ST Product Family Configuration Guide
For server configuration guidance and compatibility	Intel® Server Configurator tool http://serverconfigurator.intel.com
For system power budget guidance	• *Intel® Server Board S2600CW Product Family Power Budget Tool* • Intel® Server Board S2600ST Product Family Power Budget Tool
For system firmware updates and onboard device drivers and software to manage your Intel® Server chassis.	http://downloadcenter.intel.com
Product Safety and Regulatory Information	Intel Server Products - Product Safety and Regulatory Compliance Document

Table 2. System Utility Software

To do this:	**Use this utility:**
To obtain full system information	Intel® SYSINFO Utility – Various OS support
To read System Event Log (SEL)	Intel® SELVIEW Utility – Various OS support
To configure, save, and restore various system options	Intel® SYSCFG Utility – Various OS support
To test on-board feature functionality	Intel® Platform Confidence Test (PCT) – uEFI only
To update system software	System Update Package (SUP) – uEFI only Intel® One Boot Flash Update (OFU) – Various OS Support
To configure and manage Intel® RAID Controllers	Intel® RAID Web Console 2 Utility – Various OS support
Server Management Software	Intel® Active System Console

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1. Server Building Block System Integration and Service

Purpose

This chapter provides instructions for the integration of the following Intel server building blocks:

Intel® Server Chassis P4304XXMFEN2 + Intel® Server Board S2600CW

Intel® Server Chassis P4304XXMUXX + Intel® Server Board S2600CW + Power Supply Module

Intel® Server Chassis P4304XXMFEN2 + Intel® Server Board S2600ST

Intel® Server Chassis P4304XXMUXX + Intel® Server Board S2600ST + Power Supply Module

Before You Begin

Before working with your server product, observe the safety and ESD precautions found in the Warnings section at the beginning of this manual.

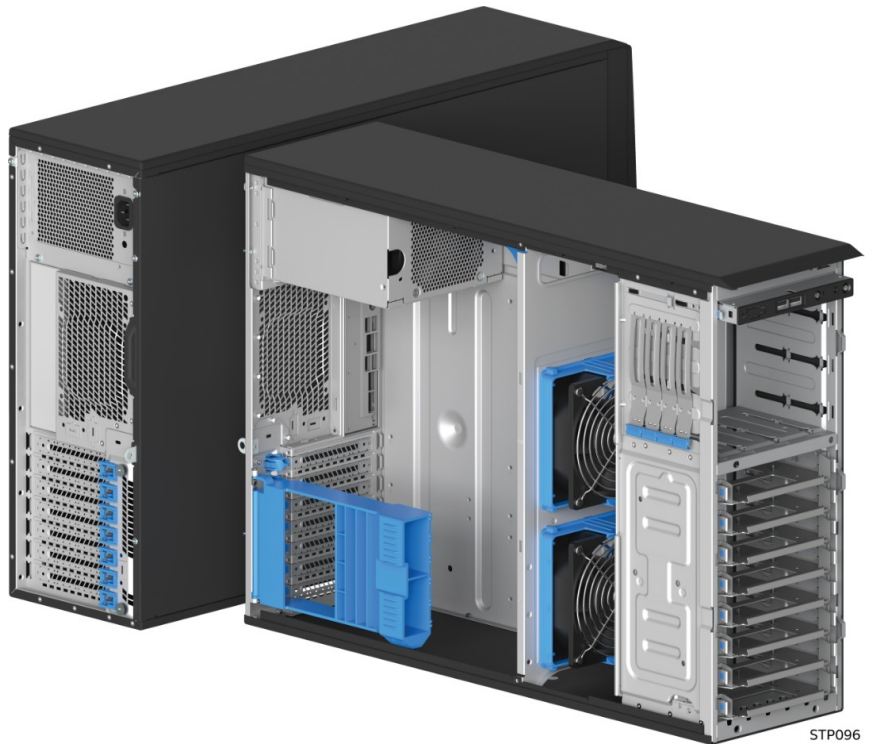
Tools and Supplies Needed

- Anti-static wrist strap and conductive foam pad (recommended)
- Phillips* (cross head) screwdriver (#2 bit)

System Reference

All references to left, right, front, top, and bottom assume the reader is facing the front of the chassis.

1.1 Intel® Server Chassis Identification



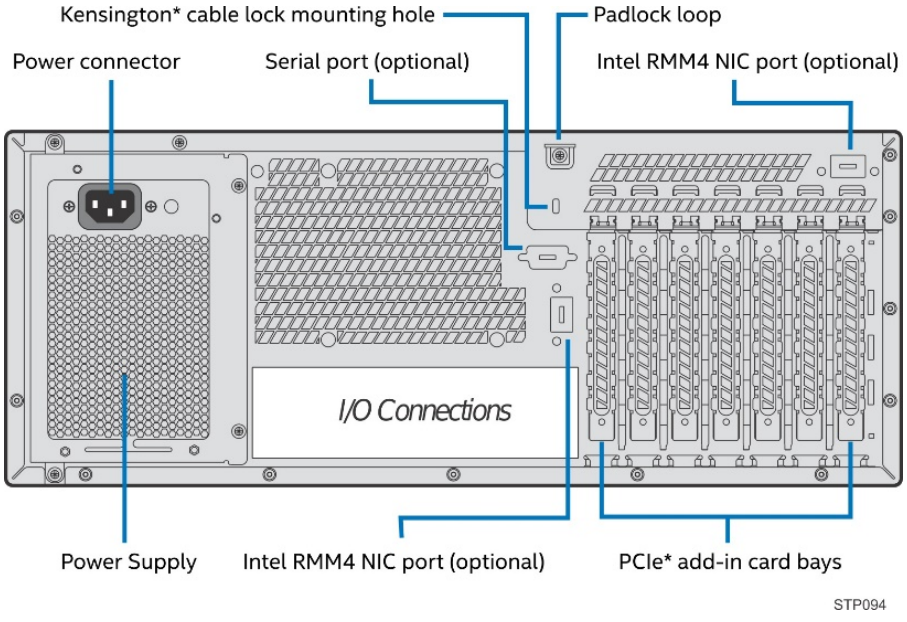
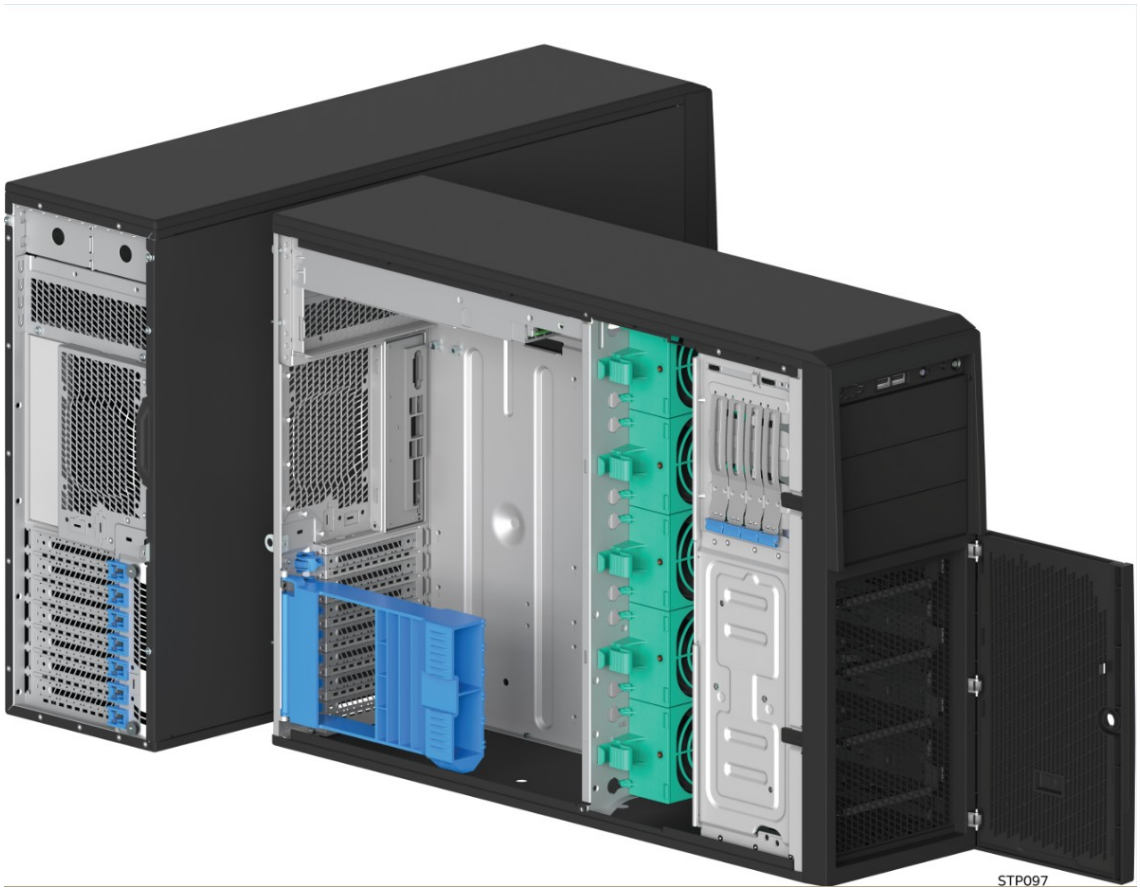


Figure 1. Intel® Server Chassis P4304XXMFEN2 – Features overview



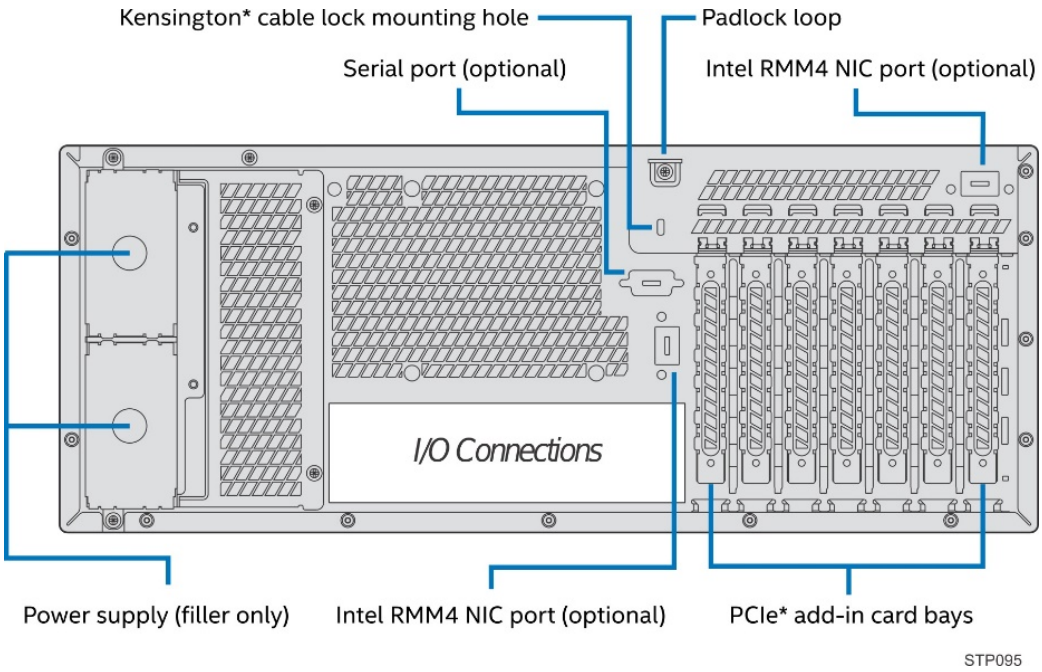


Figure 2. Intel® Server Chassis P4304XXMUXX – Optional Redundant Power Supplies

Note: There may be only one filler present on the power supply positions.

1.2 Server Building Block Installation

As received, the Intel Server Chassis will include several components within a boxed accessory kit or placed within the chassis.

1.2.1 Chassis Side Cover Removal / Installation

1.2.1.1 Chassis Side Cover Removal

Operate the server with the chassis side cover in place to ensure proper cooling. Remove the side cover to add or replace components inside of the chassis. Before removing the side cover, power down the chassis and unplug all peripheral devices and the AC power cable(s).

Note: A non-skid surface or a stop behind the server chassis may be needed to prevent the server chassis from sliding on a work surface.

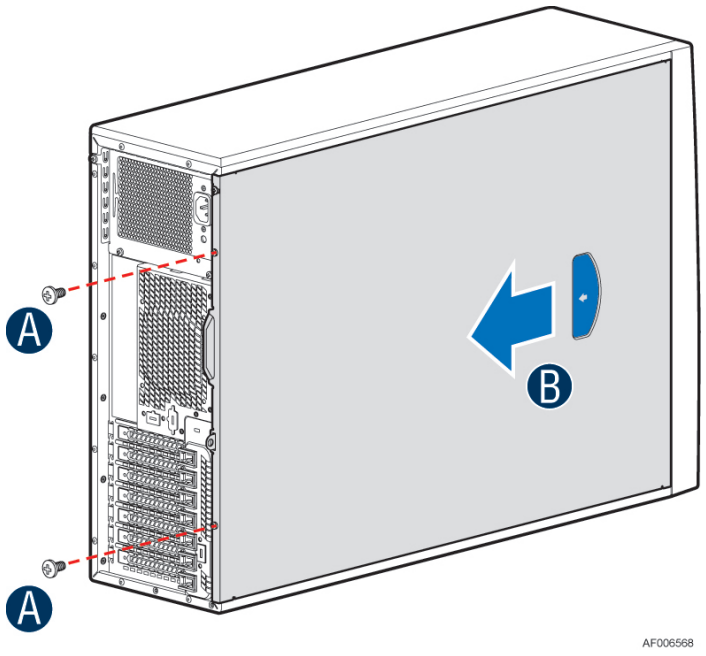


Figure 3. Removing the Chassis Side Cover

1. Loosen the two screws located on the back edge of the chassis side cover (see letter A).
2. Slide the cover back and lift it away (see letter B).

The accessory kit and or system packaging will include the following components:

- Bag of screws for mounting the server board
- Set of standoff screws for mounting the server board
- Dual power Connector Cable
- Mini-SAS HD to 4 ports SATA 7 pins cable
- Bag with a set of Chassis plastic Feet
- Bumper pad for server board

The following components will be found inside the chassis. Each should be removed:

- Plastic air duct

1.2.1.2 Chassis Side Cover Installation

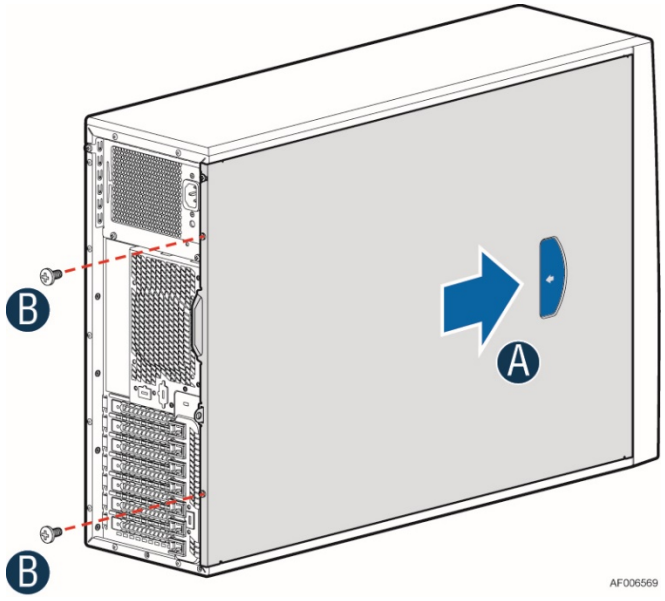


Figure 4. Installing the Chassis Side Cover

1. Place the chassis side cover onto the chassis and slide forward until the front edge of the cover is pressed up against the back edge of the front drive bay (see letter A).
2. Secure the side cover with two screws (included with the chassis) at the back of the chassis (see letter B).

1.2.2 Air Duct Removal / Installation

Always operate the server chassis with the air duct in place. The air duct is required for proper airflow within the server chassis.

1.2.2.1 Air Duct Removal

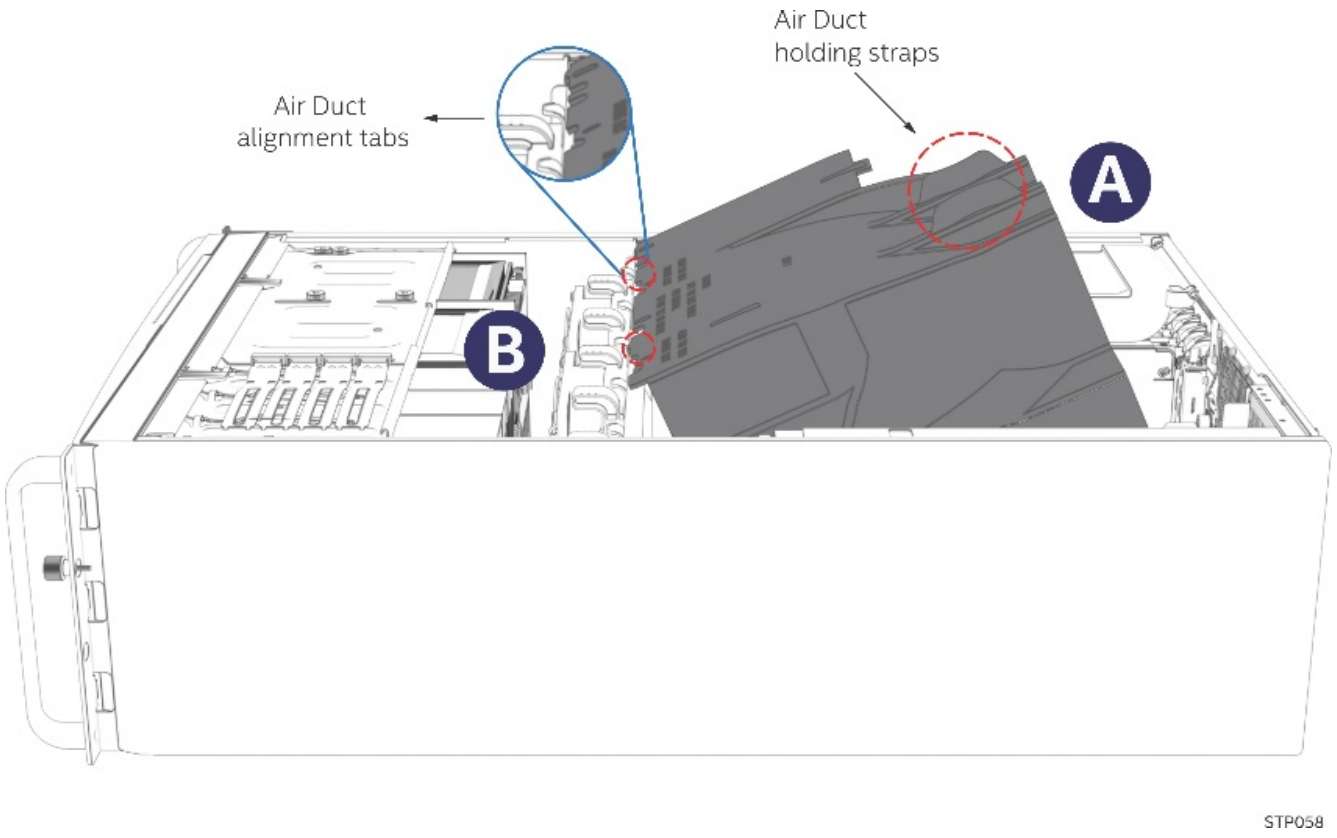


Figure 5. Installing the Air Duct 4/4

1. Lift the air duct holding it by the holding straps (see letter A) until the tabs on the front edge of the air duct are free from the chassis alignment holes (see letter B).

1.2.2.2 Air Duct Installation

Note: In order to avoid risk of damaging the server board and power cables, verify that the cable routing follows the recommendations described in Appendix B.

1. Carefully manage the system main power cable and CPU power cables so that they fit under the notch of the air duct.

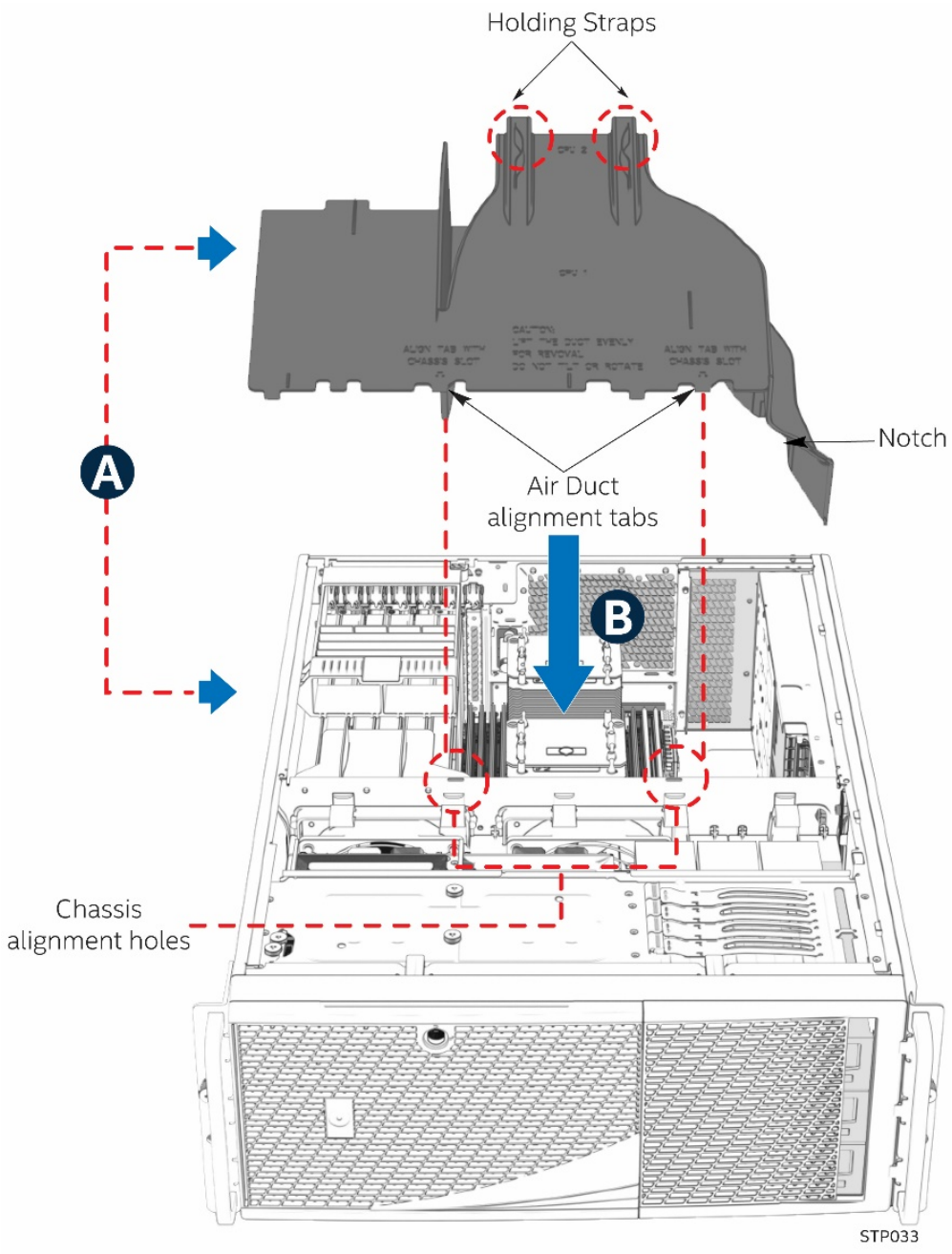


Figure 6. Installing the Air Duct 1/4

2. Align the two tabs on the front edge of the air duct with the matching slots on the fan assembly (See letters A and B).

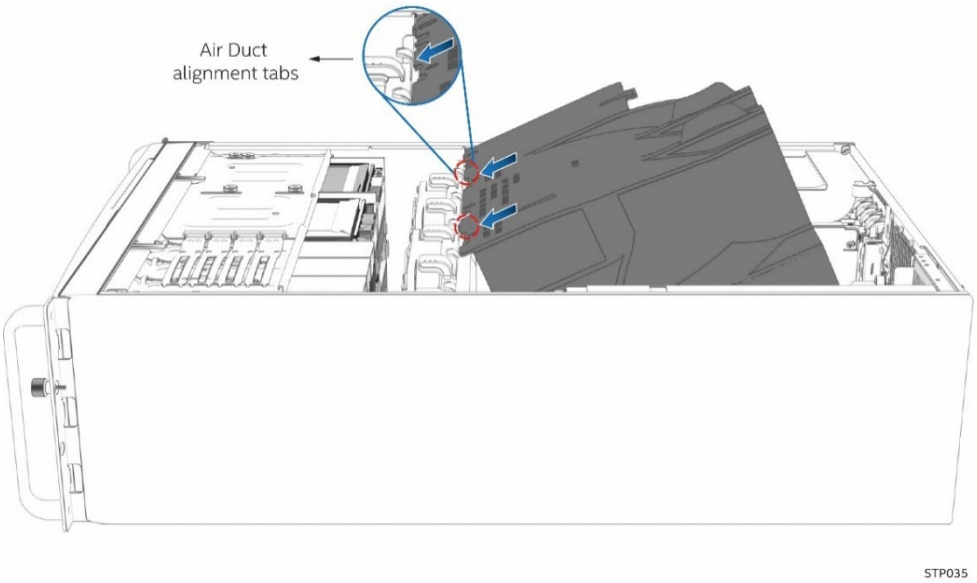


Figure 7. Installing the Air Duct 2/4

3. Lower the air duct into the chassis in a tilted manner so that the two tabs in the front are securely installed in the chassis alignment holes first.

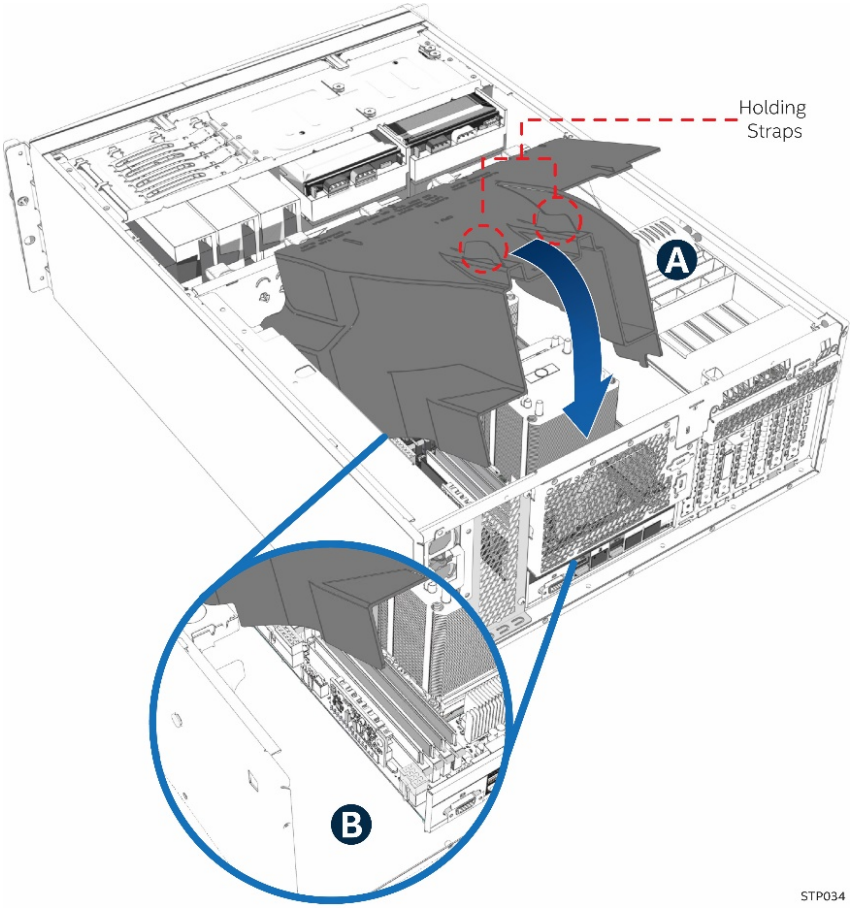


Figure 8. Installing the Air Duct 3/4

4. Hold the back of the air duct by the holding straps as shown in the illustration (see letter A).
5. Carefully lower the back of the air duct, avoiding contact with the server board components (see letter B), and ensuring the power cables fit under the notch.

1.2.3 Installing the IO Shield

Note: The IO shield can be found in the server board package or can be ordered separately.

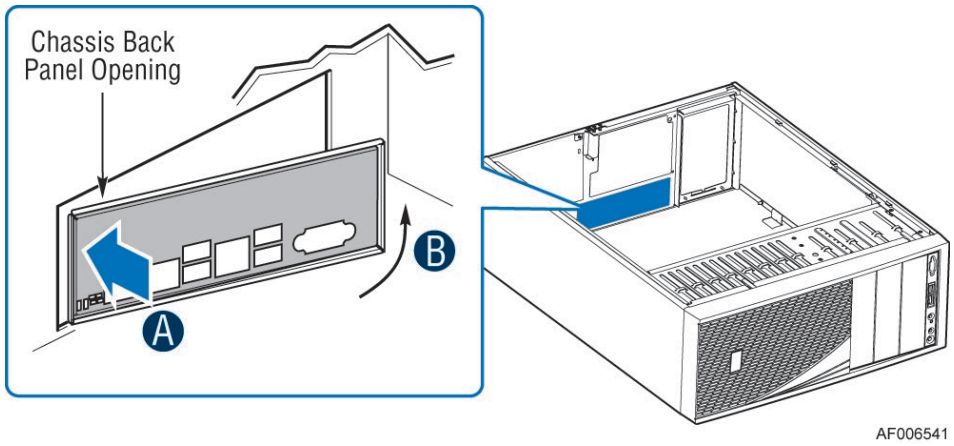


Figure 9. Installing the I/O Shield

1. From the chassis inner side, align the IO shield with the chassis rear IO opening.
2. Press the IO shield firmly to the chassis rear IO opening until it clicks into place. To make the process easier, install one end of the IO shield first (see letter A) and finish by pressing the other end (see letter B).

1.2.4 Installing the Stand-off screws

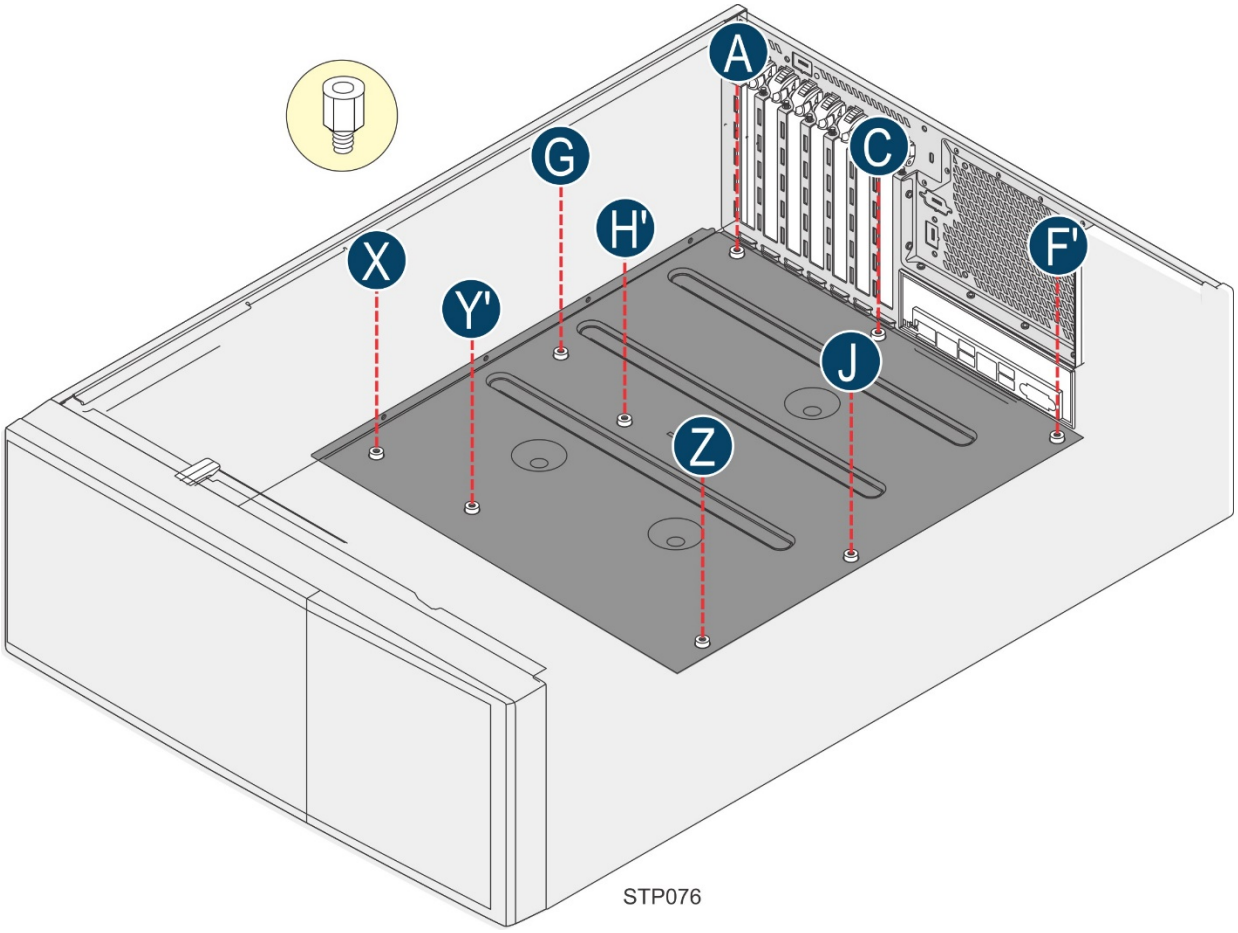


Figure 10. Standoff Positions on Chassis

1. Locate the standoff screws inside the accessory kit.
2. Install the stand-off screws to the chassis mounting holes, matching the positions in the chassis with the same label as shown in Figure 10.

Note: The P4304XXMFEN2 and P4304XXMUXX chassis can support different boards. The standoff configuration shown above is the only valid configuration to install the S2600CW and S2600ST server board product families.

1.2.5 Server Board Installation

Note: Follow ESD precautions outlined at the beginning of this document.

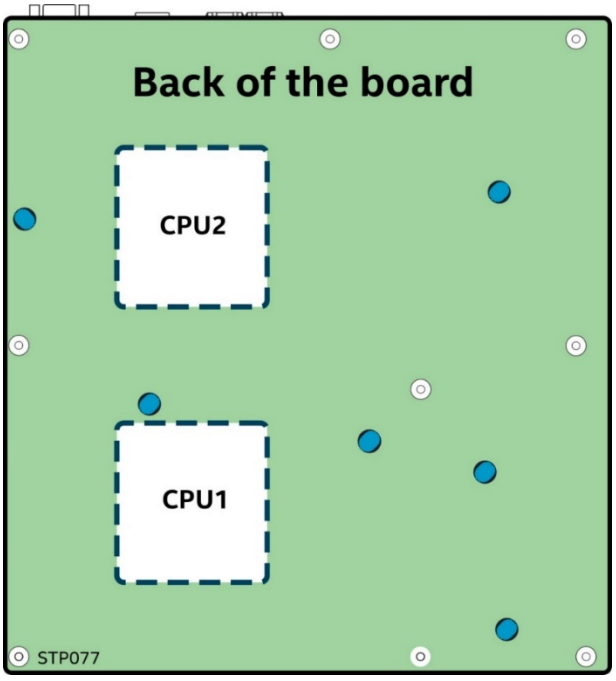


Figure 11. Bumper Position on Server Board

1. Remove the server board from its anti-static bag.
2. Attach the bumpers to the back of the server board. They are identified with circles as shown in the above illustration.

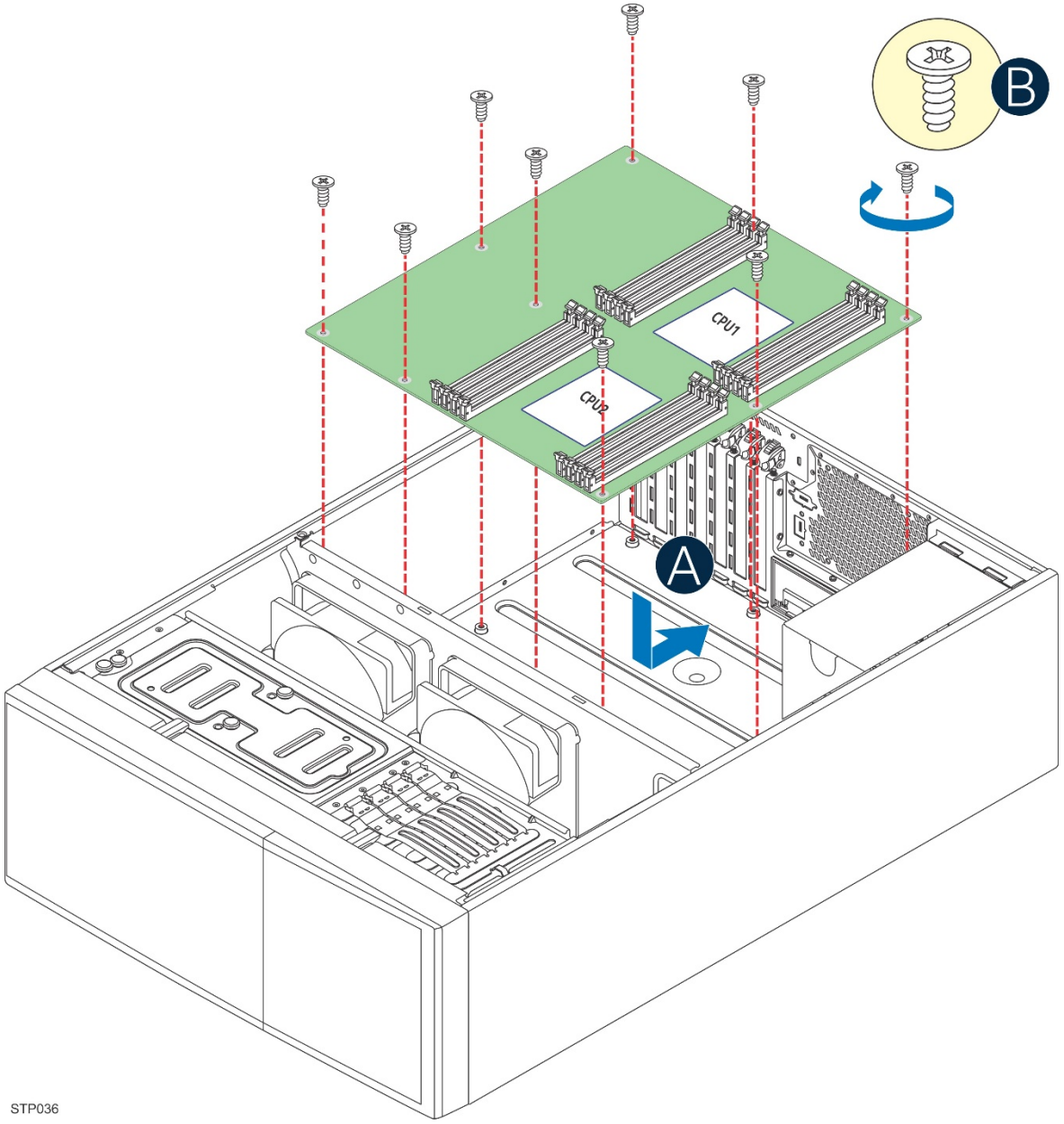


Figure 12. Server Board Installation

1. Carefully move aside any cables taped to the chassis base to clear the area for server board placement.
2. Carefully lower the server board into the chassis so that the rear I/O connectors of the server board align with it and are fully seated into the matching holes on the chassis back panel (see letter A).
3. The server board is accurately placed when rear I/O connectors (NIC connectors, USB connectors, and VGA connector) align with the IO shield openings and properly fit into it.
4. Fasten down the server board with nine screws using 8 in/lbs torque (see letter B).

1.2.6 750W Power Supply Installation (P4304XXMUXX chassis)

The P4304XXMUXX supports 750W or 1600W redundant power supplies that need to be ordered separately and installed in the server chassis.

To see instructions on how to install the 1600W redundant power supply, see section 1.2.6.

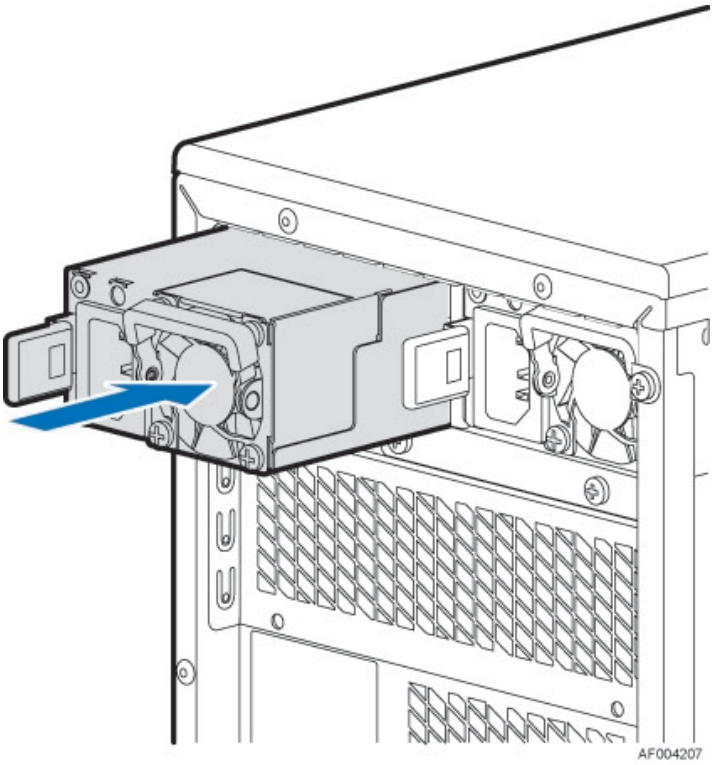


Figure 13. Installing 750W Power Supply

1. Remove the power supply bay filler if necessary.
2. Insert the 750W power supply module into the power supply bay until it clicks and locks into place.

1.2.7 1600W Power Supply Installation (P4304XXMUXX chassis)

Before inserting the 1600W power supply into the chassis, the power distribution board must be moved from its default position.

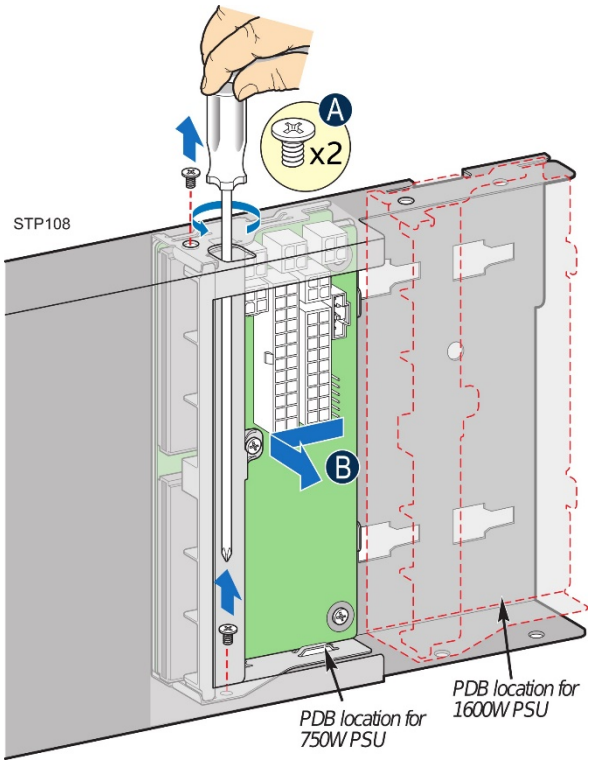


Figure 14. PDB Location for 750W PSU

1. Release the two screws that secure the power distribution board to the chassis (see letter A).
2. Remove the power distribution board from its default location (see letter B).

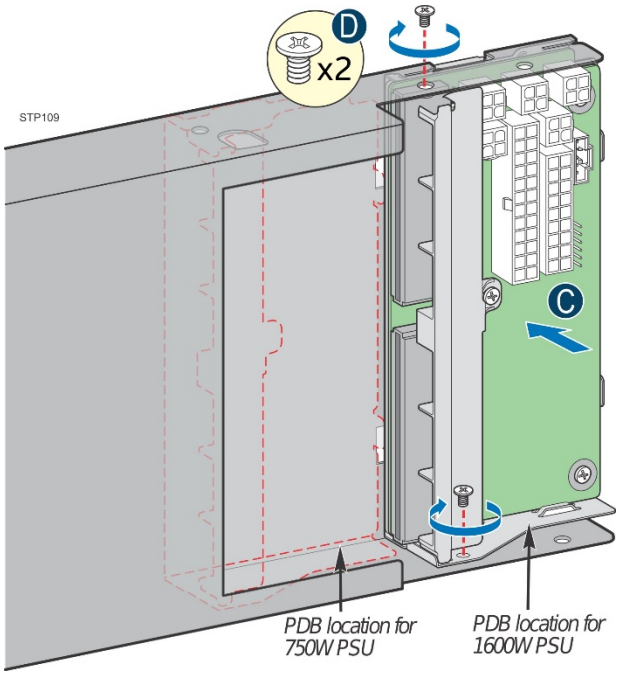


Figure 15. PDB Location for 1600W PSU

3. Install the power distribution board in the location for 1600W PSU (see letter C).
4. Secure the power distribution board to the chassis with the two screws (see letter D).

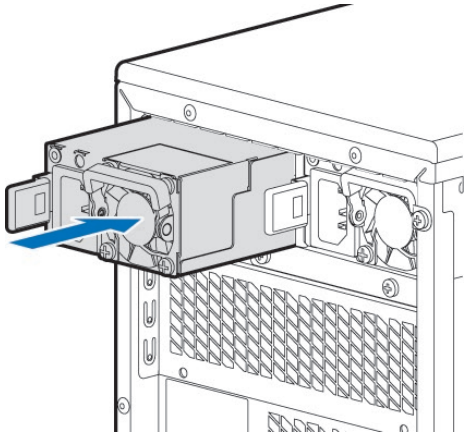


Figure 16. Installing 1600W Power Supply

5. Remove one of the two power supply bay filler.
6. Insert the 1600W power supply module into the power supply bay until it clicks and locks into place.

1.3 Cable Connections

1.3.1 Connecting the Power Cables to the Server Board

Note: Both CPU1 and CPU2 power cables need to be connected even if CPU2 is not installed.

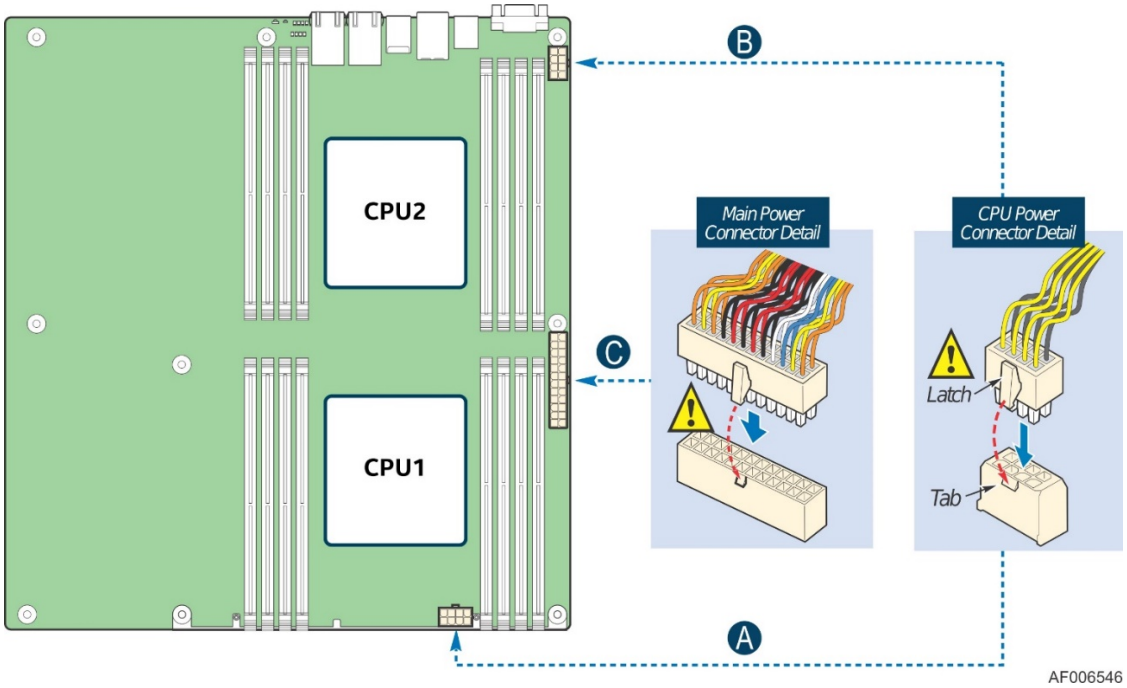


Figure 17. Connecting Power Cables - S2600CW Server Board Family

1. Connect the 2x4 pin cable connector to the server board close to CPU1 (see letter A). The silkscreen on the server board is "**CPU_1_PWR**".
2. Connect the 2x4 pin cable connector to the server board close to CPU2 (see letter B). The silkscreen on the server board is "**CPU_2_PWR**".
3. Connect the 2x12 pin cable connector to the server board close to the server edge (see letter C). The silkscreen on the server board is "**MAIN_PWR**".

1.3.2 Connecting the System Fan Cables to the Server Board

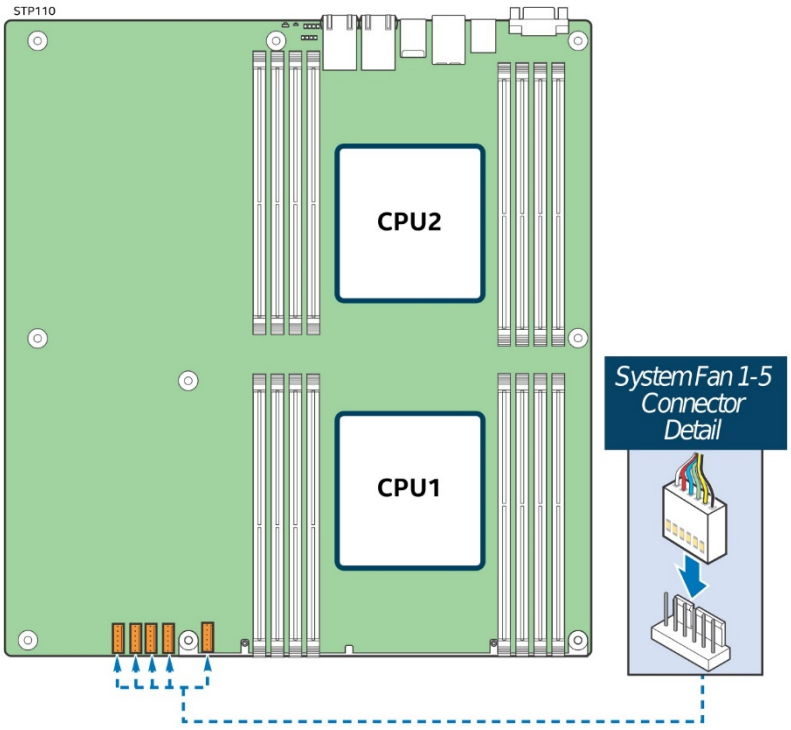


Figure 18. Connecting System Fan Cables

1. For server chassis P4304XXMFEN2, connect the cables of the two fixed system fans to the fan headers on the server board (silkscreen labeled "**SYS_FAN_1**" and "**SYS_FAN_2**").
2. For server chassis P4304XXMUXX, connect the cables of the five Hot-Swap system fans to the fan headers on the server board (silkscreen labeled "**SYS_FAN_1**", "**SYS_FAN_2**", "**SYS_FAN_3**", "**SYS_FAN_4**" and "**SYS_FAN_5**").

See Appendix B for details on cable routing and fan position.

Note: The system fan connectors labeled as "SYS_FAN_6" and "SYS_FAN_7" will not be used with server chassis P4304XXMFEN2 and P4304XXMUXX.

1.3.3 Connecting Cables From Front Panel to Server Board

1.3.3.1 S2600CW Server Board Family

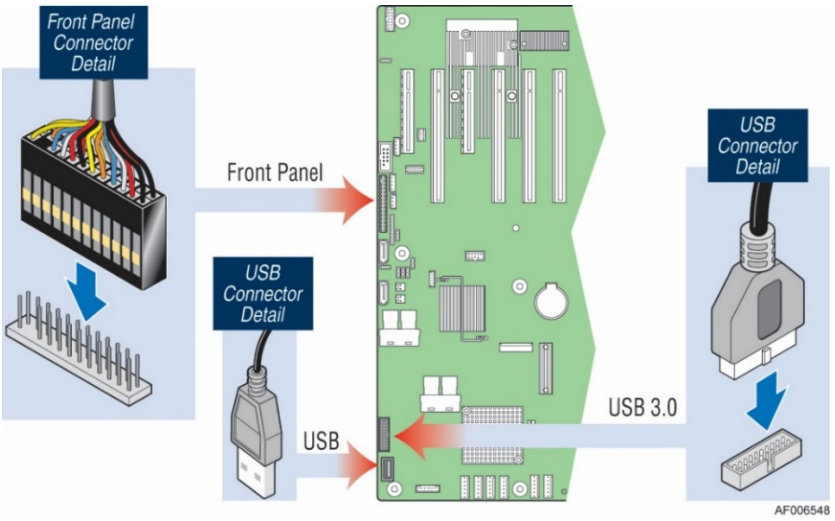


Figure 19. Connecting Front Panel Cables - S2600CW Board Family

1. Connect the gray 24-pin front panel cable to the 2x12 SSI -compliant front panel header on the server board edge (silkscreen labeled “SSI_FRONT_PANEL”).
2. Connect the black USB 3.0 cable to the 2x10 USB 3.0 header in blue close to the corner of the server board (silkscreen labeled “USB_5-6”).

1.3.3.2 S2600ST Server Board Family

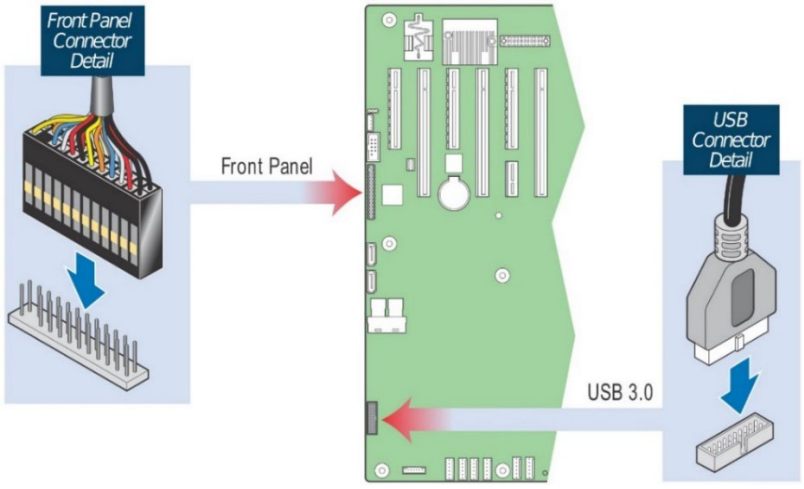


Figure 20. Connecting Front Panel - S2600ST Board Family

1. Connect the gray 24-pin front panel cable to the 2x12 SSI- compliant front panel header on the server board edge (silkscreen labeled “**SSI_FRONT_PANEL**”).
2. Connect the USB 3.0 cable to the 2x10 USB 3.0 header in blue close to the corner of the server board (silkscreen labeled **FP_USB_6-7**).

2. Essential System Component Installation

Purpose

This chapter provides instructions for installing and removing essential system components, including processors, memory, storage devices, and add-in cards.

Before You Begin

Before working with your server product, observe the safety and ESD precautions found in the **Warnings** section at the beginning of this document.

Tools and Supplies Needed

- Anti-static wrist strap and conductive foam pad (recommended)
- Phillips* (cross head) screwdriver (#2 bit)
- T – 30 Torx screwdriver
- Flathead screwdriver

System Reference

All references to left, right, front, top, and bottom assume you are facing the front of the chassis.

2.1 Processor Installation / Removal

2.1.1 For S2600CW Server Board Family

2.1.1.1 Processor Heatsink(s) Removal

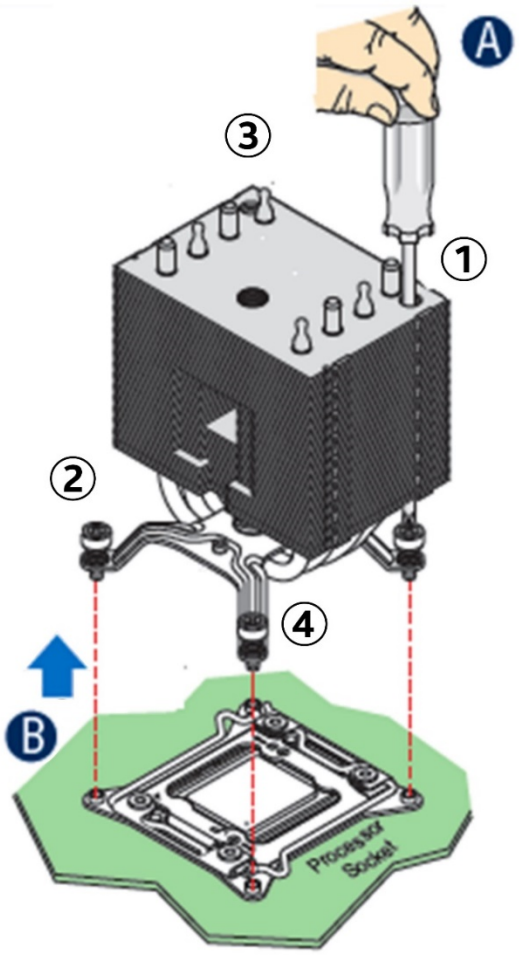


Figure 21. Processor Heatsink Removal

The heatsink is attached to the server board or processor socket with captive fasteners. Using a #2 Phillips* screwdriver, loosen the four screws located on the heatsink corners in a diagonal manner with this procedure:

1. Using a #2 Phillips* screwdriver (see letter A), start with screw 1 and loosen it by giving it two rotations and stop. (**IMPORTANT**: Do not fully loosen). Then proceed to screw 2 and loosen it by giving it two rotations and stop. Then proceed to loosen screws 3 and 4 in the same manner. Repeat giving each screw two rotations each time until all screws are loosened completely.
2. Lift the heatsink straight up (see letter B).

2.1.1.2 Processor Installation

Caution:

The processor must be appropriate: If you install a processor that is inappropriate for your server, you may damage the server board. For a web link to the list of compatible processor(s), see "*Additional Information and Software*".

ESD and Handling Processors: Reduce the risk of electrostatic discharge (ESD) damage to the processor by doing the following:

(1) Touching the metal chassis before touching the processor or server board. Keep part of your body in contact with the metal chassis to dissipate the static charge while handling the processor.

(2) Avoiding moving around unnecessarily.

1. Unlatch the CPU Load Plate.

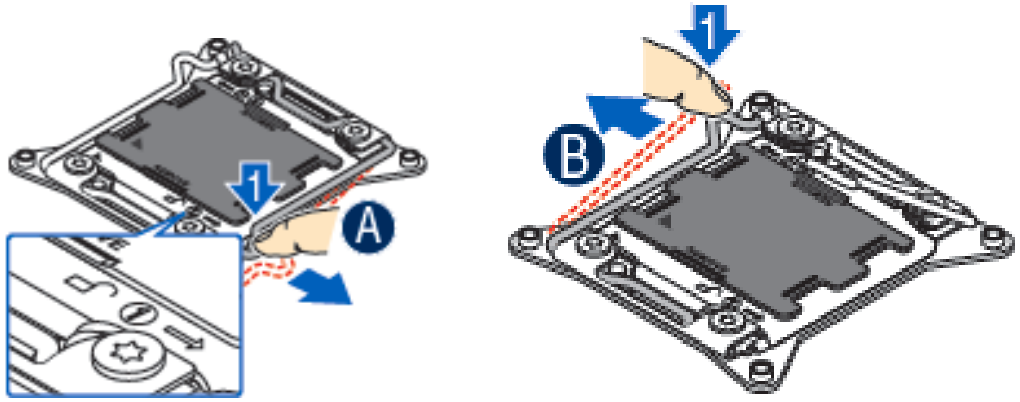


Figure 22. Processor Installation – Open the Socket Lever

2. Push the lever handle labeled "OPEN 1st" (see letter A) down and away from the CPU socket. Rotate the lever handle up. Repeat the steps for the second lever handle (see letter B).
3. Lift open the load plate.

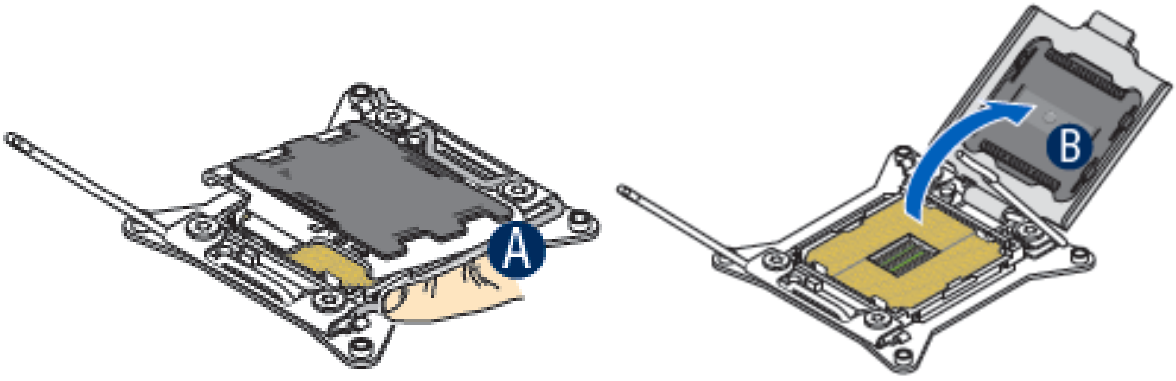


Figure 23. Processor Installation – Open the Load Plate

4. Rotate the right lever handle down until it releases the load plate (see letter A). While holding down the lever handle, with your other hand, lift open the load plate (see letter B).
5. Install the processor.

Notes:

The underside of the processor has components that may damage the socket pins if installed improperly.
The processor must align correctly with the socket opening before installation. DO NOT DROP the processor into the socket.
The pins inside the processor socket are extremely sensitive. Other than the CPU, use no object to make contact with the pins inside the processor socket.
When possible, use a processor insertion tool to install the processor.

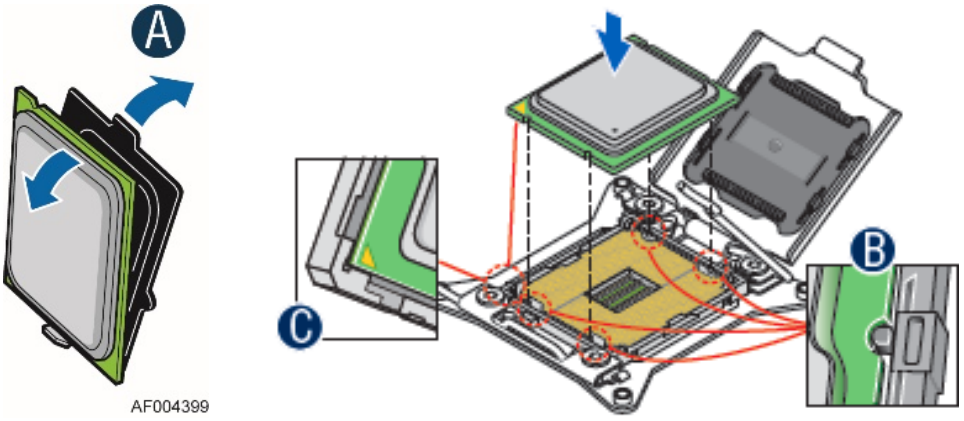


Figure 24. Processor Installation – Install the Processor

6. Remove the processor from its packaging. Carefully remove the protective cover from the bottom side of the CPU, taking care not to touch any CPU contacts (see letter A). Orient the processor with the socket so that the processor cutouts match the four orientation posts on the socket (see letter B).
7. Remove the socket cover by pressing it out of the load plate.

Note the location of the gold key on the corner of processor (see letter C). Carefully place (Do NOT drop) the CPU into the socket.

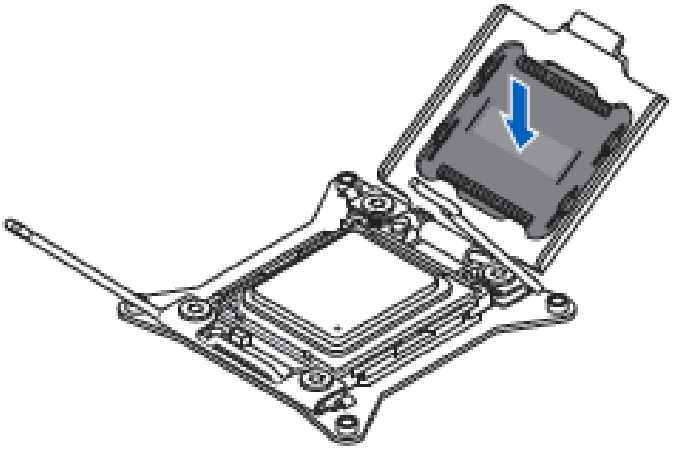


Figure 25. Processor Installation – Remove the Socket Cover

Note: Save the socket cover for re-use should the processor need to be removed at any time in the future.

8. Close the load plate.
9. Carefully lower the load plate down over the processor.
10. Lock down the load plate.

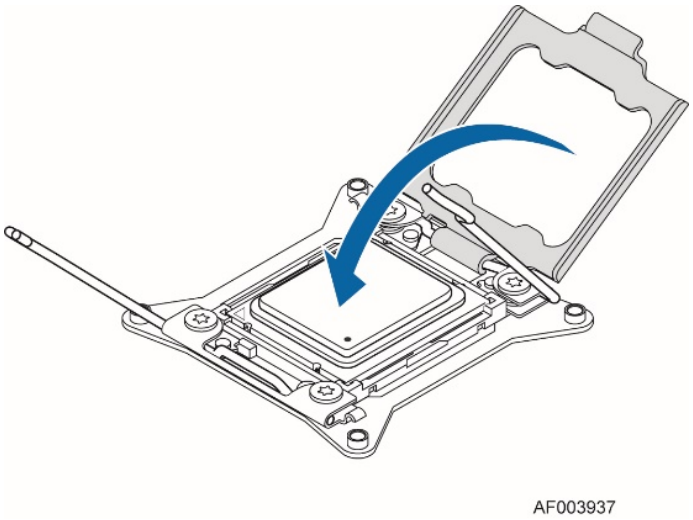


Figure 26. Processor Installation – Close the Load Plate

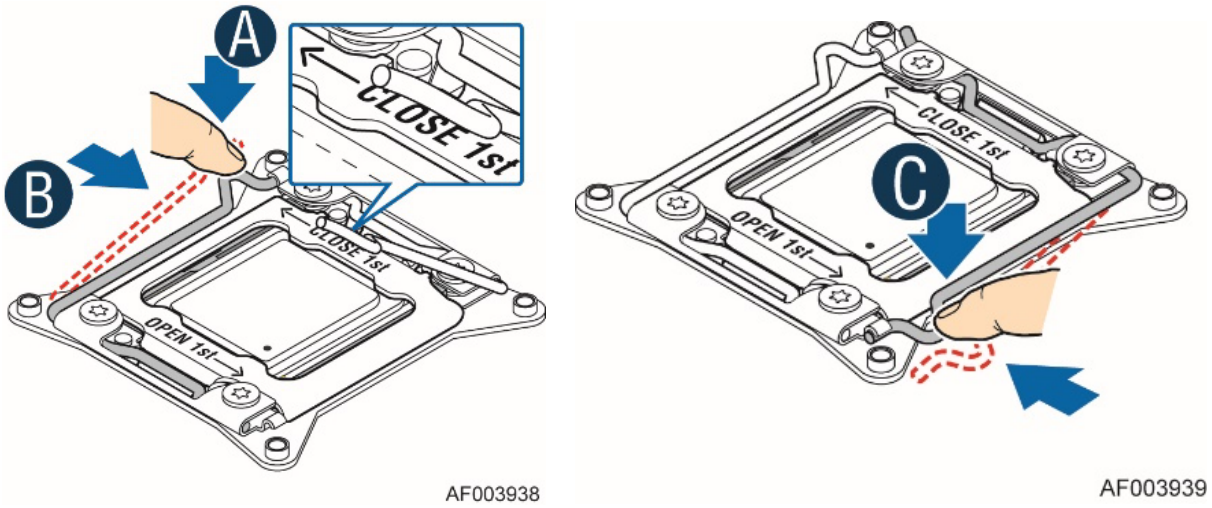


Figure 27. Processor Installation – Latch the Locking Lever

a. Push down on the locking lever on the CLOSE 1st side (see letter A).
b. Slide the tip of the lever under the notch in the load plate (see letter B). Make sure the load plate tab engages under the socket lever when fully closed.
c. Repeat the steps to latch the locking lever on the other side (see letter C).
d. Latch the levers in the order as shown.

2.1.1.3 Processor Heatsink Installation

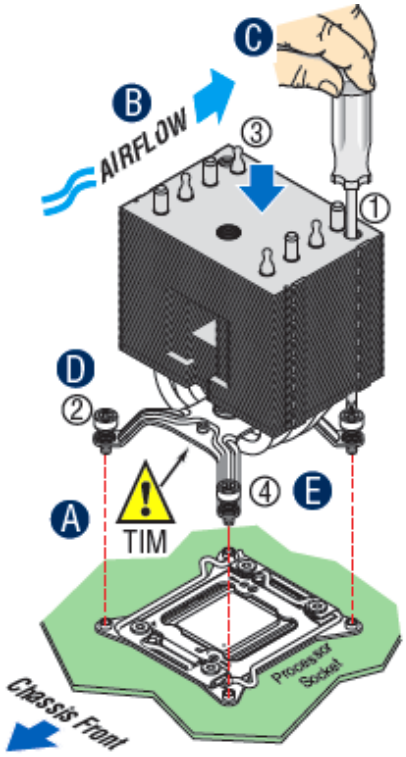


Figure 28. Processor Heatsink Installation

1. If present, remove the protective film covering the Thermal Interface Material (TIM) on the bottom side of the heatsink (see letter A).
2. Align heatsink fins to the front and back of the chassis for correct airflow. Airflow goes from front to back of the chassis (see letter B).

- Each heatsink has four captive fasteners; tighten these in a diagonal manner using this procedure:

a. Using a #2 Phillips* screwdriver, start with screw 1 and engage screw threads by giving it two rotations and stop (see letter C). (Do not fully tighten.)

b. Proceed to screw 2 and engage screw threads by giving it two rotations and stop (see letter D). Similarly, engage screws 3 and 4.

c. Repeat Steps C and D by giving each screw two rotations each time until each screw is lightly tightened up to a maximum of 8 inch-lbs torque (see letter E).

2.1.1.4 Removing the Processor

1. Remove the processor heatsink (see Section 2.3.1).
2. Unlatch the CPU Load Plate (see Section 2.3.1.2).
3. Lift the load plate (see Section 2.3.1.2).
4. Remove the processor by carefully lifting it out of the socket, taking care NOT to drop the processor and not touching any pins inside the socket.
5. Install the socket cover if a replacement processor will not be installed.

2.1.2 For S2600ST Server Board Family

2.1.2.1 Assembling the Processor Heat Sink Module (PHM)

The Processor Heat Sink Module (PHM) refers to the sub-assembly where the heat sink and processor are clipped together prior to installation onto the server board. Processor installation requires that the processor be attached to the processor heat sink prior to installation onto the server board.

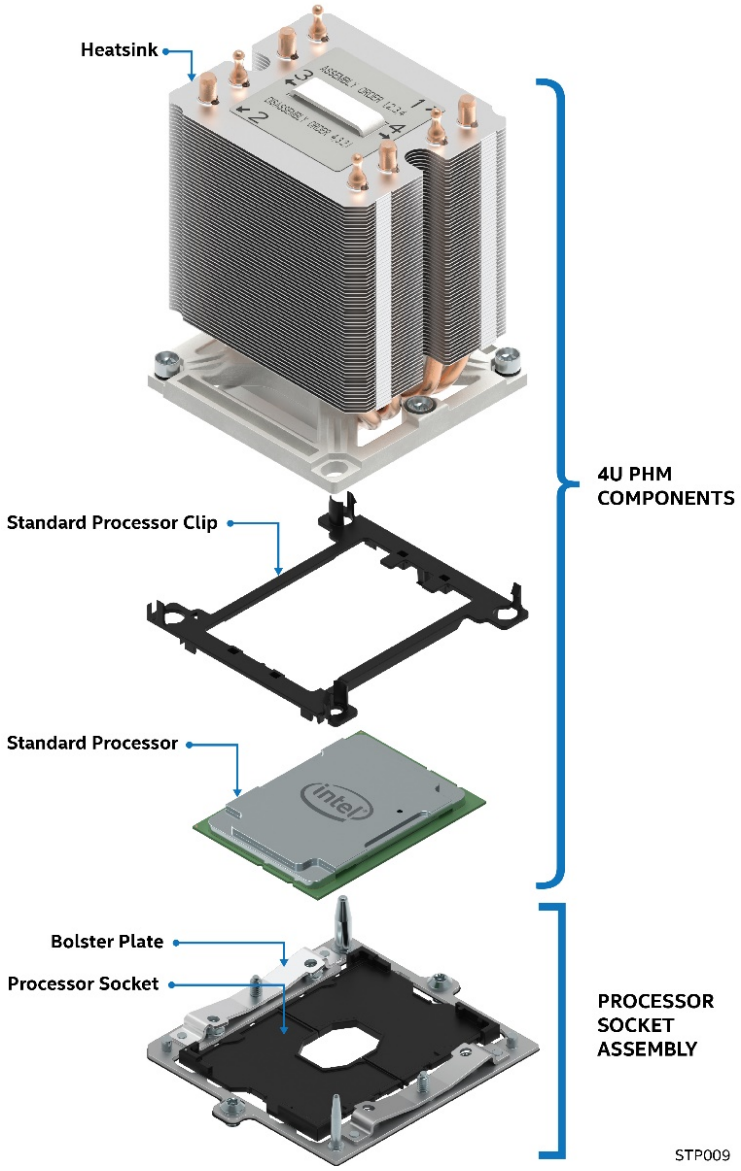


Figure 29. Processor Heat Sink Module (PHM) and Processor Socket Reference Diagram

Important: Follow the procedures described in this section in the order specified to properly assemble the PHM and to install it to or remove it from the server board. These instructions assume that all the PHM components are new and the TIM is already applied to the bottom of the heat sink.

Required Tools:

- T – 30 Torx screwdriver
- Flathead screwdriver
- Adequate ESD protective gear (wrist strap, ESD mat)

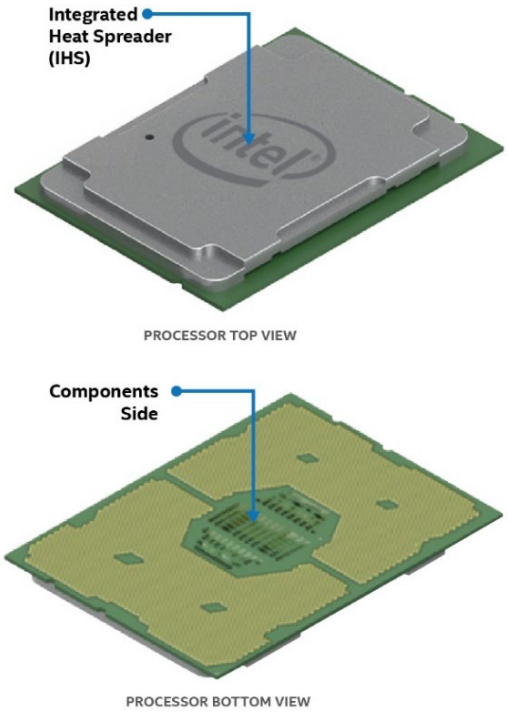


Figure 30. Processor Reference Diagram - Top and Bottom Views of Processor

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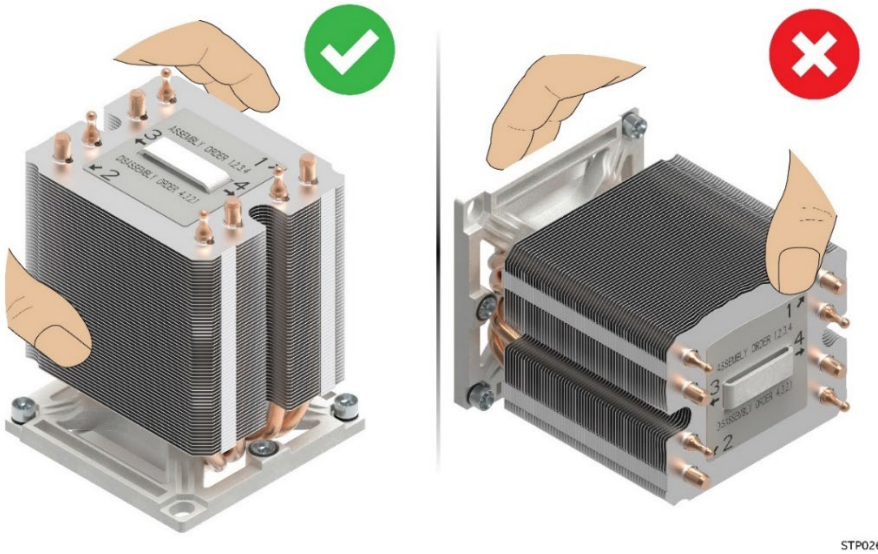
WARNING: You may damage the processor heat sink when grasping the heat sink by the longer sides and squeezing the fins together. Grasp processor heat sinks only on the the shorter edges as shown in the following illustration.



1. Remove the heat sink from its packaging if present. With the TIM facing up, place the heat sink on to a flat surface, as shown in the following illustration.

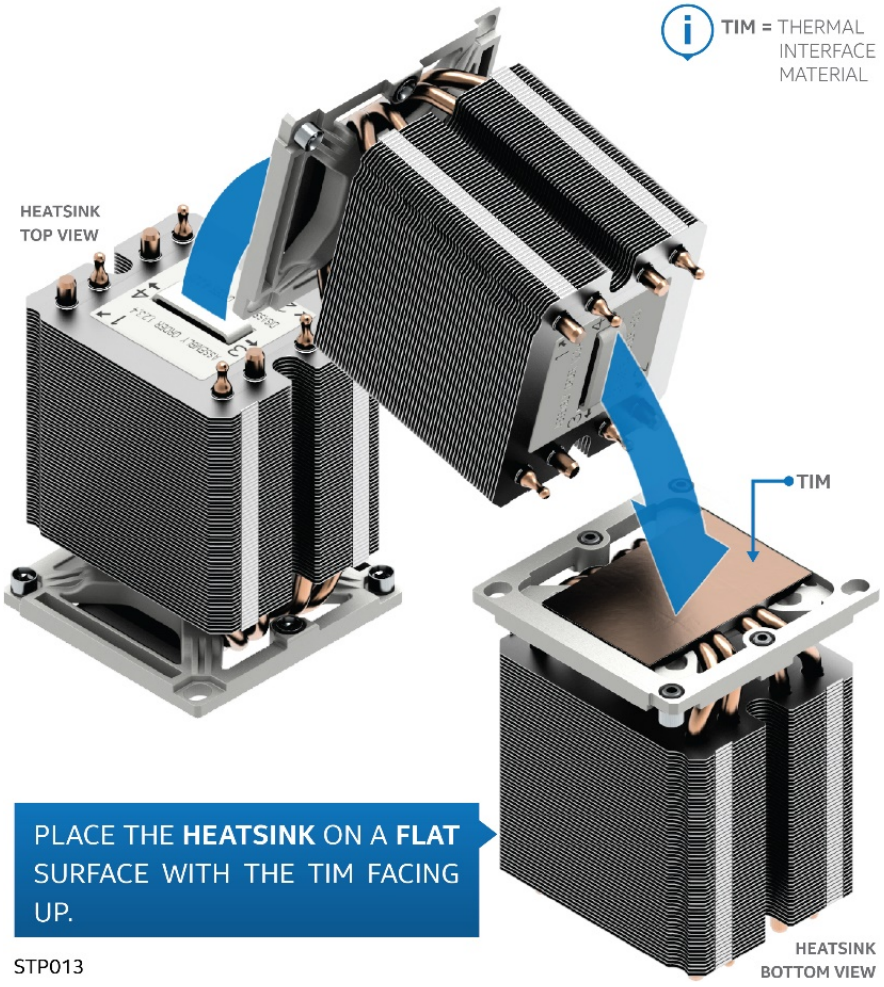


Figure 31. Processor Heat Sink

CAUTION: Do not touch sensitive contacts on the bottom side of the processor at any time during PHM assembly or installation. Also refrain from touching the pins inside the processor socket as they also are extremely sensitive. A damaged processor socket may produce unpredictable system errors.

2. If it is present, carefully remove the plastic protective cover from the bottom side of the processor.

NOTE: The PHM and processor socket include several alignment features to ensure proper assembly and installation. Take care to ensure components are accurately assembled and the PHM is oriented correctly to the processor socket prior to installation.

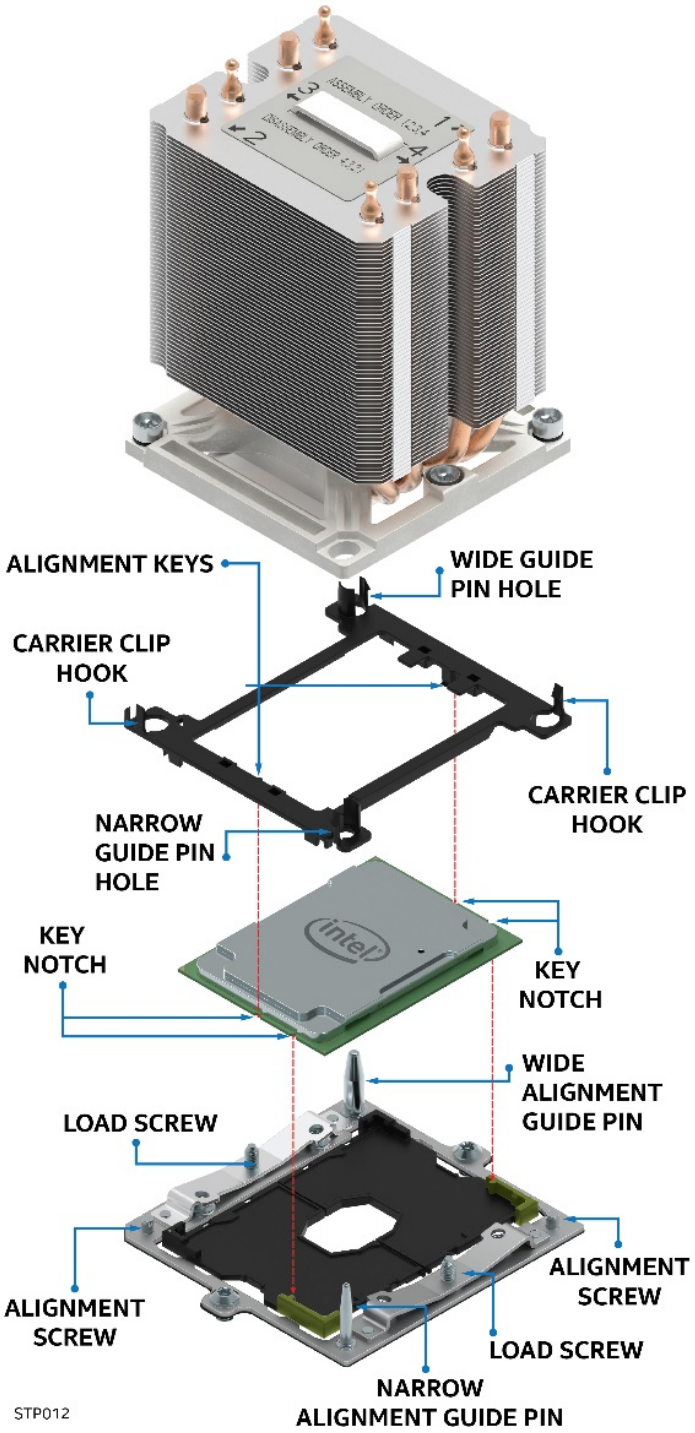


Figure 32. Alignment Features

CAUTION: Handle the processor carefully. Do not touch the bottomside contacts or components; always grip the processor by its edges.

3. Orient the processor with the heat spreader side down so its alignment features match those of the carrier clip, as shown in the following figures.

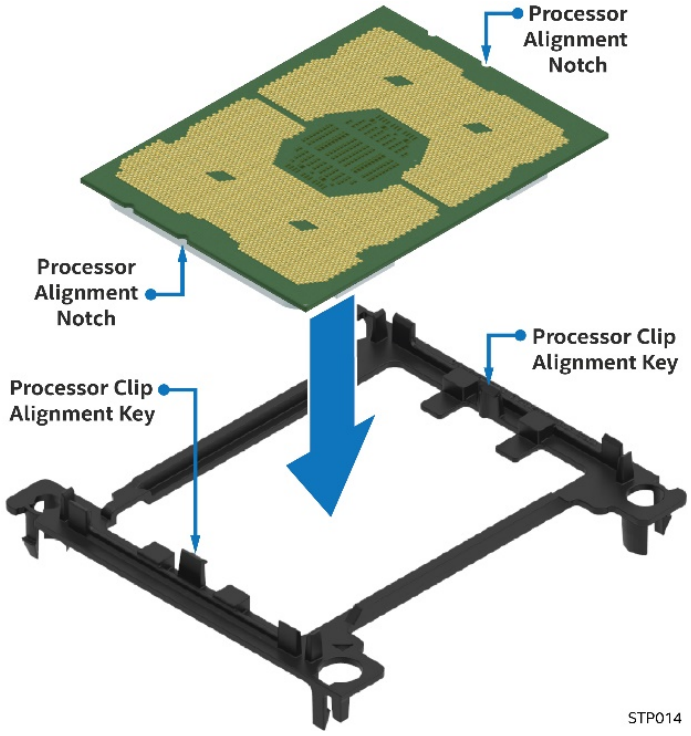


Figure 33. Processor Carrier Clip Assembly

4. Install the processor into the processor carrier clip until it snaps into place.

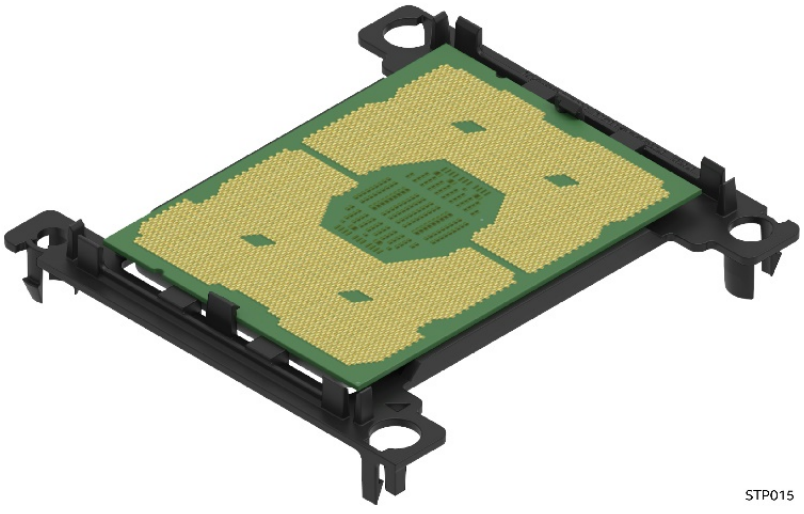


Figure 34. Processor Carrier Clip Sub-Assembly

CAUTION: A processor can dislodge from the processor carrier clip if you grasp the assembly by the long narrow edges of the processor clip. Grasp the processor carrier assembly only by using the shorter edges of the assembly.

5. If present, remove the protective film covering the TIM on the bottom side of the heat sink.
6. Orient the processor sub-assembly over the processor heat sink so that all corner features are in alignment.

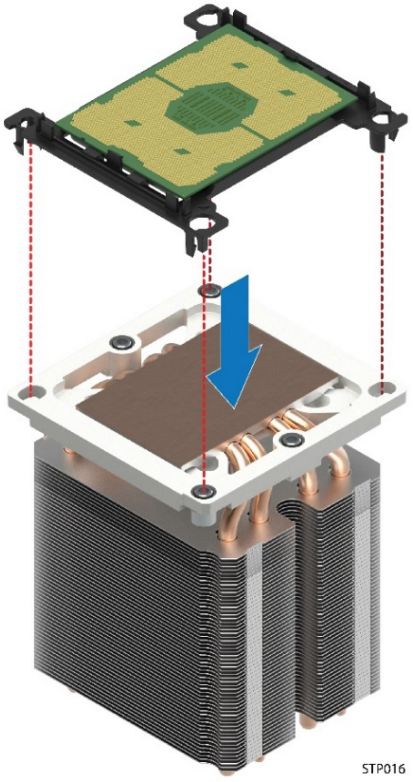


Figure 35. Processor and CarrierClip Sub-Assembly to Heat Sink

7. Push the processor sub-assembly down on to the processor heat sink until it snaps into place, ensuring all four corners are secure.

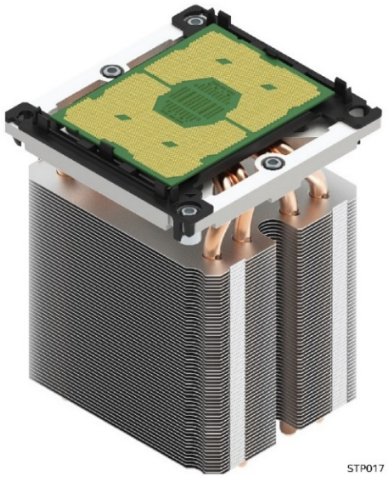


Figure 36. Processor Heat Sink Module (PHM)

2.1.2.2 Processor Heat-sink Module Installation

1. Remove the plastic processor socket cover through the following:

a. Grasp the socket cover using the finger grips on each end as shown in the following figure (see letter A) then carefully pull up to remove (see letter B).

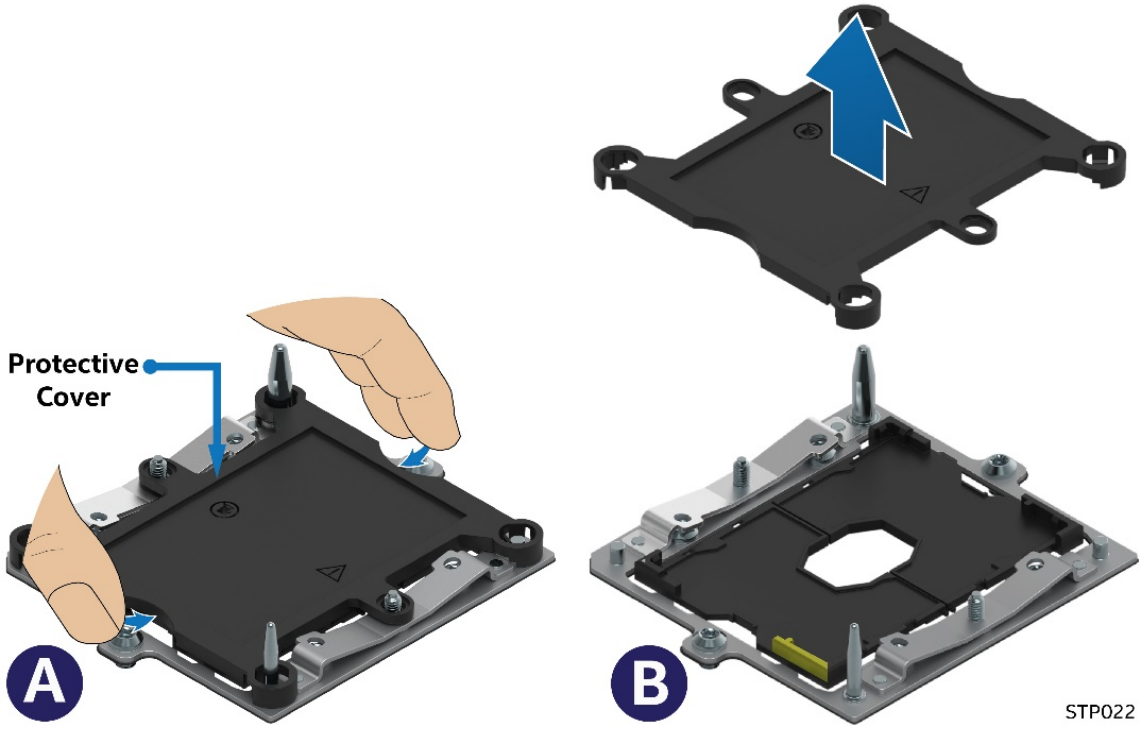


Figure 37. Removing the Plastic Socket Cover

Note: Save the processor socket cover for future use.

CAUTION: When re-installing the socket cover, make sure it properly snaps into place. Improper installation will cause it to become loose and damage the processor socket.

---

2. Install the PHM to the processor socket.
3. Align the mounting holes of the PHM (located on diagonal corners) to the bolster plate guide pins of the processor socket, as shown in the following figure.

Note: Each of the two guide pins of the bolster plate has a different diameter. Each guide pin has a matching PHM mounting hole which allows for only one orientation when installed.

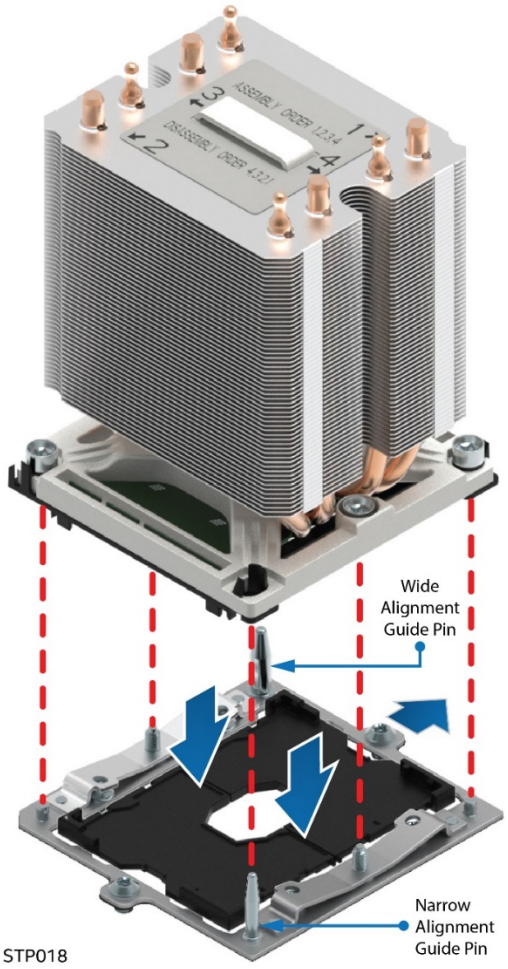


Figure 38. PHM alignment to Bolster Plate

4. Lower the PHM onto the processor socket assembly.

CAUTION: Processor socket pins are delicate and bend easily. Use extreme care when placing the PHM onto the processor socket.

Note: Confirm proper PHM installation by visually checking whether or not the PHM sits level with the processor socket assembly. PHMs can only be fastened down if correctly installed.

The PHM is NOT installed properly if it does not sit level with the processor socket assembly. Improperly installed PHMs cannot be fastened down.

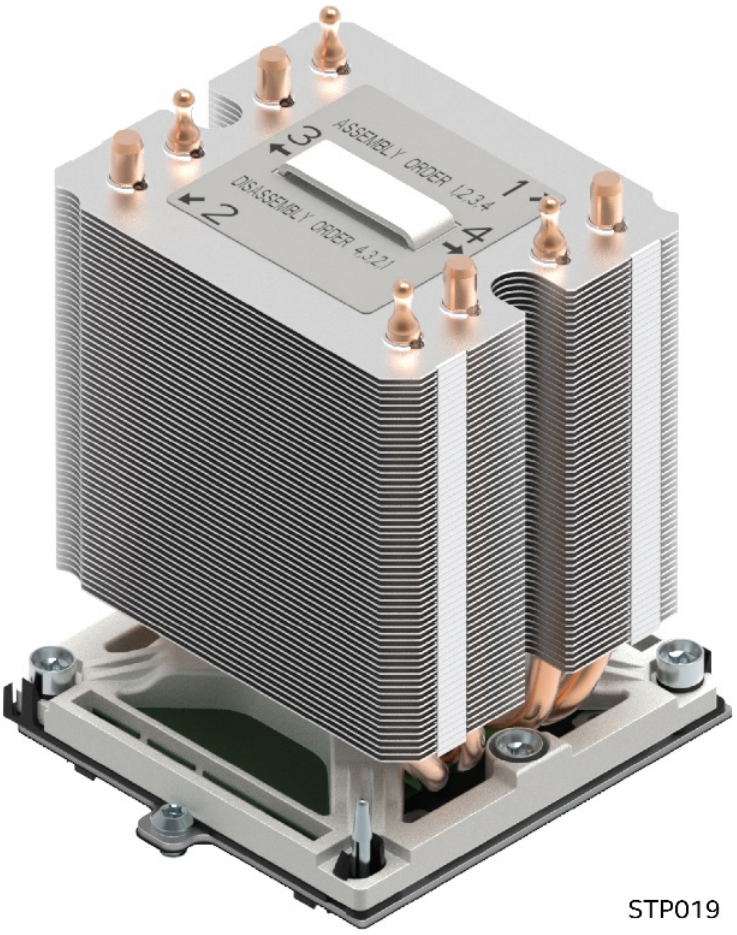


Figure 39. Correct Placement of Processor Socket Pin

5. Secure the PHM to the processor socket Assembly. Using a T30 Torx bit screwdriver, securely tighten (12 in-lb.) each fastener in the sequence shown on the label located on the top of the heat-sink.

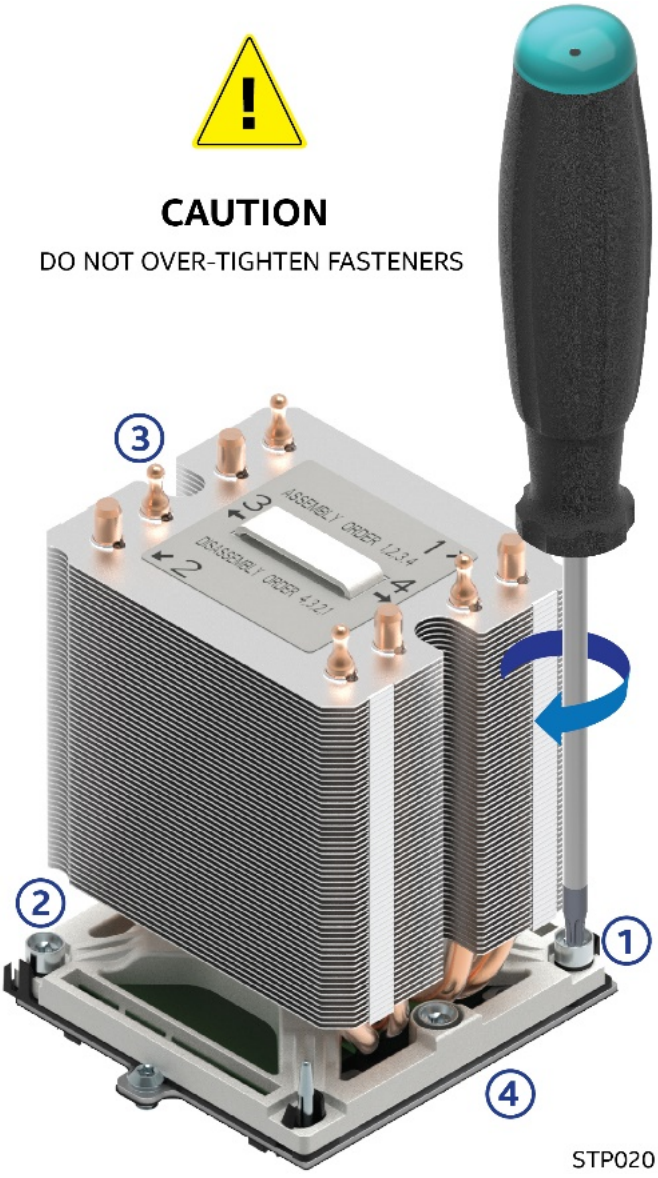


Figure 40. Installing the PHM

CAUTION: Failure to tighten the heat sink screws in the specified order may cause damage to the processor socket assembly. Each heat sink screw should be fully tightened to 12 In-Lb torque before securing the next screw in the sequence.

2.1.2.3 Processor Heat-sink Module Removal

WARNING: Processor heat-sinks can become extremely hot during normal system operation. Before attempting to remove the processor from the server board, ensure that system power has been fully disconnected and allow the processor heat sinks to fully cool before attempting to remove the PHM from the server board.

1. Using a T30 Torx bit screwdriver, loosen each heat sink fastener in the sequence shown on the label affixed to the top side of the heat sink (#4 - #3 - #2 - #1). (See letter A).
2. Lift the PHM straight up from the server board until it is free from the bolster plate guide pins (See letter B).

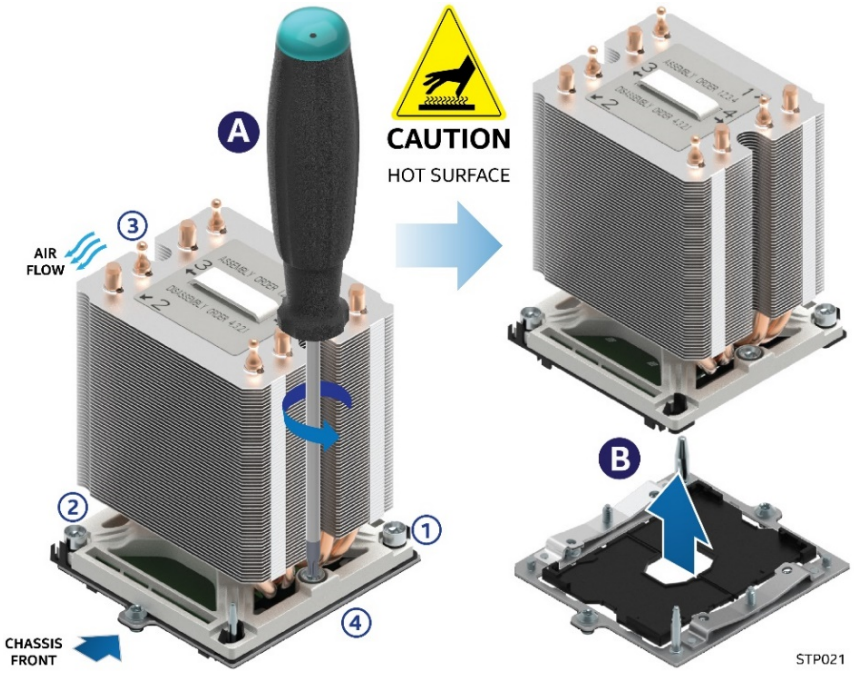


Figure 41. Uninstalling the PHM

3. If a processor is not being installed, re-install the plastic processor socket cover.

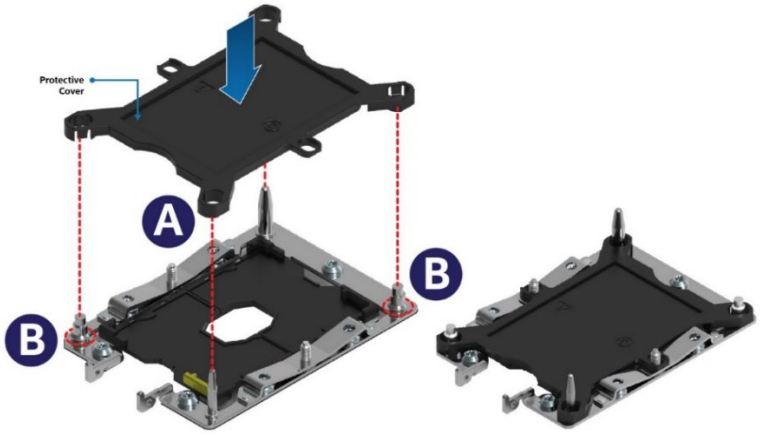


Figure 42. Plastic Socket Cover installation

Note: The bolster plate may be different from the picture ; the steps and procedure are the same.

2.1.2.4 Processor Heat-sink Module Disassembly

1. Place the PHM (heat-sink down) onto a flat surface.
2. To remove the processor and clip sub-assembly from the heat sink, insert the head of a flat head screw driver in-between the heat sink and the processor clip assembly (as shown below) and gently twist until the bond between heat sink and the processor is broken.

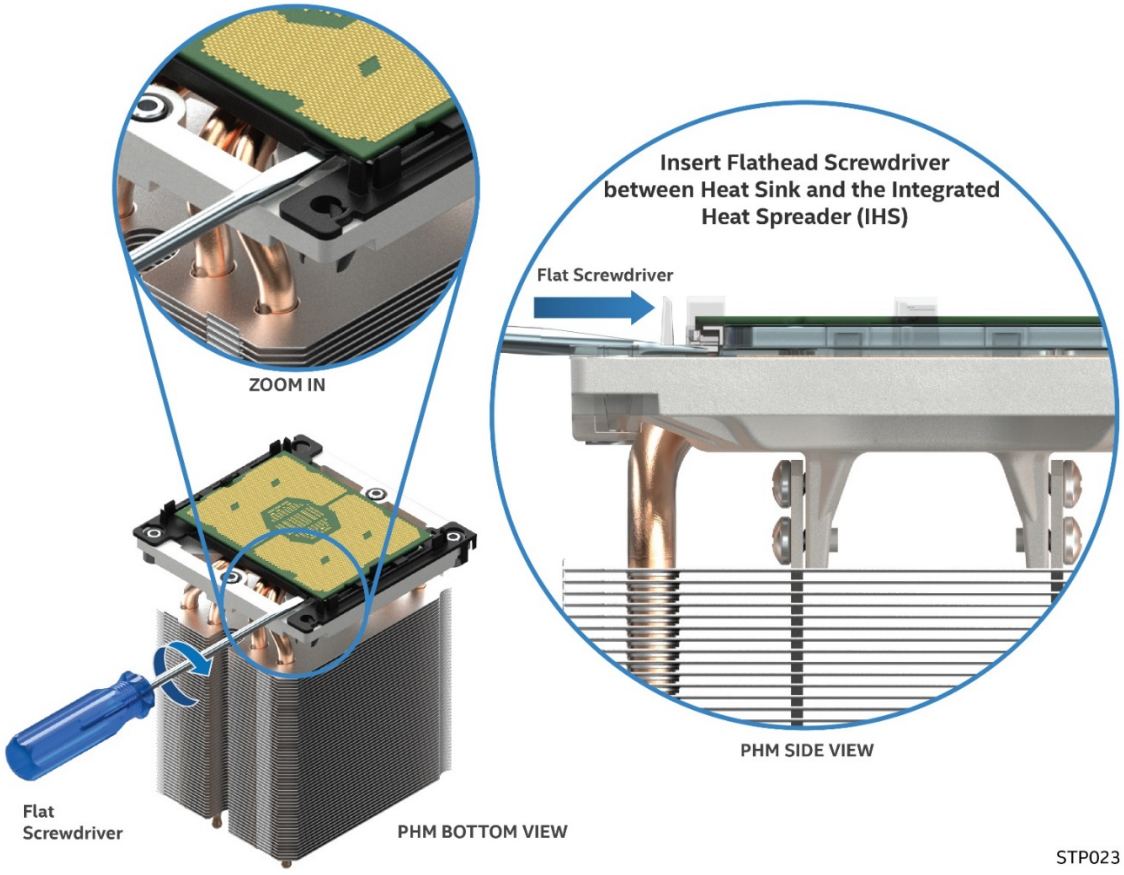


Figure 43. PHM Disassembly

3. Unlatch the hooks on each corner of the of the processor carrier clip to free the processor carrier from the heat sink.
4. Carefully lift the processor carrier away from the heat sink.

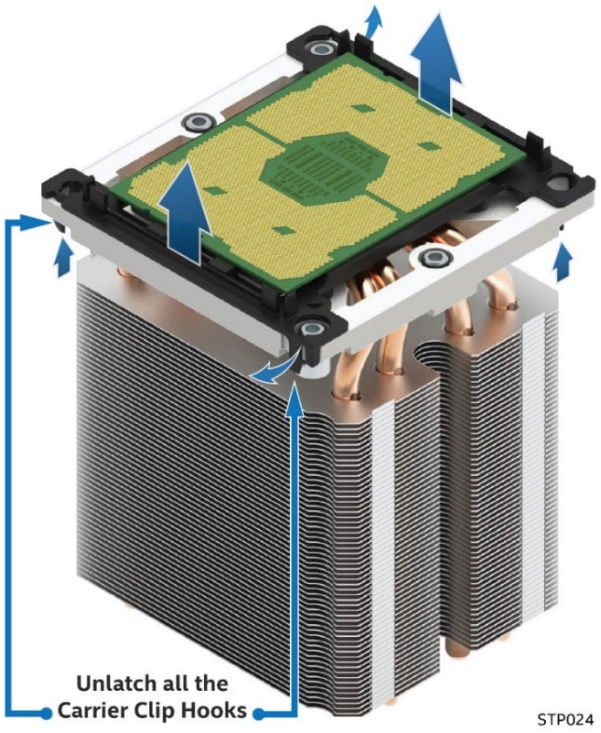


Figure 44. Releasing the Processor Carrier Clip from the Heat Sink

5. Remove the processor from the processor carrier clip by carefully pushing back one of the latches located on the ends of the processor and rotating the processor up and out of the processor carrier.

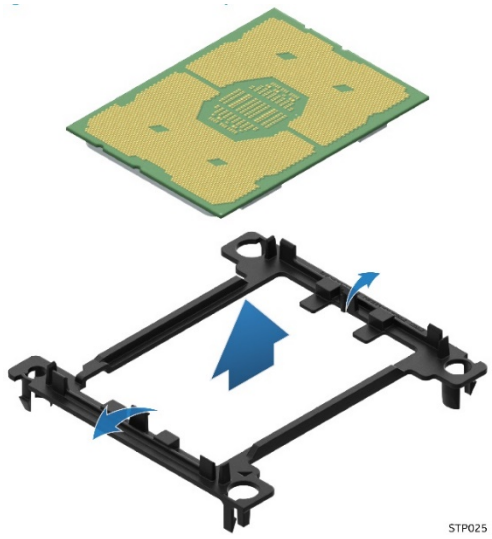


Figure 45. Releasing Processor from Carrier Clip

2.2 Memory Installation and Removal

2.2.1 Memory Slot Population Requirements

2.2.1.1 For S2600CW Server Board Family

Note: For details on DIMM population rules, please refer to the Intel® Server Board S2600CW Product Family Technical Product Specification.

DIMM Installation Order:

- Channels A, B, C, and D. Start with the 1st DIMM (Blue Slot) on each channel, then Slot 2.
- Channels E, F, G, and H. Start with the 1st DIMM (Blue Slot) on each channel, then Slot 2.

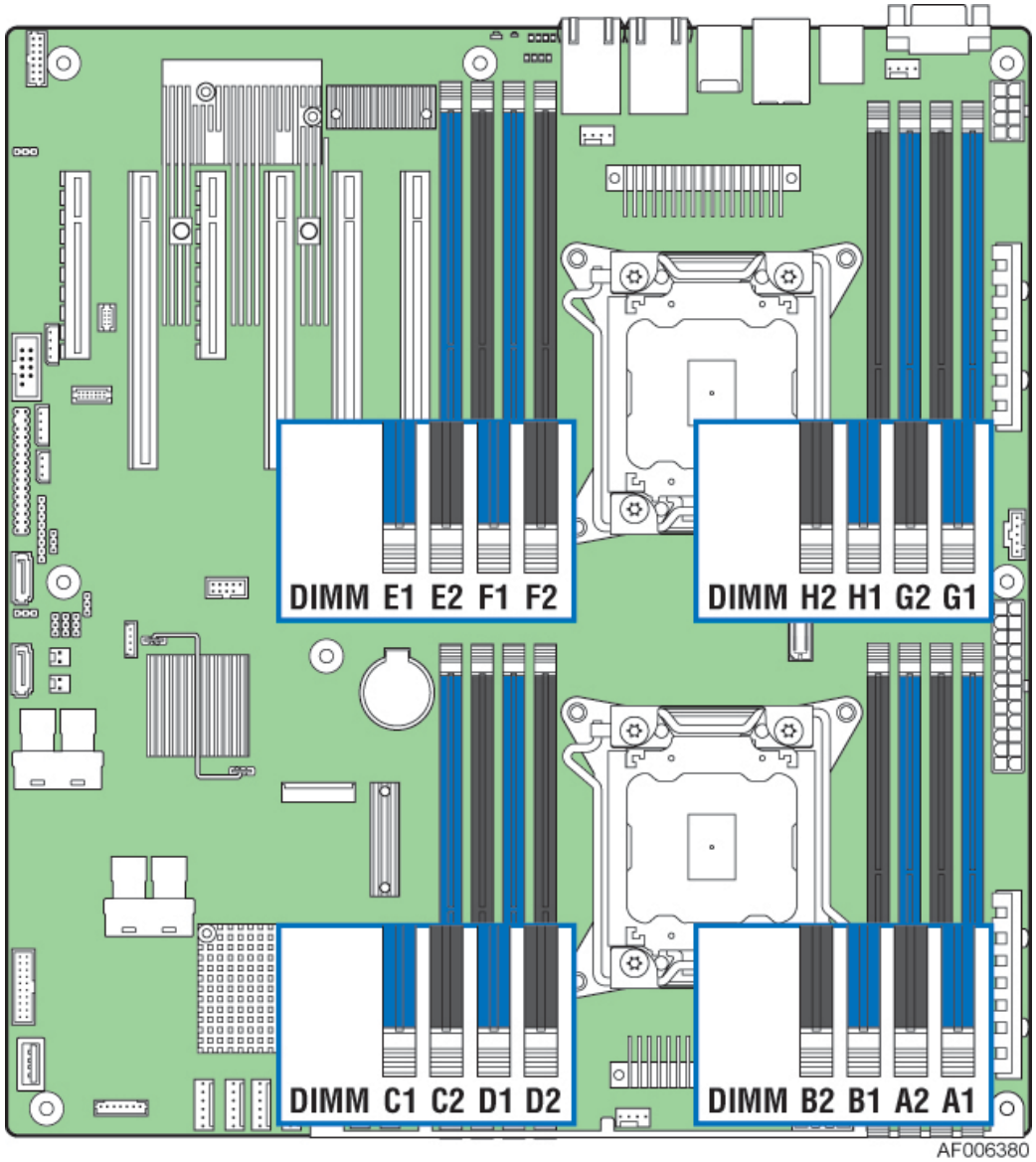


Figure 46. Intel® Server Board S2600CW DIMM Slot Layout

2.2.1.2 For S2600ST Server Board Family

Note: For details on DIMM population rules, please refer to the Intel® Server Board S2600ST Product Family Technical Product Specification.

- Each installed processor provides six memory channels. On the Intel® Server Board S2600ST product family memory channels for each processor are labeled A – F. Channels A and D on each processor support two DIMM slots. All other memory channels have one DIMM slot.
- Channels that support more than one DIMM must be populated starting with the BLUE DIMM slot. In addition, when populating a Quad-rank DIMM with a Single- or Dual-rank DIMM in the same channel, the Quad-rank DIMM farthest from the processor must be populated .

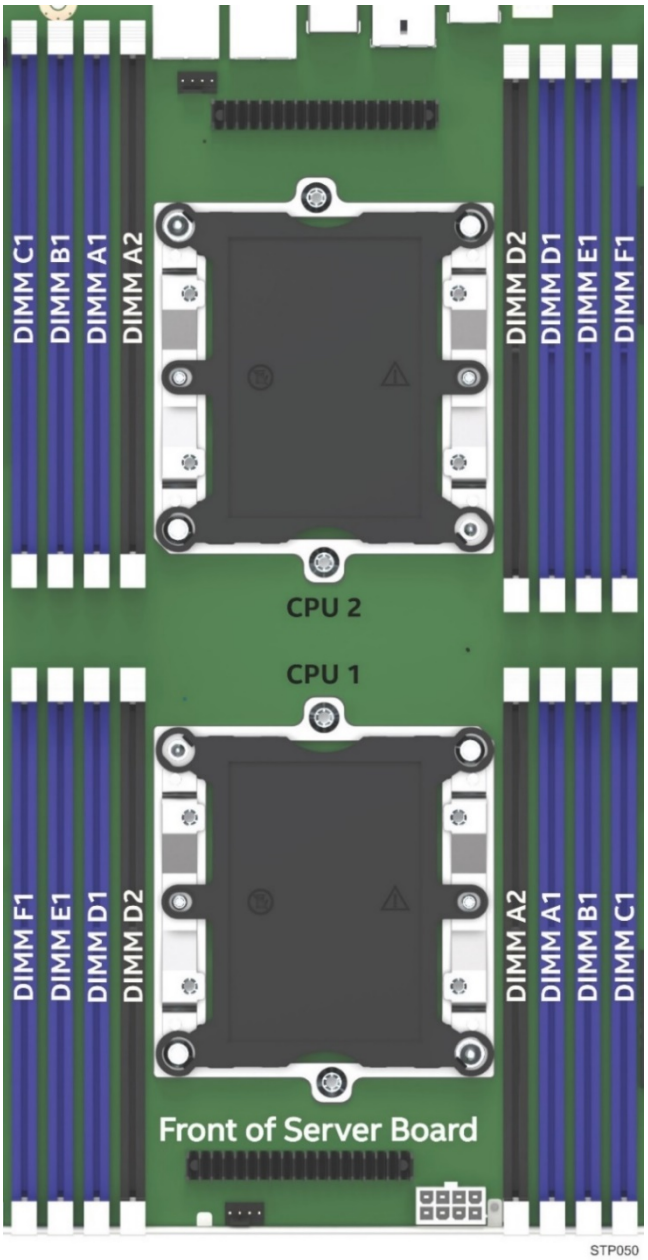


Figure 47. Intel® Server Board S2600ST Product Family Memory Slot Layout

2.2.2 Memory Installation

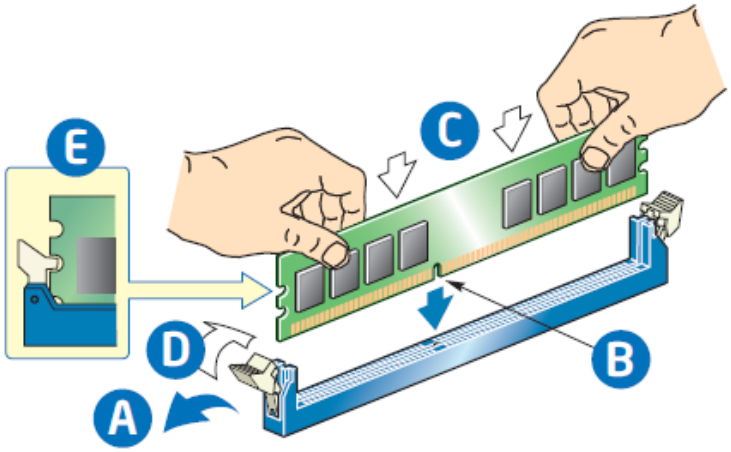


Figure 48. Installing Memory

1. Locate the DIMM slots. Make sure the clips at either end of the DIMM slot(s) are pushed outward to the open position (see letter A).
2. Holding the DIMM by the edges, remove it from its anti-static package. Position the DIMM above the socket. Align the notch on the bottom edge of the DIMM with the key in the DIMM slot (see letter B).
3. Insert the bottom edge of the DIMM into the socket (see letter C). When the DIMM is inserted, push down on the top edge of the DIMM until the retaining clips snap into place (see letter D). Make sure the clips are firmly in place (see letter E).

2.2.3 Removing Memory

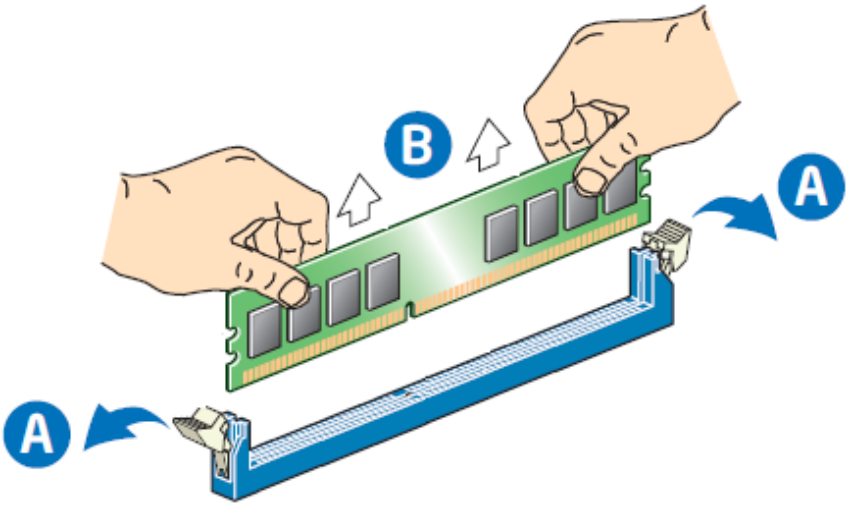


Figure 49. Removing Memory

1. Locate the DIMM slots. Unlatch the retaining clips located on each end of the socket. The DIMM lifts from the socket (see letter A).
2. Holding the DIMM by the edges, lift it from the socket and store it in an anti-static package.

2.3 Storage Device Installation/Upgrade

The server chassis P4304XXMFEN2 and P4304XXMUXX support several different storage device options depending on the installed server board. This section provides instructions for the installation and upgrade of front drive bay storage devices. Installation of other storage options available through accessory kits is provided in Chapter 3.

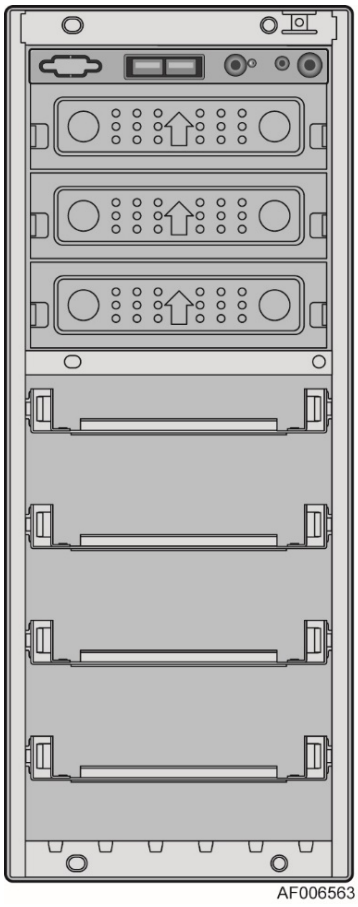
Note: To maintain proper system cooling, you must populate all externally accessible drive bays with a drive carrier. Each drive carrier must have a hard disk drive (HDD), Solid State Device (SSD), or a supplied drive blank installed.

- **For S2600CW board family**:

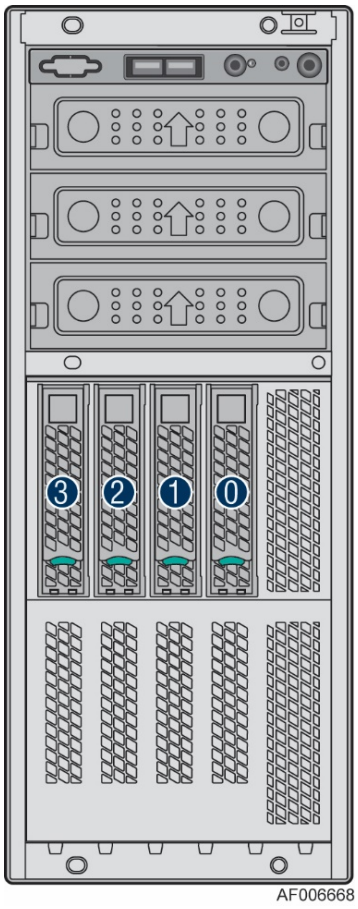
Basic Configuration: Four 3.5” fixed drive trays are the default chassis configuration.

Upgrade Option: One 3.5” drive bay with Hot-Swap backplane. Supports up to 4x3.5” drives.

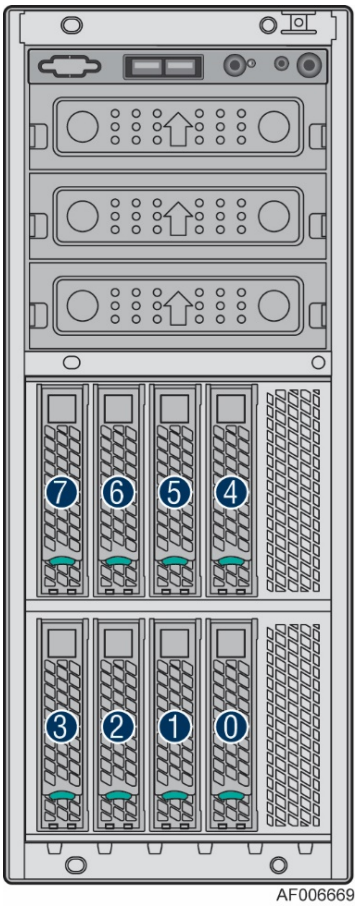
Upgrade Option: Two 3.5” drive bays with Hot-Swap backplanes. Support up to 8x3.5 drives.



Basic Configuration

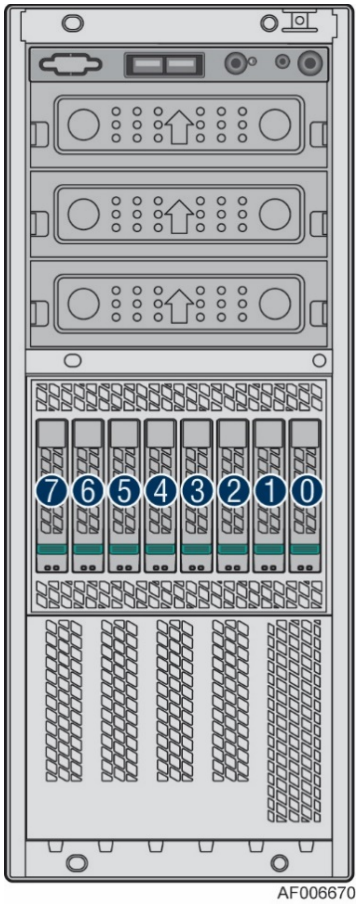


4x3.5 Upgrade Option

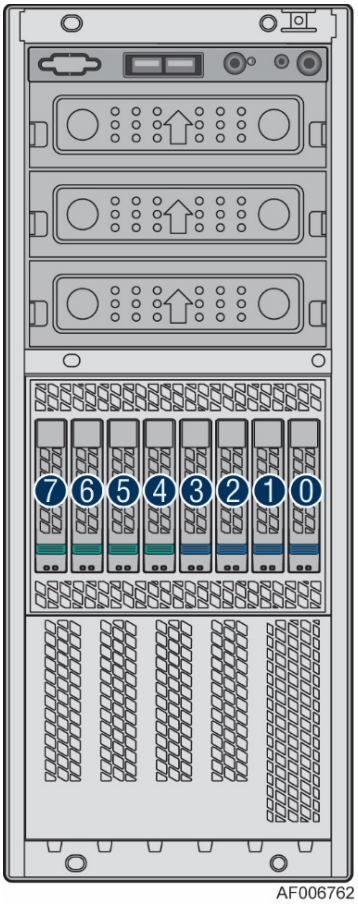


8x3.5 Upgrade Option

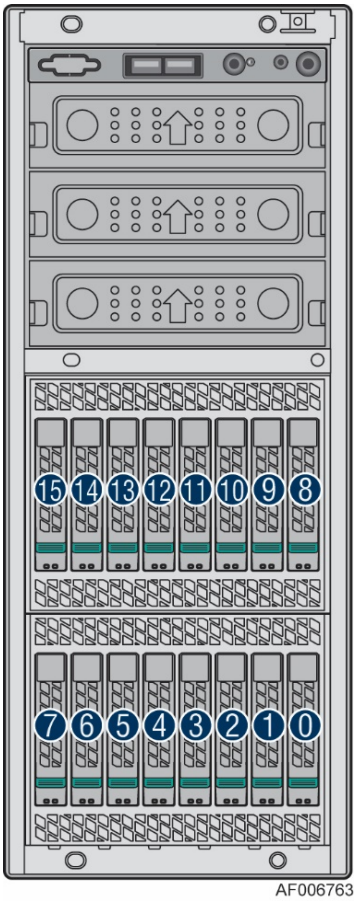
- **Upgrade Option:** One 2.5” drive bay with Hot-Swap backplane. Supports up to 8x2.5” drives (SAS/SATA).
- **Upgrade Option:** One 2.5” drive bay with Hot-Swap backplane. Supports up to 4x2.5” drives (SAS/SATA) with green latch for Hot-Swap support and 4x2.5 PCIe* SSDs (NVMe) with blue latch (Hot-Swap not supported) for Intel® S2600CW Server Board Product Family only.)
- **Upgrade Option:** Two optional 2.5” drive bay with Hot-Swap backplanes supporting up to 16x2.5” drives (SAS/SATA).



8x2.5 Upgrade Option



8x2.5 NVMe Combo Upgrade Option



16x2.5 Upgrade Option

- **For S2600ST board family**:

Basic Configuration: Four 3.5” fixed drive trays are the default chassis configuration.

Upgrade Option: One 3.5” drive bay with Hot-Swap backplane. Supports up to 4x3.5” drives.

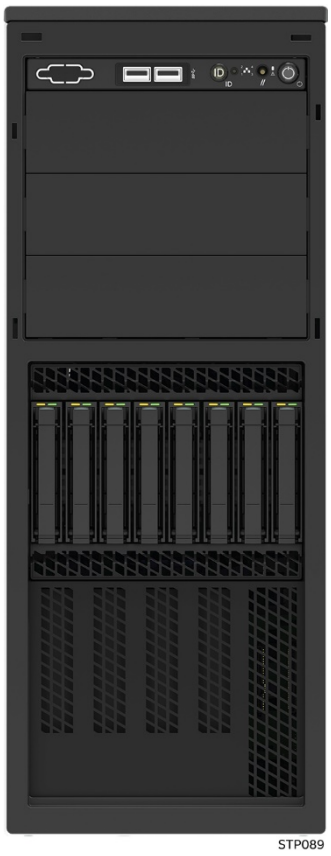
Upgrade Option: Two 3.5” drive bays with Hot-Swap backplanes. Support up to 8x3.5 drives.

Basic Configuration

4x3.5 Upgrade Option

8x3.5 Upgrade Option

- **Upgrade Option:** One optional 2.5” drive bay with Hot-Swap backplane. Supports up to 8x2.5” drives (SAS/SATA/NVMe).
- **Upgrade Option:** One 2.5” drive bay with dual port Hot-Swap backplane. Supports up to 8x2.5” SAS drives.
- **Upgrade Option:** Two optional 2.5” drive bay with Hot-Swap backplanes supporting up to 16x2.5” drives (SAS/SATA).



8x2.5 Upgrade Option

16x2.5 Upgrade Option

The table below shows the cables required for these storage drive options.

Drive Count	Configuration	Cable Type
4 drives	Fixed drives (Default configuration)	Mini-SAS HD to 7-pin SATA (AXXCBL450HD7S), connect Mini-SAS HD side to server board side and 7-pin SATA side to drives. Cable shipped with chassis.
	4x3.5 Hot-Swap backplane/cage	Mini-SAS HD to Mini-SAS HD (AXXCBL380HDHD). Both server board and backplane side are Mini-SAS HD type.
8 drives	Two 4x3.5 Hot-Swap backplanes/cages	Mini-SAS HD to Mini-SAS HD (AXXCBL380HDHD). Both server board and backplane side are Mini-SAS HD type.
	8x2.5 Hot-Swap backplane/cage	Mini-SAS HD to Mini-SAS HD (AXXCBL380HDHD). Both server board and backplane side are Mini-SAS HD type.
	8x2.5 NVMe Combo backplane/cage	For S2600CW Server Board Family: One PCIe* SSD cable for drive port 0-3 (shipped with FUP8X25S3NVDK) One Mini-SAS HD to Mini-SAS HD cable (AXXCBL380HDHD) for drive port 4-7 For S2600ST Server Board Family: OCuLink cable for 4 PCIe* SSDs One Mini-SAS HD to Mini-SAS HD cable (AXXCBL380HDHD) for drive ports 0-3 and/or 4-7 **Note:** Refer to the Intel® Server Board S2600ST Product Family Configuration Guide for details on cables used in this configuration
16 drives	Two 8x2.5 Hot-Swap backplanes/cages	For S2600CW Server Board Family: Mini-SAS HD to Mini-SAS HD cables (AXXCBL380HDHD) For S2600ST Server Board Family: Please refer to the *S2600ST_P4000 Configuration Guide* for details on requirements.

2.3.1 Removing the Front Bezel

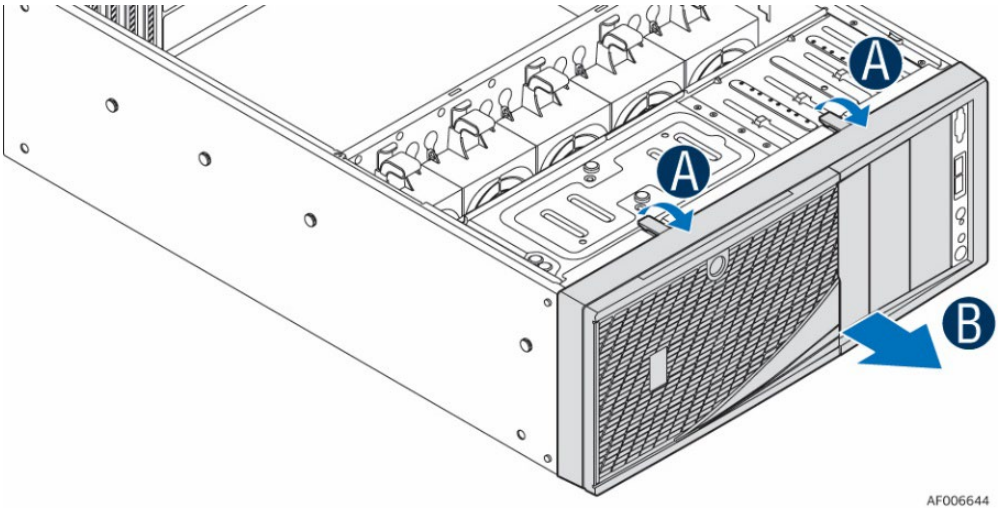


Figure 50. Removing the Front Bezel

1. Remove the chassis side cover following instructions in Section 1.2.1. Before accessing the storage device, remove the front bezel.
2. Push the two tabs on the front bezel outward until the tabs disengage from the chassis (see letter A).
3. Lift the front bezel away from the chassis (see letter B).

2.3.2 Installing the Front Bezel

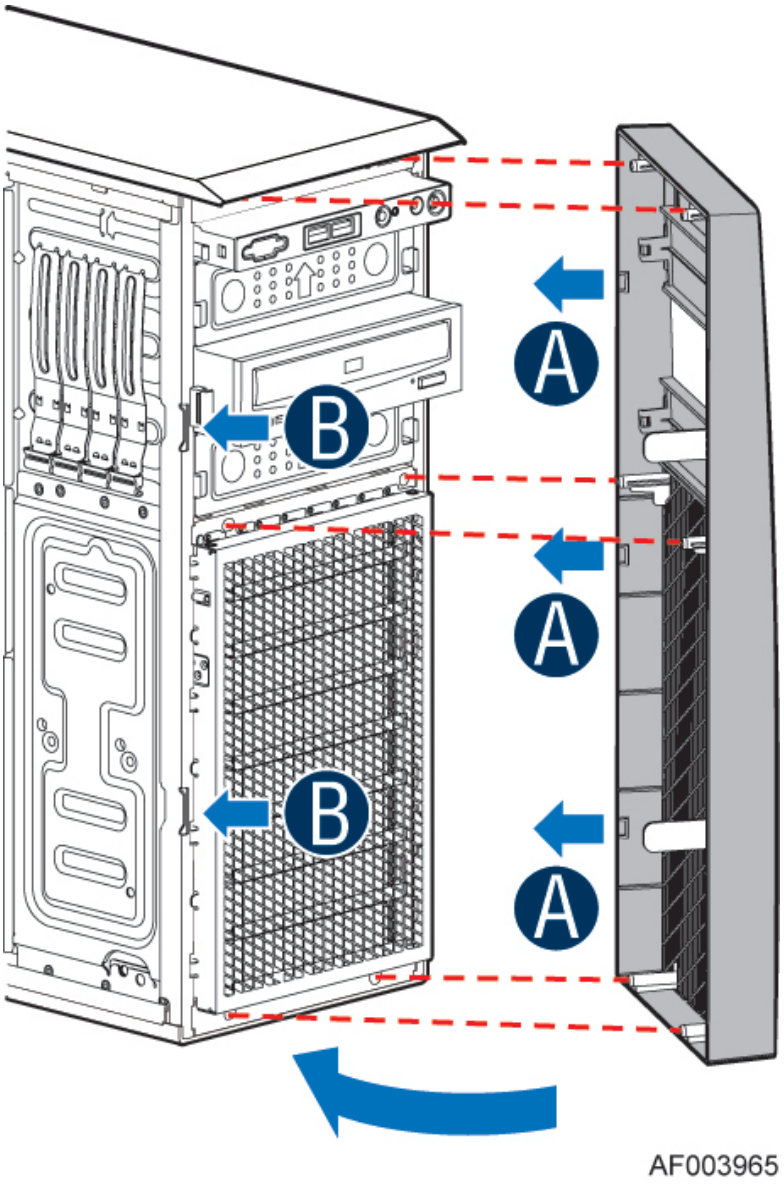


Figure 51. Installing the Front Bezel

1. Fit the right edge of the bezel assembly against the right side of the chassis.
2. Engage the plastic bezel hooks (see letter A) into the raised metal slots at the chassis edge.
3. Rotate the bezel assembly toward the chassis.
4. Latch the two plastic tabs (see letter B) on the left side of the bezel assembly to the chassis.

2.3.3 Installing a Fixed Mount Drive

The server chassis P4304XXMFEN2 and P4304XXMUXX support four 3.5” fixed drive trays with their default configuration. Additional fixed drive trays can be purchased (iPC - **FUP4X35NHDK**) in order to support up to 8 fixed drives.

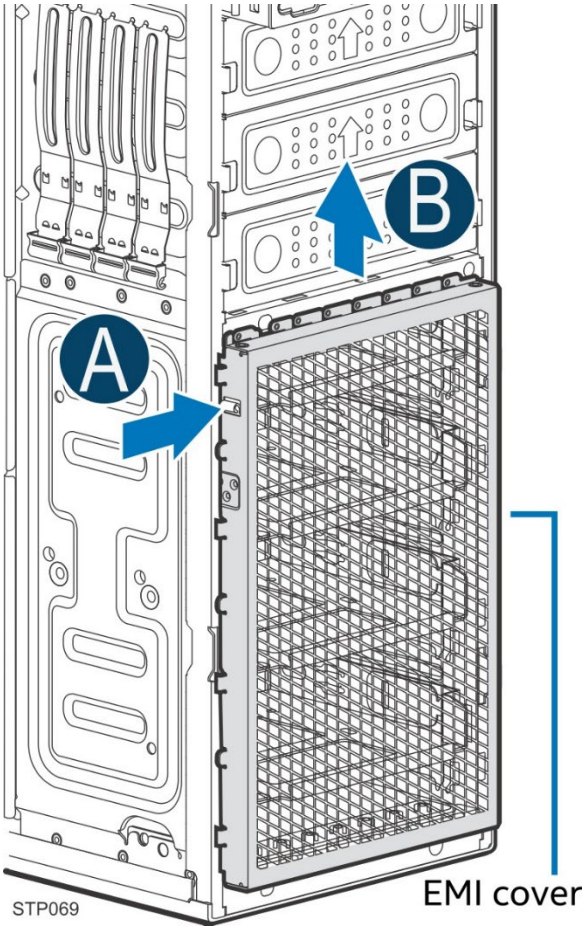


Figure 52. Removing the EMI Cover

To install a fixed drive:

1. Remove the chassis side cover following instructions in Section 1.2.1.
2. Remove the front bezel following instructions in Section 2.3.1.
3. Press the clip to release the EMI cover (see letter A) and lift up until it is removed (see letter B).

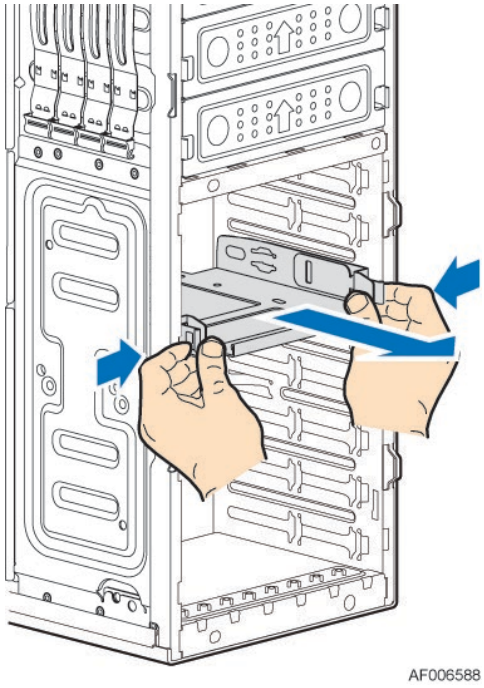


Figure 53. Releasing the Fixed Drive Trays

4. Release the fixed drive trays by pressing the latches on both sides of the tray and pull the drive trays until they are fully removed from the chassis.

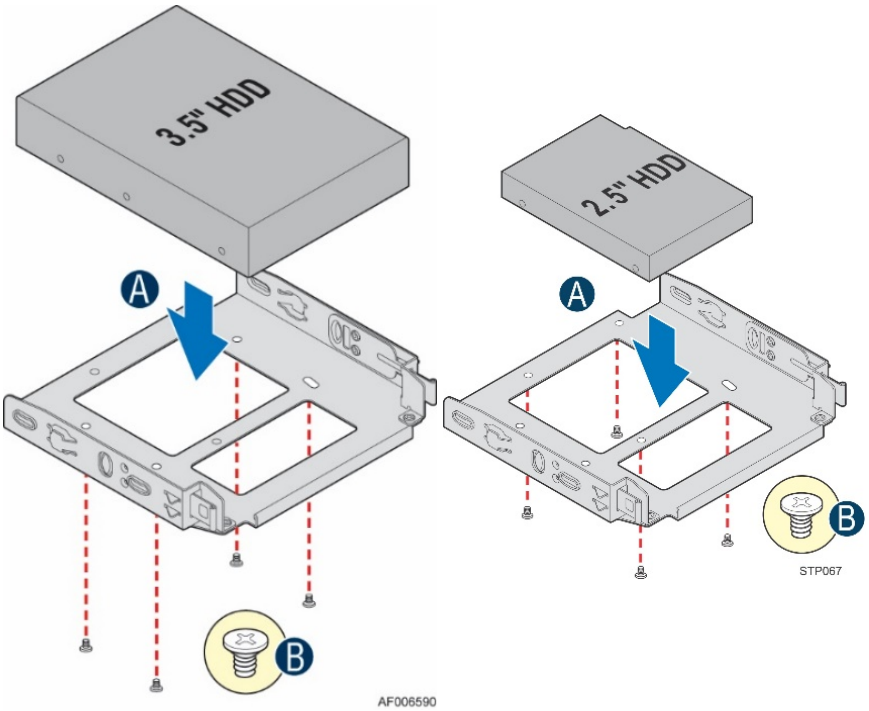


Figure 54. Securing 3.5”/2.5” Drives on a Fixed Drive Bay

5. Align the 3.5” or 2.5” drives with the corresponding mounting holes (see letter A), and screw them onto the fixed drive tray (see letter B).

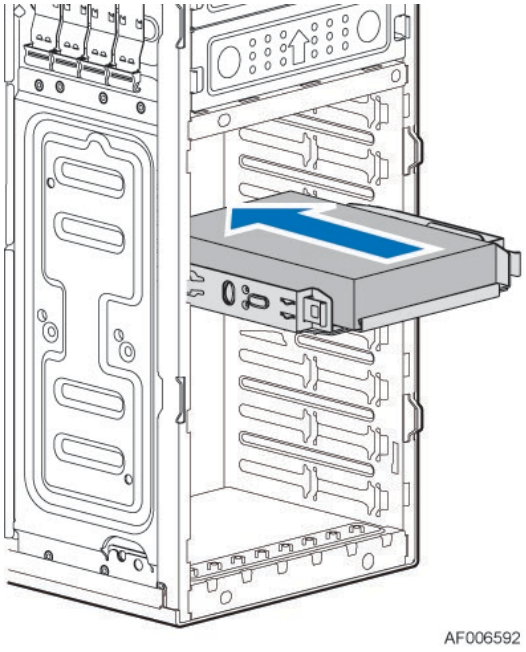


Figure 55. Installing a Populated Fixed Drive Tray

6. Slide the fixed drive tray back into the chassis until it clicks into place.

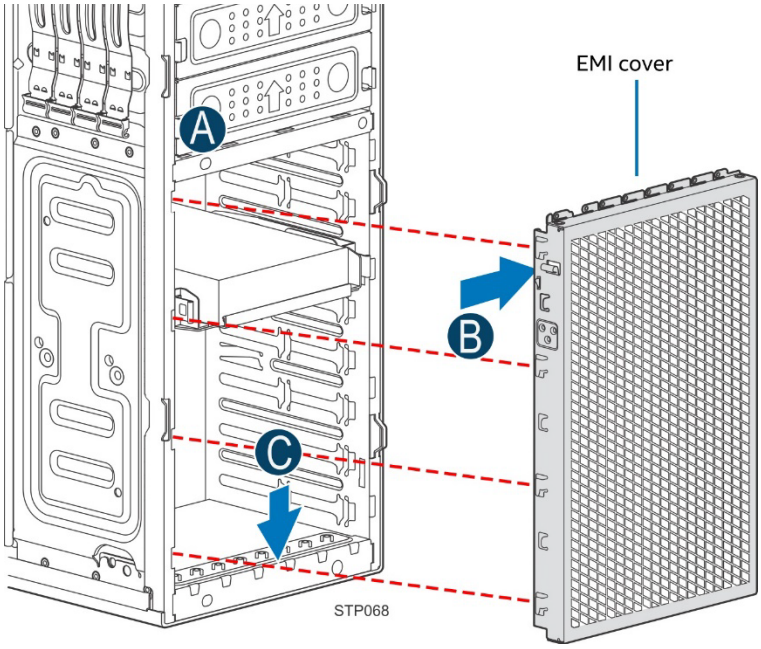


Figure 56. Installing the EMI Cover

7. Install the EMI cover to the chassis front

- Align the tabs on the sides of the EMI cover to the slots on the chassis (see letter A)
- Install the EMI cover pressing the clip on the side (see letter B)
- Once installed, secure the EMI cover by pushing it down until it clicks (see letter C)

8. Locate the data cable for fixed storage drives (included in the accessory bag inside the chassis) and connect the cable connections using one of the on-board Mini-SAS HD SATA connectors as shown in Figure 58. The connector on the left side is connected to the server board; the connector on the right side is connected to the fixed drive.

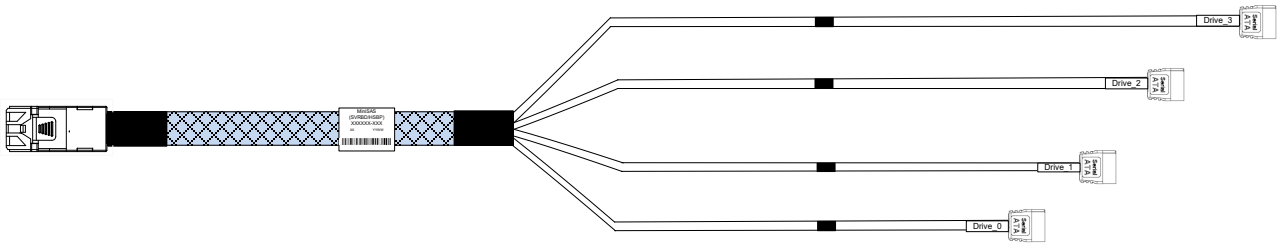
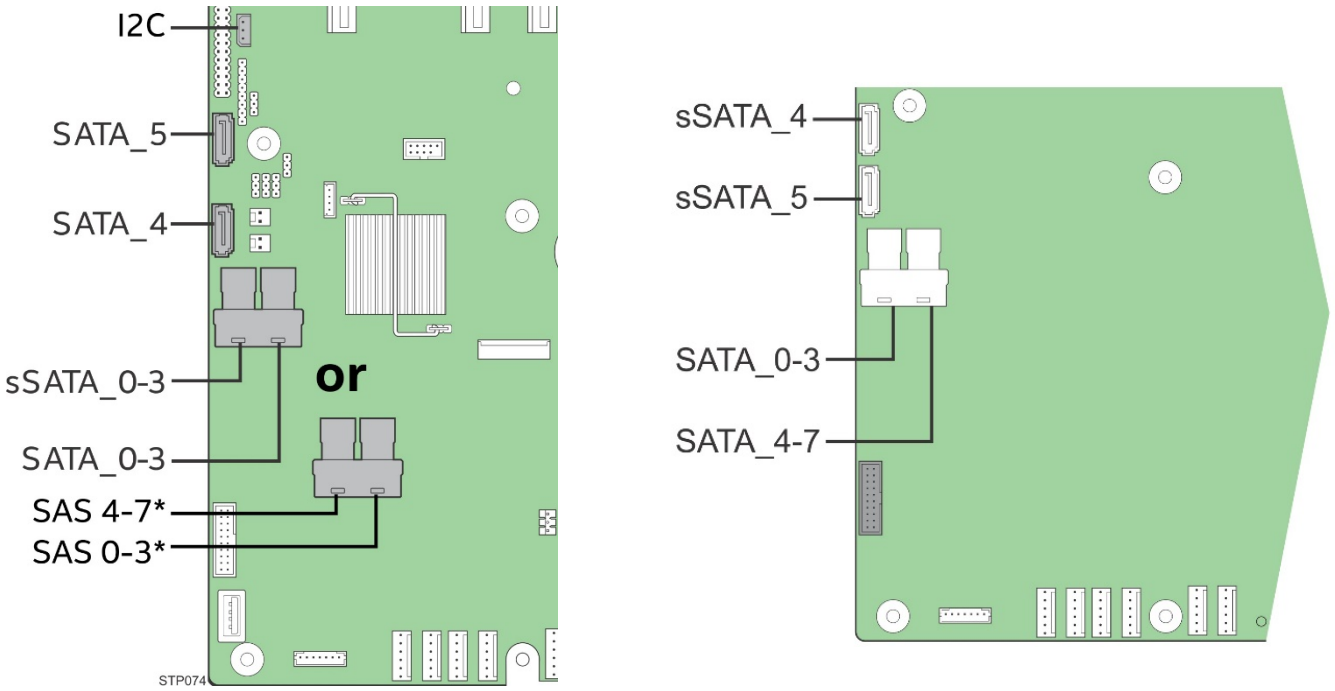


Figure 57. Data Cable for Fixed Storage Drives iPC- AXXCBL450HD7S



S2600CW Board Family

S2600ST Board Family

Figure 58. Connecting Fixed Drive Data Cables

9. Connect a 7-pin SATA data cable to each installed fixed drive.
10. Connect a SATA power cable from the power distribution board or fixed power supply to each installed fixed drive.

2.3.4 Upgrading the Fixed Drive Storage to 4x3.5” or 8x2.5” Hot-Swap Drive Bay Storage

The server chassis supports fixed drive storage by default; optional 4x3.5” or 8x2.5” Hot-Swap drive bay kits and cables can be ordered separately and installed in the server chassis as an upgrade option.

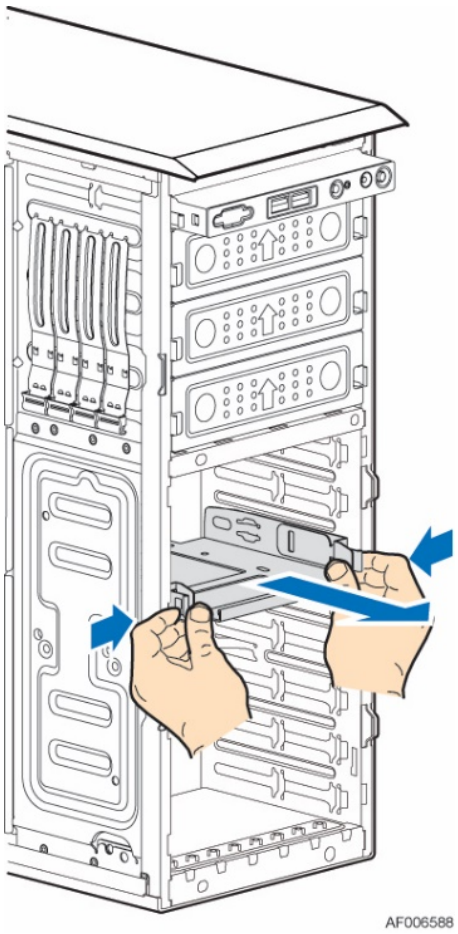


Figure 59. Removing the Fixed Drive Trays

1. Remove the chassis side cover following instructions in Section 1.2.1.
2. Remove the front bezel following instructions in Section 2.3.1.
3. Remove the EMI cover following instructions on Section 2.3.3, Step 3.
4. Remove the fixed drive trays by pressing the latches on both sides of the tray and pull the drive tray until it is fully removed from the chassis.

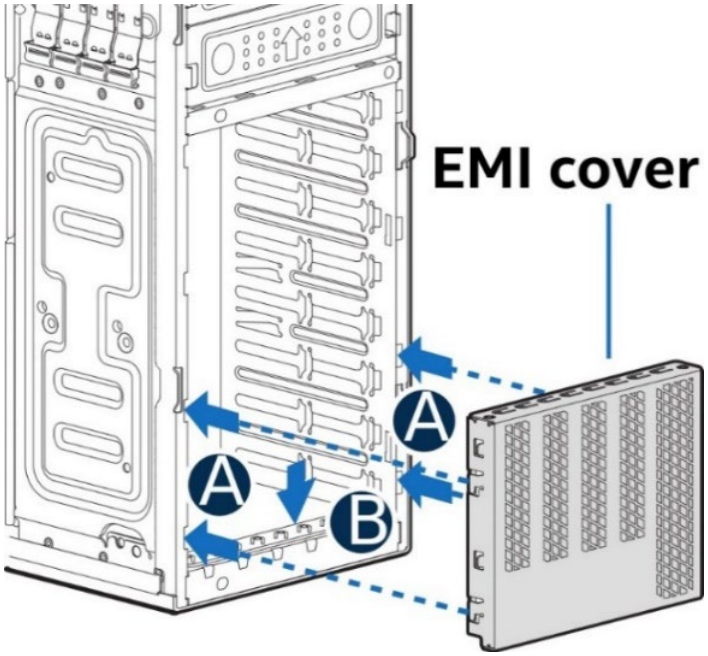


Figure 60. Installing the EMI Cover

5. Install the EMI cover from the Hot Swap Drive Bay Kit, by aligning the tabs on the EMI cover to the chassis slots (see letter A) and slide it down (see letter B).

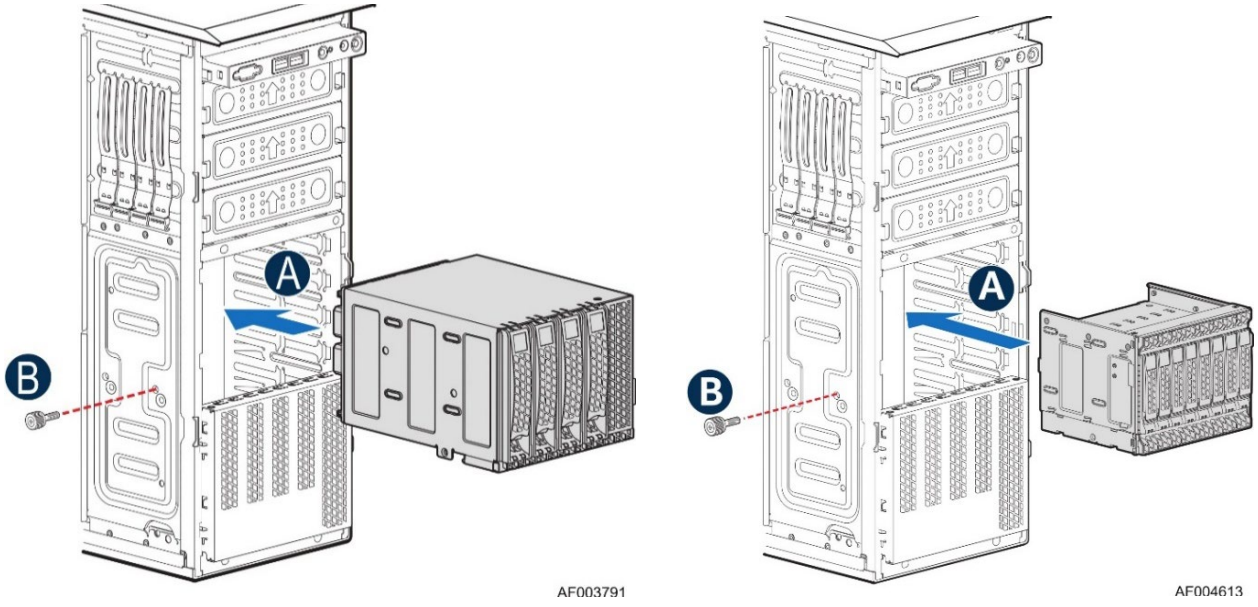


Figure 61. Installing a 4x3.5" or 8x2.5" Hot-Swap Drive Bay Kit

6. Slide the 4x3.5" or 8x2.5" Hot-Swap Drive Bay to the upper drive bay position (see letter A).
7. Secure the drive bay with the thumb screw from the Hot Swap Drive Bay Kit (see letter B).

8. Cable connections.

- S2600CW Server Board Family:

Note: The following instructions apply when using the on-board connectors.

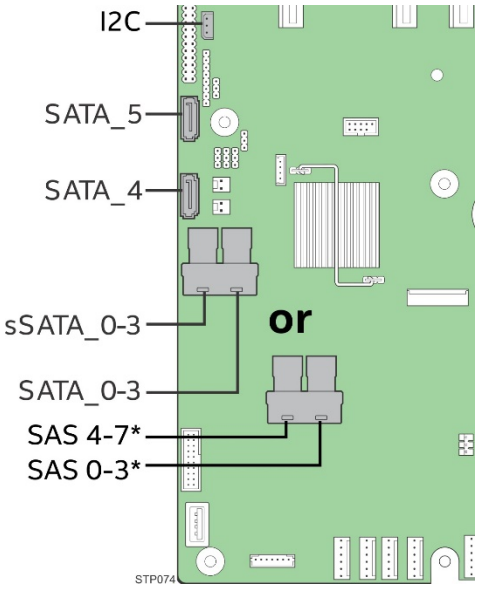


Figure 62. Connecting Data Cables for Hot-Swap Drive Bay Kit – S2600CW Board Family

a. If using a 4x3.5 Hot-Swap Drive Bay, connect the Mini-SAS HD cable connector to the server board connector labeled as sSATA_0-3 or SATA_0-3. If using an 8x2.5 Hot-Swap Drive Bay, connect the Mini-SAS HD cable connector to both sSATA_0-3 and SATA_0-3.

Notes: The SAS_0-3 and SAS_4-7 are available on S2600CW2S and S2600CWTS.

- S2600ST Server Board Family:
-

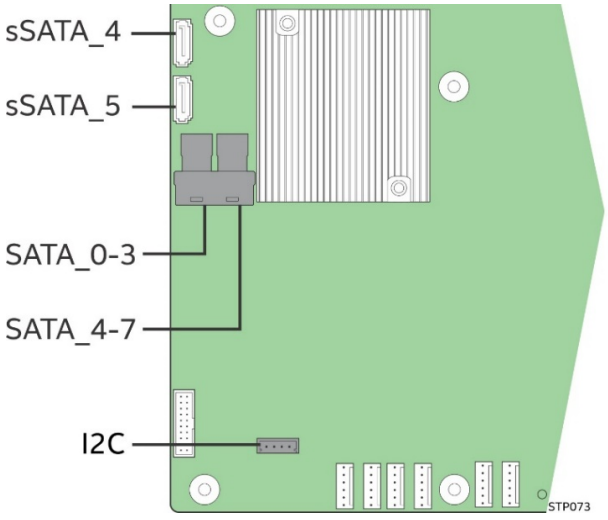


Figure 63. Connecting Data Cables for Hot-Swap Drive Bay Kit – S2600ST Board Family

a. If using a 4x3.5 Hot-Swap Drive Bay, connect the Mini-SAS HD cable connector to the server board connector labeled as SATA_0-3 or SATA_4-7. If using an 8x2.5 Hot-Swap Drive Bay, connect the Mini-SAS HD cable connector to both SATA_0-3 and SATA_4-7.

9. Plug the connector on the other end of the Mini-SAS HD cable to the backplane.

Figure 64. Data Cable for Hot-Swap Drive Bay Kit iPC- AXXCBL380HDHD

10. Connect one end of the I²C cable to the HSBP_I²C header on the server board and the other end to the I²C_IN header on the backplane. See Appendix B for routing of the I²C and Mini-SAS HD cables.

Figure 65. 5p to 3p I²C Cable – For S2600CW Board Family

Figure 66. 6p to 4p I²C Cable – For S2600ST Board Family

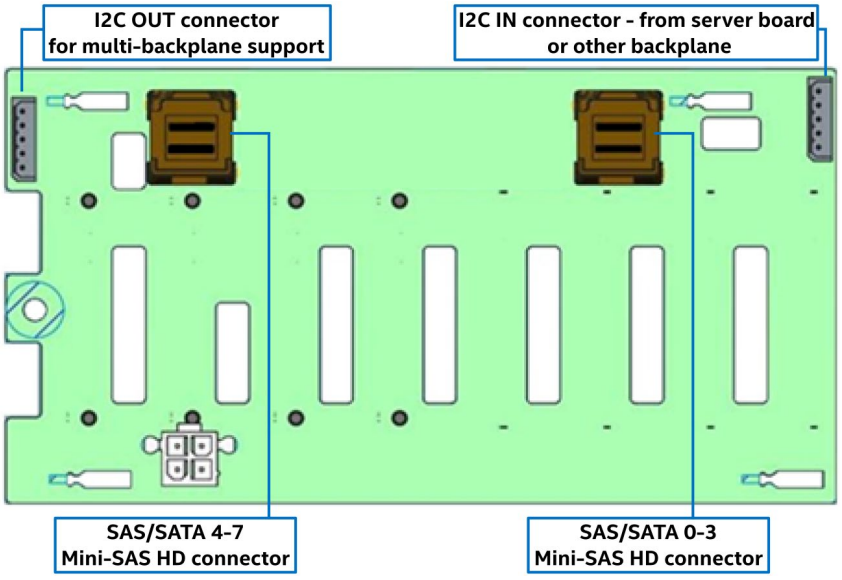


Figure 67. Backplane Connections

11. Connect a power cable from the power distribution board or fixed power supply to the Hot-Swap Drive Kit.

Refer to the *Intel® Server Board S2600ST Product Family Configuration Guide* for options on drive bay kits, storage-related add-in cards, and other accessories.

2.3.5 Upgrading the Fixed Drive Storage to 8x2.5" PCIe* SSD (NVMe) Combo Drive Bay Storage

2.3.5.1 For S2600CW Server Board Family

The installation of the 8x2.5" SAS/PCIe* SSD (NVMe) combo drive bay involves several components:

- NVMe add-in card
- 8x2.5" SAS/PCIe* SSD (NVMe) Combo Drive Bay Kit (FUP8X25S3NVDK)
- NVMe cables
- Mini-SAS HD to Mini-SAS HD cables (optional)
- I²C cable

1. Refer to section 2.3.4 for installing the Hot-swap Drive Bay kit.

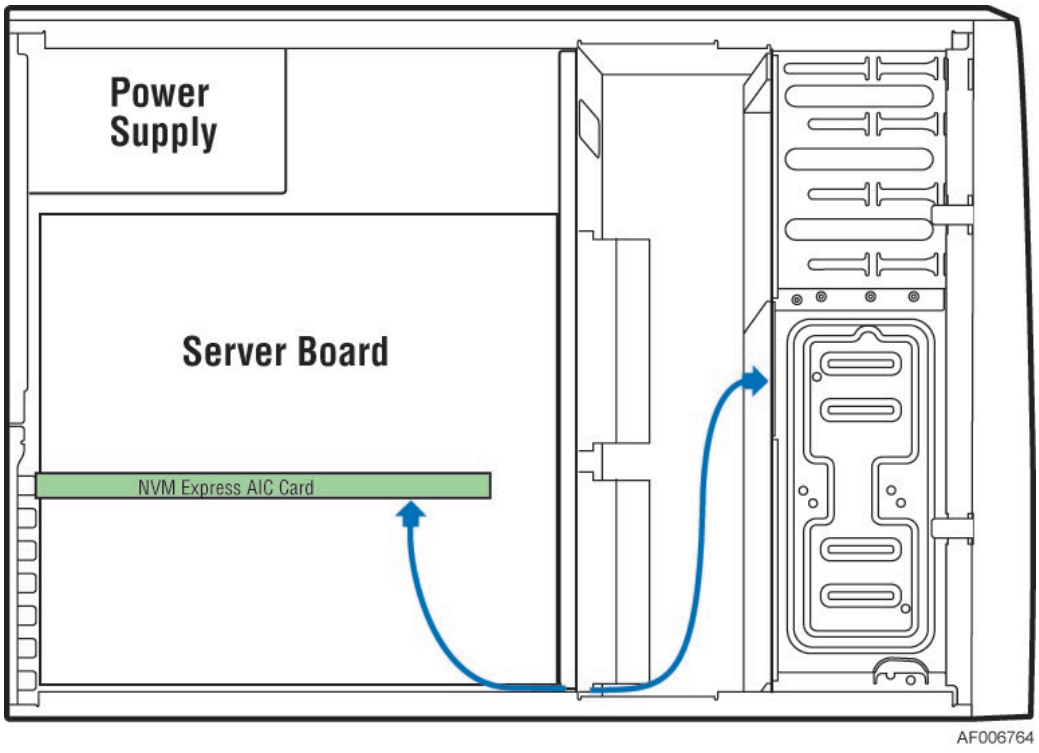
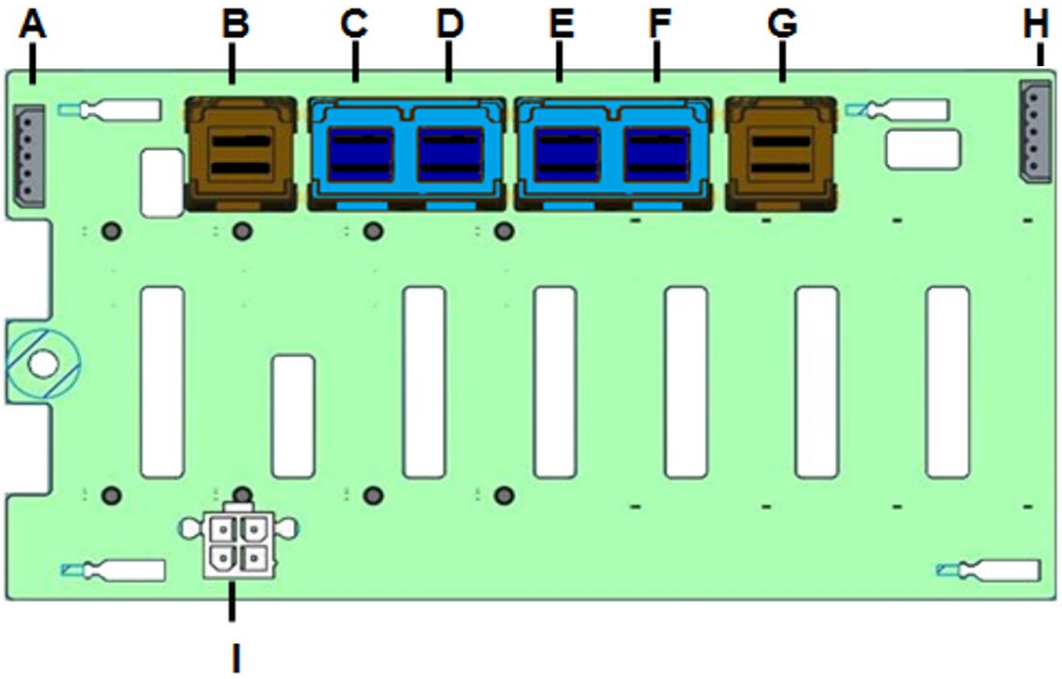


Figure 68. Installing an NVMe Add-in Card – S2600CW Board Family

2. Install the NVMe add-in card to any PCIe* x16 slot on the server board.

Note: The PCIe* slot 5 will be PCIe* x8 bandwidth on S2600CW2S and S2600CWTS.

3. Connect the NVMe cables to the NVMe add-in card and the 8x2.5" SAS/PCIe* SSD (NVMe) Combo backplane. The cables are included in the accessory kit.



Label	Description
A	SMBus-Out (I²C OUT) cable connector for multi-backplane support
B	SAS/SATA Ports 4-7 Mini-SAS HD cable connector
C	PCIe* SSD Drive #3 Mini-SAS HD cable connector
D	PCIe* SSD Drive #2 Mini-SAS HD cable connector
E	PCIe* SSD Drive #1 Mini-SAS HD cable connector
F	PCIe* SSD Drive #0 Mini-SAS HD cable connector
G	SAS/SATA Ports 0-3 Mini-SAS HD cable connector
H	SMBus-In (I²C IN) cable connector – From Server board or other backplane
I	Power connector

Figure 69. 8x2.5" PCIe* SSD (NVMe) Combo Backplane Features – Only for S2600CW Board Family

4. Connect the I²C cable from the server board HSBP_I²C header to the backplane I²C_IN (SMBus-in) header. See Figure 64 for header location on the server board.
5. If SAS/SATA drives will be used in Drive Slot 0-3, connect the "Mini-SAS HD to Mini-SAS HD" cable to the backplane connector G. If SAS/SATA drives will be used in Drive Slot 4-7, connect the "Mini-SAS HD to Mini-SAS HD" cable to the backplane connector B. The other end of the Mini-SAS HD connector can be connected to the motherboard connector sSATA_0-3, SATA_0-3, SAS_0-3, or SAS_4-7. See Figure 64 for the connector location on the server board.

The figure below shows the PCIe* SSD and SAS/SATA Drive Slots on the backplane.

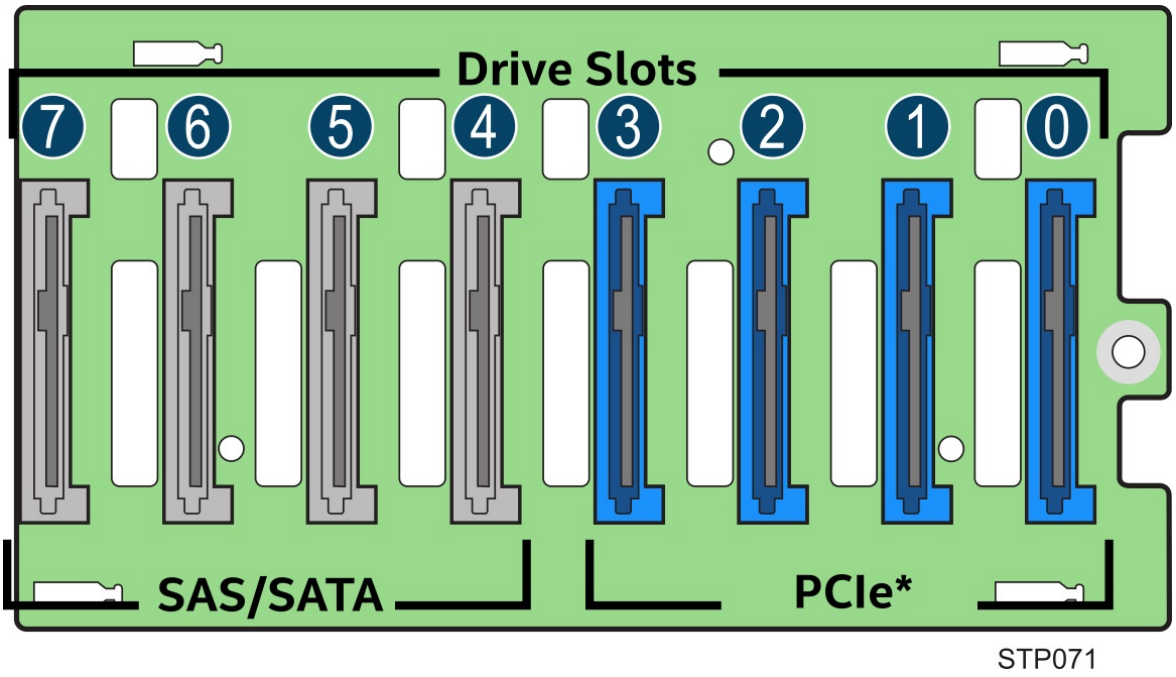


Figure 70. 8x2.5" PCIe* SSD (NVMe) Combo Backplane Front Side –S2600CW Board Family Only

The cables used to connect the NVMe add-in card to the 8x2.5" Combo backplane (PCIe* SSD Drive #0~3 Mini-SAS HD cable connector) are shown in the illustration below. The left side of the cable connects to the backplane; the right side of the cable connects to the PCIe* SSD add-in card.

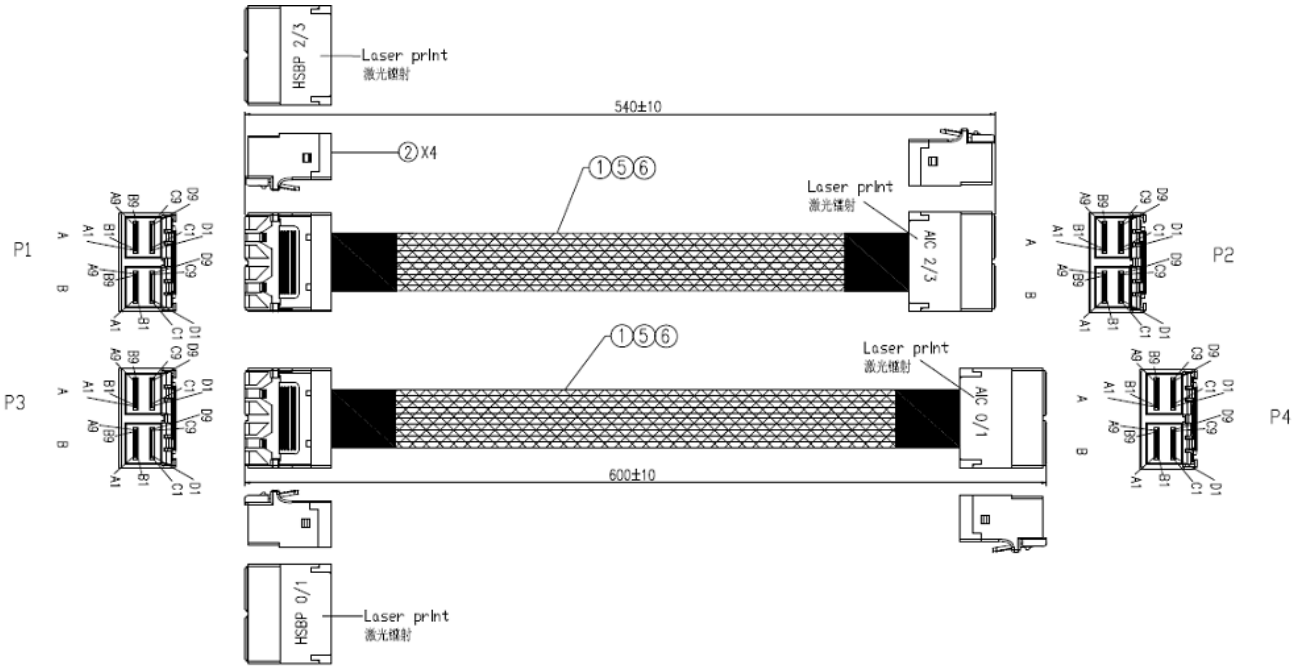


Figure 71. NVMe Data Cables for 8x2.5" PCIe* SSD (NVMe) Combo Drive Bay Kit

Notes:

The 8x2.5 SAS/NVMe Combo Backplane is capable of supporting 12Gb SAS or 6Gb SAS/SATA drives. The SAS/SATA drives are Hot-Swappable, and each drive is mounted to a drive tray with a green latch. The front side of the backplane includes eight drive slots. All eight slots can support SAS or SATA drives, but only the first four are capable of supporting NVMe drives (highlighted in blue on Figure 73).

Any combination of NVMe drives and SAS/SATA drives can be supported as long as the number of NVMe drives does not exceed four and they are installed into any of the first four drive connectors on the backplane.

The NVMe drives are NOT Hot-Swappable. The system must be powered off to add or replace an NVMe drives. To identify an NVMe drive in a system where multiple other SAS/SATA devices may be installed, look for the blue latch release on the NVMe drive tray.

2.3.5.2 For S2600ST Server Board Family

The installation of the 8x2.5” SAS/PCIe* SSD (NVMe) Combo Drive Bay involves several components:

- 8x2.5” SAS/PCIe* SSD (NVMe) Combo Drive Bay (iPC AUP8X25S3NVDK)
- OCuLink* data cables (when installing PCIe* SSDs)
- Mini-SAS HD to Mini-SAS HD cables (when installing SAS/SATA drives)
- I²C cable

1. Refer to section 2.3.4 for installing the Hot-swap Drive Bay.

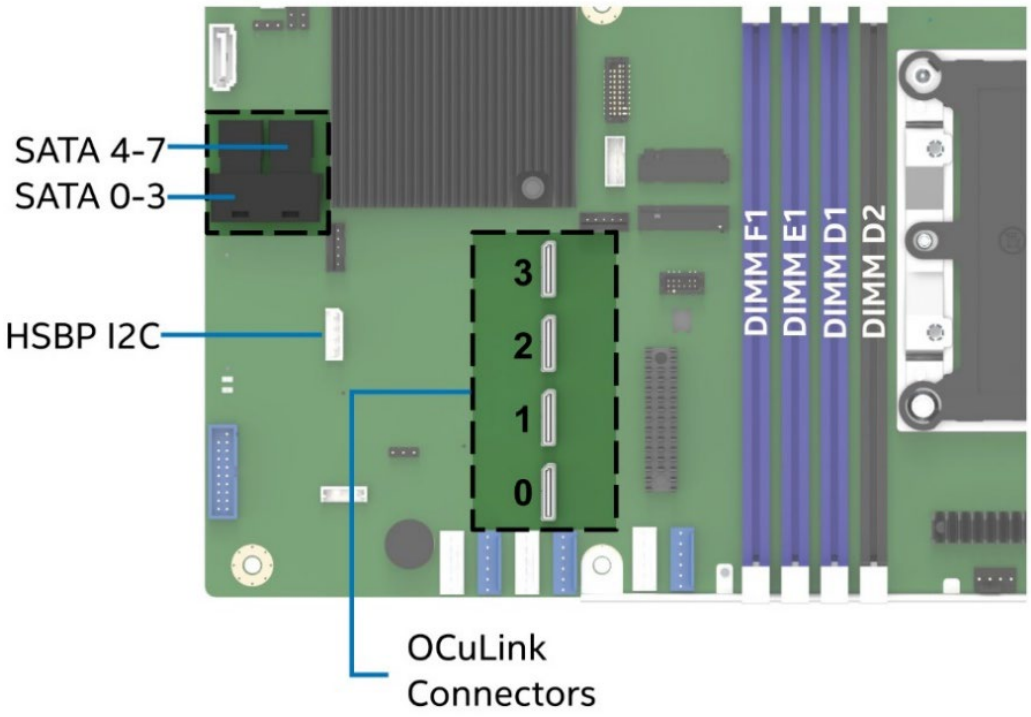


Figure 72. Data Cable Connectors for PCIe* SSD Combo HSBP – S2600ST Board Family only

2. If SAS/SATA drives are used, connect one end of the “Mini-SAS HD to Mini-SAS HD” cable to the backplane connector that corresponds to the used drive ports. The other end of the Mini-SAS HD connector can be connected to the motherboard connector SATA_0-3 or SATA_4-7.

The figure below shows the backplane connectors.

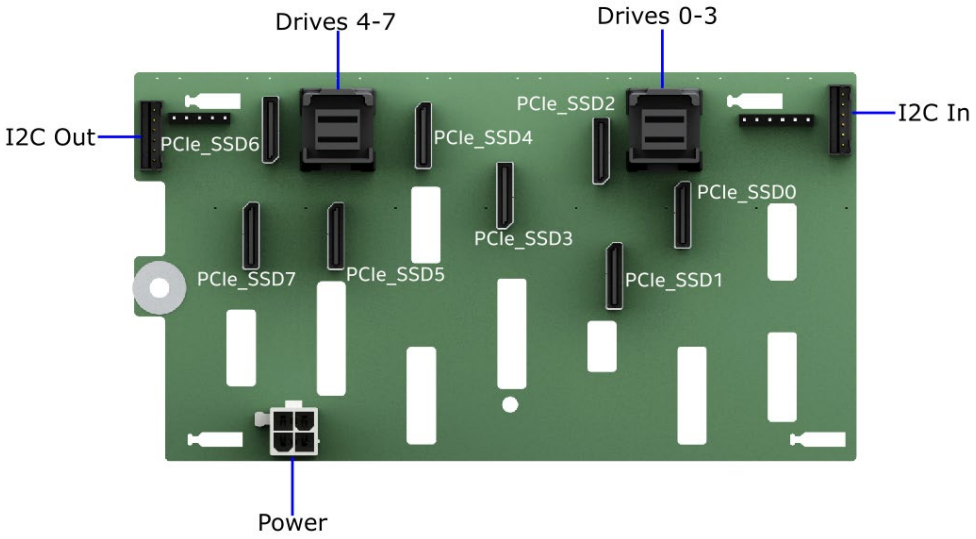


Figure 73. 8x2.5" PCIe* SSD (NVMe) Combo Backplane Features –For S2600ST Board Family Only

3. When installing PCIe* SSD NVMe drives, connect one end of the OCuLink* data cables to the OCuLink* connectors corresponding to the used ports on the backplane and the other end to the OCuLink* connectors on the server board. An example of the OCuLink* data cable is shown below.

Figure 74. OCuLink Data Cable for PCIe* SSD Drives – Only for S2600ST Board Family

NVMe* Drive Population Rules for Intel® VROC

In order to support NVMe RAID and NVMe Management features, the optional Intel® VROC Key must be installed on to the server board. With the Intel VROC key installed, specific drive population rules exist and must be followed for proper support of the NVMe management features.

The backplane can support PCIe interfaces from the onboard OCuLink connectors on the server board, and/or optional add-in Intel Tri-Mode RAID modules and/or PCIe Switch cards. When cabling the PCIe interfaces from two different PCIe interface sources to the backplane, the cables from each source must be connected in defined drive sets of four (0,1,2,3) & (4,5,6,7) as shown in the following diagrams.

Note: OCuLink connectors on the server board (one or all) routed to the backplane is considered a single source.

Routing OCuLink cables from two or more PCIe sources to a defined drive set is not supported.

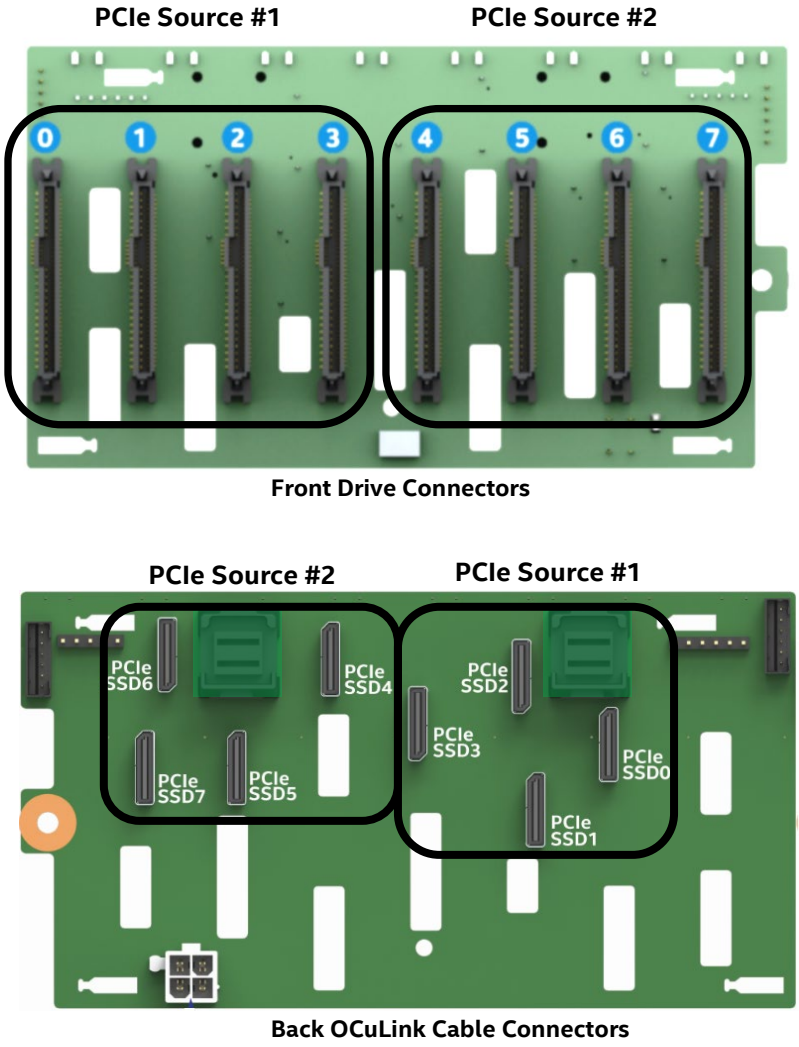


Figure 75. Backplane Cabling from Two PCIe Sources

When cabling the backplane from two different PCIe sources, no other drive set combinations beyond those defined above are supported.

Drive population rules will differ depending on the source of the PCIe interface to the backplane. In addition, specific drive population limits exist when populating a backplane with both NVMe and SAS/SATA drive types.

The following sections define the drive population rules for an installed 2.5" x 8 combo backplane when cabled to a specific PCIe source.

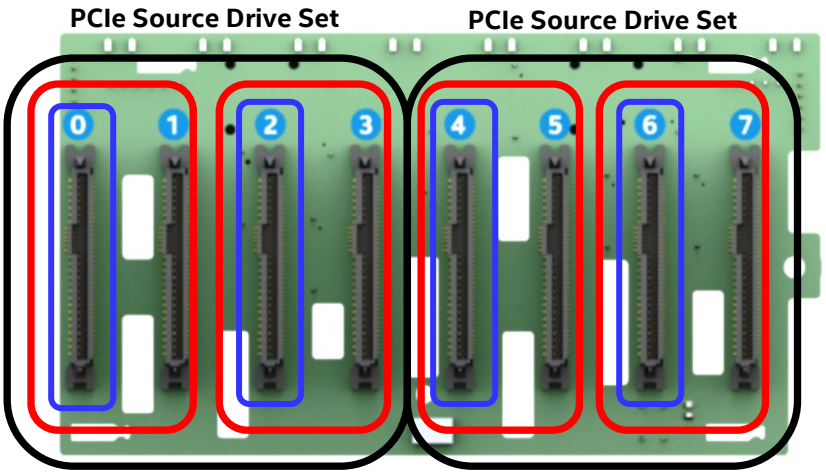
NOTE: When connecting the backplane to two different PCIe sources, the defined population rules for each PCIe source are applied to the drive set connected to it

---

Onboard PCIe OCuLink Connectors and / or Intel Tri-mode RAID module to 8 x 2.5" Combo Backplane
The following information is applicable when PCIe signals to the 8x2.5" combo backplane are cabled from the PCIe OCuLink connectors located on the server board and/or an optionally installed Intel® Tri-mode RAID Module.

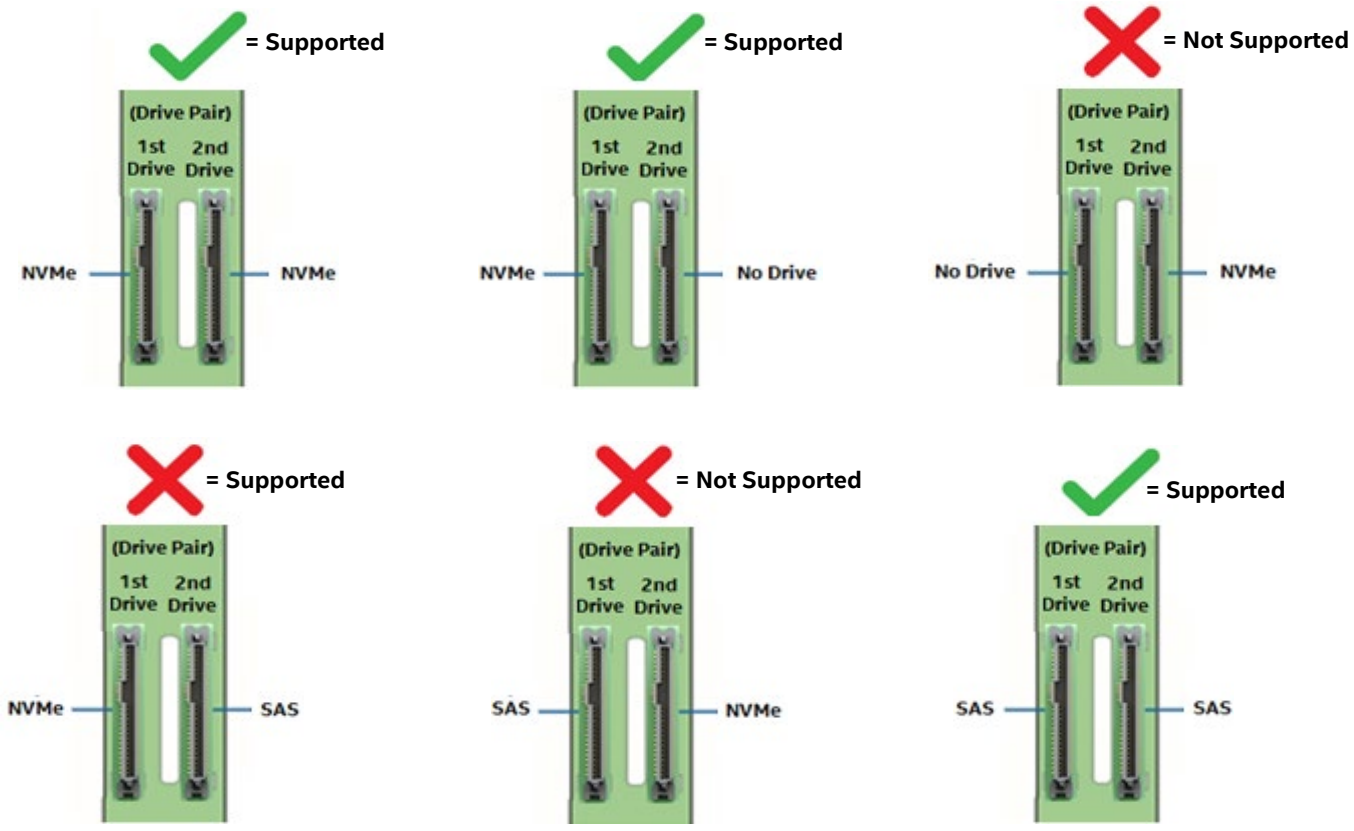
- OCuLink connectors on the server board are considered a single PCIe source to the backplane, and therefore can only be connected in defined drive sets: PCIe_SSD **(0-3) or (4-7)**
- NVMe drive management sideband signals on the backplane are routed between drive connector pairs: **(0,1) (2,3) (4,5)** and **(6,7)**

- In order to support NVMe drive management within a defined drive pair, an NVMe drive MUST be populated in the first drive connector of the given pair (drives 0, 2, 4, or 6)



- Combining an NVMe drive with a SAS/SATA drive within a defined drive pair is NOT supported. Example) In order to support NVMe management features within a given drive set, with an NVMe drive installed to drive connector 0, drive connector 1 cannot be populated with a SAS/SATA drive. The same rule applies to ALL other drive pairs on the backplane.

The following illustrations identify supported and unsupported drive populations associated with any defined drive pair of the 8x2.5" combo backplane when Intel VROC is used for NVMe drive management.

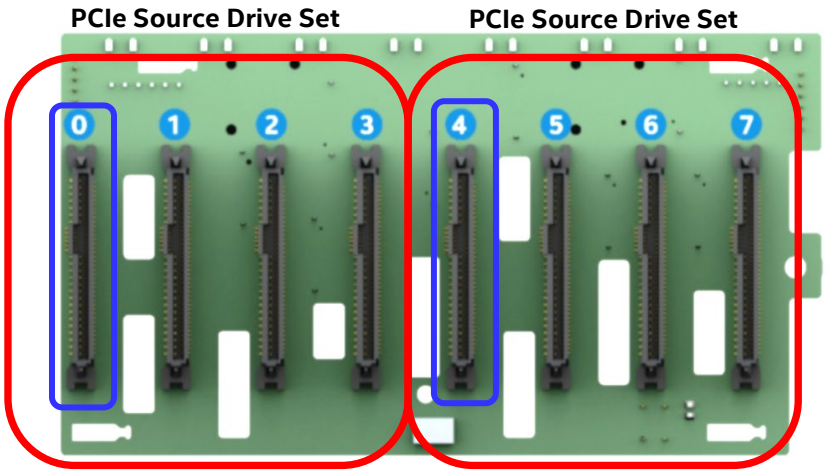


Where 1st Drive = drive connectors 0, 2, 4, or 6 and 2nd Drive = drive connectors 1, 3, 5, or 7

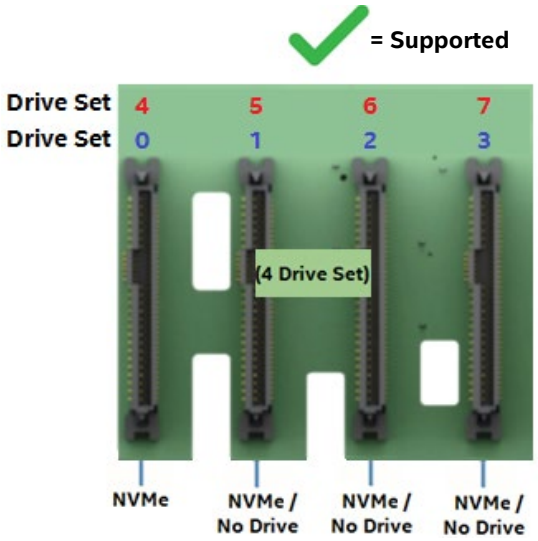
4 port / 8 port PCIe Switch to 8 x 2.5" Combo Backplane*

The following information is applicable when PCIe signals to the 8x2.5" combo backplane are cabled from 4 or 8 port PCIe Switch add-in cards.

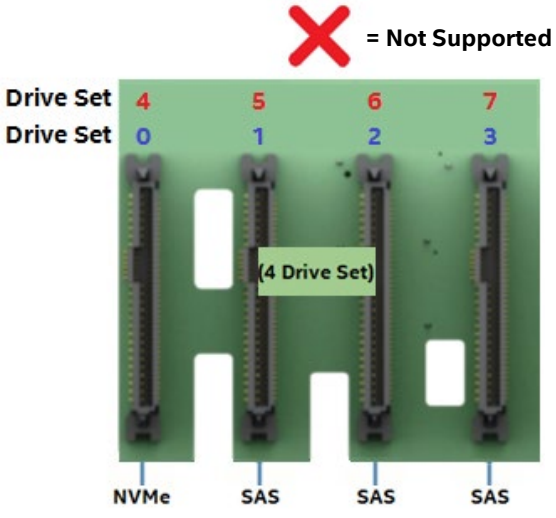
- NVMe drive management sideband signals on the backplane are routed between drive connector sets: **(0,1,2,3)** and **(4,5,6,7)**
- In order to support NVMe drive management within a defined drive set, an NVMe drive MUST be populated in the first drive connector of the given set (drive connectors **0 or 4**). Additional NVMe drives within the drive set must be populated in sequential order with no gaps between drive connectors.
- Combining NVMe drives and SAS/SATA drives within a defined drive set is NOT supported.



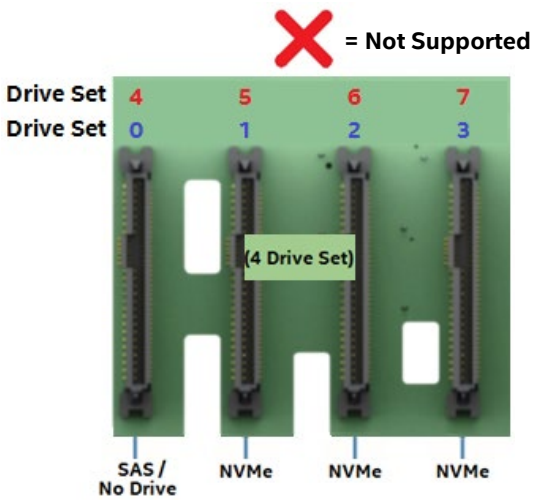
The following illustrations identify supported and unsupported drive populations associated with any defined drive set of the 8x2.5" combo backplane when an Intel® VROC key is installed to the server board and the PCIe source to the backplane is from an add-in PCIe Switch card.



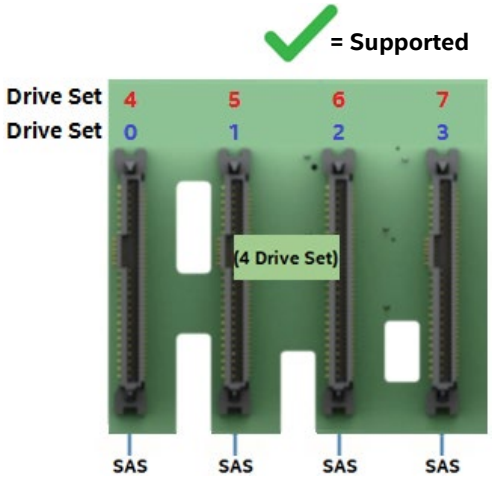
1st Drive = NVMe + NVMe in any sequential drive slot (No gaps)



Mixing of NVMe and SAS within a common drive set is not supported



No NVMe in 1st drive slot and Mixing of NVMe and SAS within a common drive set is not supported



SAS in all 4 drive slots, no NVMe

Note: The NVMe drive population rules defined above are only applicable when the Intel® VROC accessory option is installed and used to provide NVMe drive management.

2.3.6 Upgrading the Fixed Drive Storage to 8x3.5” Hot-Swap Drive Bay Storage

The server chassis can support two 4x3.5” Hot-Swap drive bays as an upgrade option from fixed drive storage.

1. Prepare the chassis by following Steps 1-4 in Section 2.3.4.
2. Slide the first 4x3.5” Hot-Swap drive bay to the upper/right drive bay position.
3. Slide the second 4x3.5” Hot-Swap drive bay to the lower/left drive bay position (see letter A).
4. Secure the drive bay with the thumb screw (included on the Hot Swap Drive Bay Kit (see letter B).

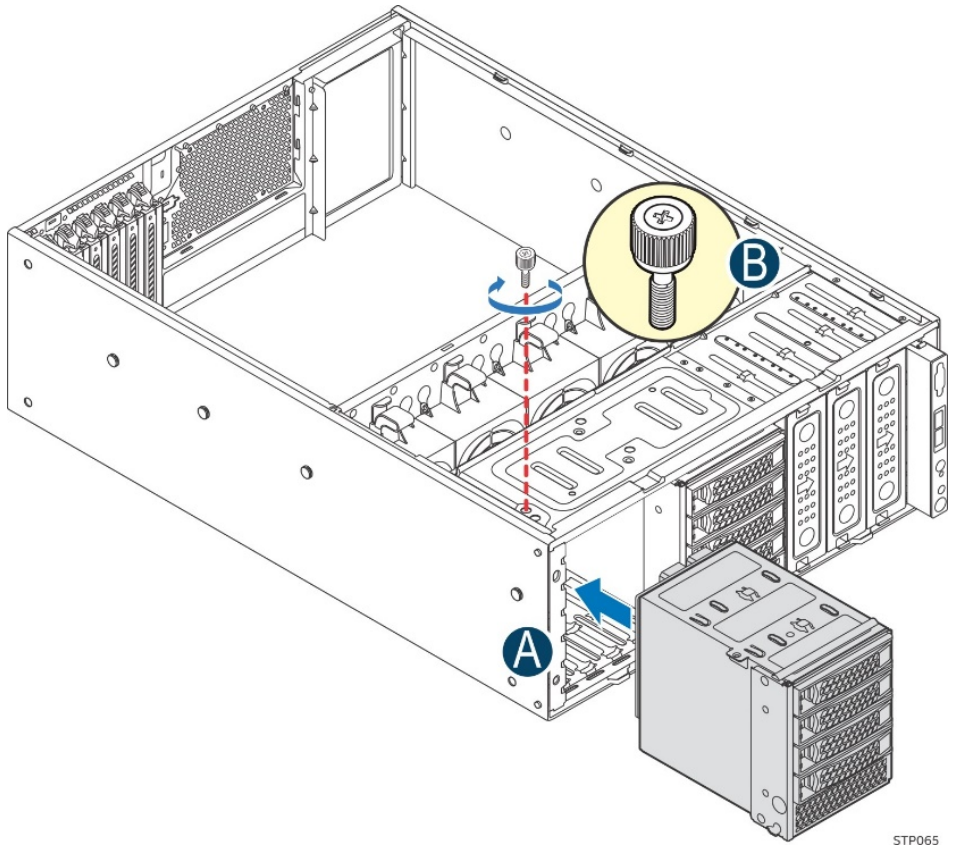


Figure 76. Installing Two 4x3.5” Hot-Swap Drive Bay Kits

5. Follow Steps 8 and 9 in Section 2.3.4 in order to connect the Mini-SAS HD cables for each of the drive bay kits.

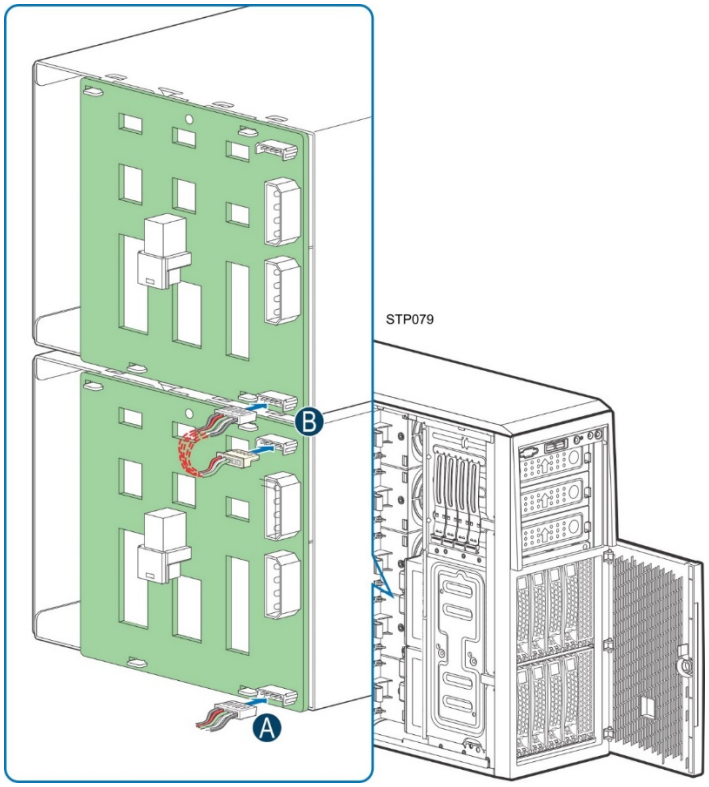


Figure 77. Interconnection Diagram for Two 4x3.5" Hot-Swap Drive Bay Kits

6. Connect one end of the I²C cable to the HSBP_I²C header on the server board and the other end to the I²C_IN header on the backplane. See Appendix B for routing the I²C and Mini-SAS HD cables. (See letter A).
7. Connect one end of the cascading I²C cable to the I²C_OUT header on the backplane in the lower/left position and the other end to the I²C_IN header on the backplane in the upper/right position (see letter B).

2.3.7 Upgrading the Fixed Drive Storage to 16x2.5” Hot-Swap Drive Bay Storage

The server chassis can support two 8x2.5” Hot-Swap drive bays as an upgrade option from fixed drive storage.

6. Prepare the chassis by following Steps 1-4 in Section 2.3.4.
7. Slide the first 8x2.5” Hot-Swap Drive Bay to the upper/right drive bay position.
3. Slide the second 8x2.5” Hot-Swap Drive Bay to the lower/left drive bay position (see letter A).
4. Secure the drive bay with the thumb screw (included on the Hot Swap Drive Bay Kit, see letter B).

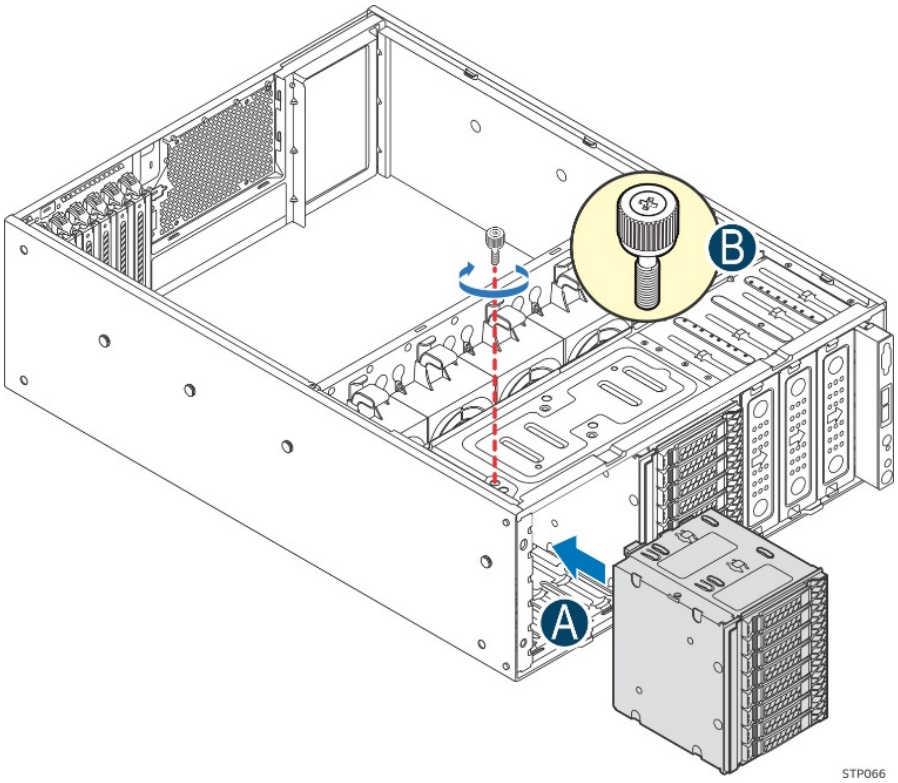


Figure 78. Installing Two 4x3.5” Hot-Swap Drive Bay Kits

5. Cable connections:

S2600CW Server Board Family:

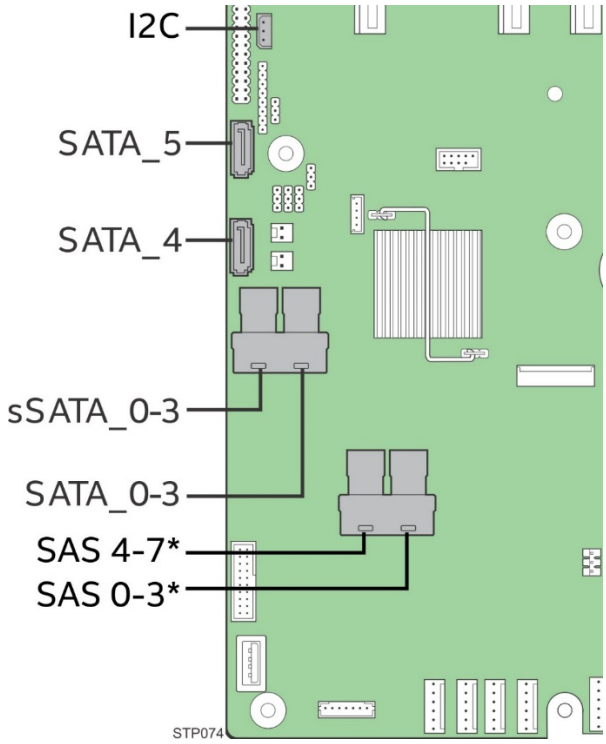


Figure 79. Connecting Data Cables for Two 8x2.5" Hot-Swap Drive Bay Kits – 2600CW Board Family

6. Connect two of the Mini-SAS HD cables to the server board connectors labeled as SAS_0-3 and SAS_4-7 and one end of the I²C cable in the locations shown on the above illustration.
7. Additionally, connect the other two Mini-SAS HD cables to the server board connectors labeled as sSATA_0-3 and SATA_0-3.

Note: The SAS_0-3 and SAS_4-7 are available on S2600CW2S and S2600CWTS.

The two backplanes are cascaded with an I²C cable as shown below.

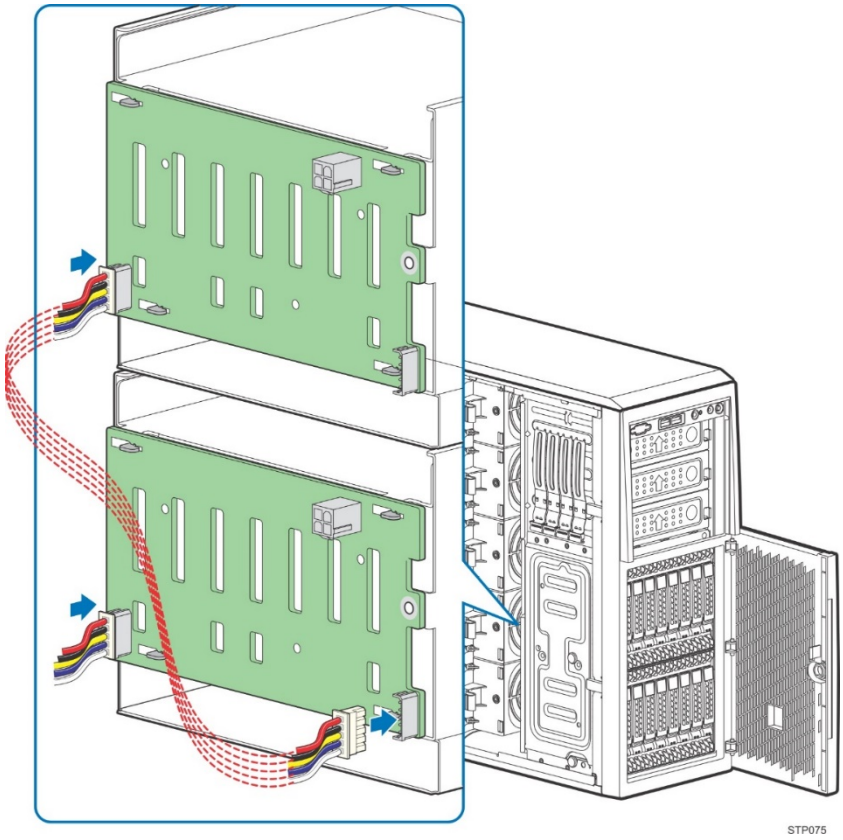


Figure 80. Interconnect Diagram for Two 8x2.5" Hot-Swap Drive Bay Kits – S2600CW Board Family

- S2600ST Server Board Family:

The server board only supports 8 drives connected through the on-board Mini-SAS HD connectors.

Refer to the *Intel® Server Board S2600ST Product Family Configuration Guide* for details on accessories needed to connect sixteen 2.5 drives.

2.3.8 Drive Carrier Extraction, Installation, and Assembly for Standard Carrieers

Note: To maintain proper system cooling, all externally accessible drive bays must be populated with a drive carrier. Each drive carrier must have a hard disk drive (HDD), Solid State Device (SSD), or a supplied drive blank installed.

2.3.8.1 Drive Carrier Extraction

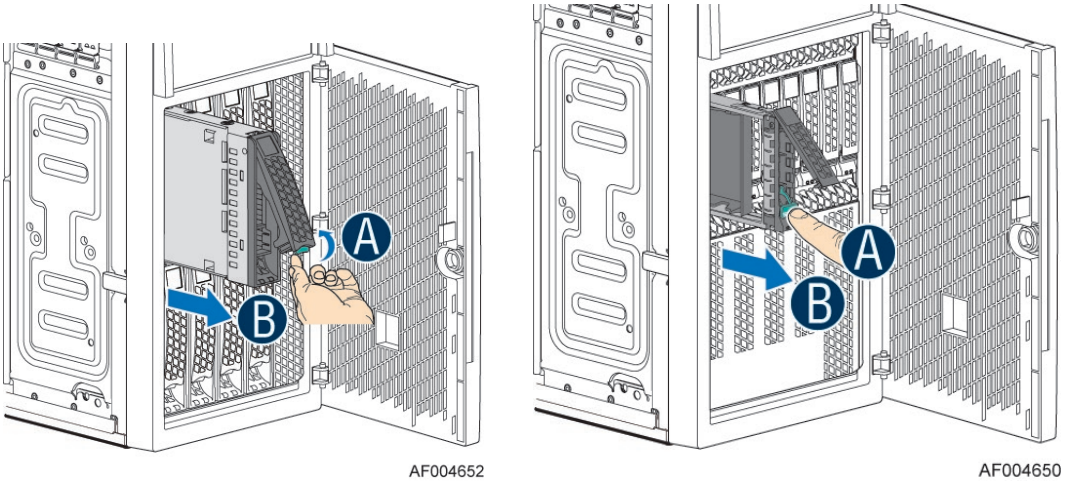


Figure 81. Installing Hot-Swap Storage Devices – Carrier Extraction

1. Remove the drive carrier from the chassis by pressing the green button and pulling open the lever (see letter A).
2. Pull the carrier out of the drive bay (see letter B).

2.3.8.2 3.5" Drive Carrier Insertion

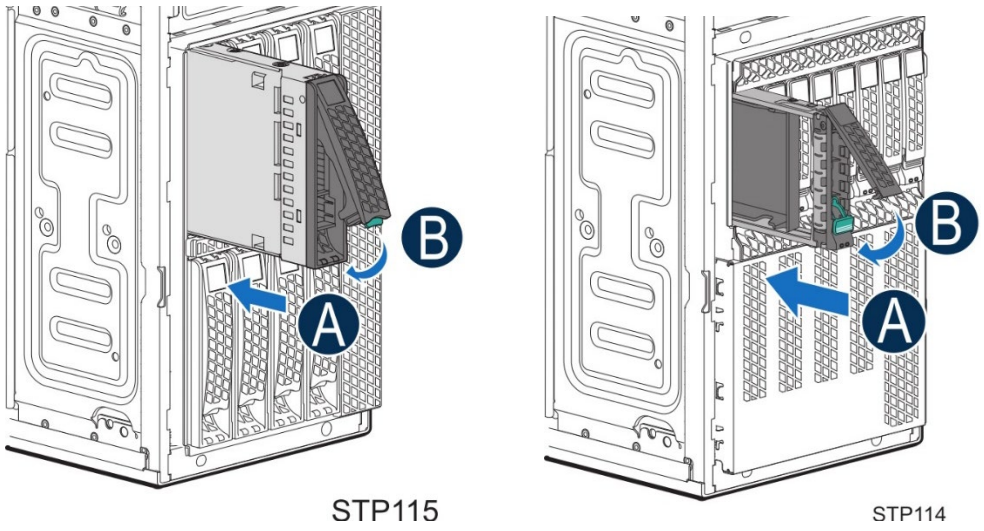


Figure 82. Hard Disk Drive Installation – Drive Carrier Insertion

1. With the lever open, insert the drive assembly into the drive bay (see letter A).
2. Push in the lever to lock it into place (see letter B).

2.3.8.3 3.5" Hard Disk Drive Installation

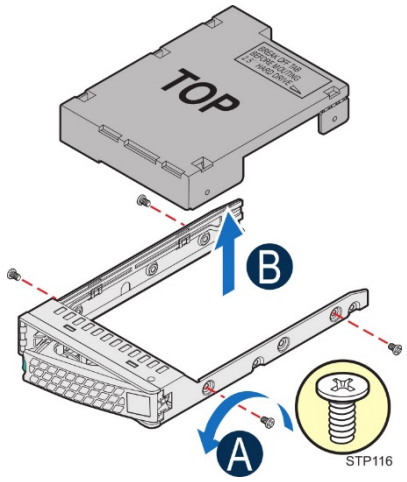


Figure 83. 3.5" Hard Disk Drive Installation – Removing the Drive Blank

1. Remove the four screws securing the plastic drive blank to the carrier (see letter A).
2. Remove the drive blank from the carrier (see letter B).

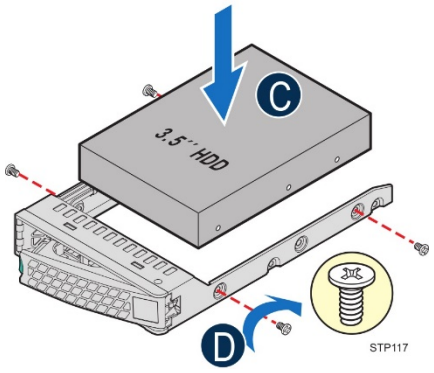


Figure 84. 3.5" Hard Disk Drive Installation – Mounting the Drive to the Carrier

3. Install the drive into the carrier. Verify the connector end of the drive is located towards the back of the carrier (see letter C).
4. Secure the drive to the carrier using four screws (see letter D).

2.3.8.4 Option to Install a 2.5” SSD into a 3.5” Carrier

The 3.5” drive blank can be used as a 2.5” SSD bracket.

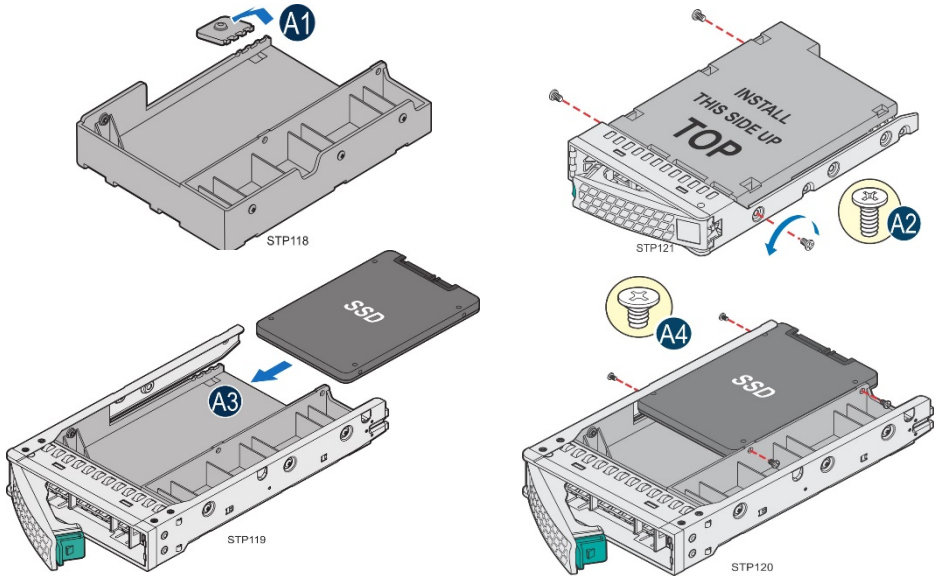


Figure 85. Option to Install a 2.5” SSD into a 3.5” Carrier

1. Remove the drive blank from the device carrier (see previous page).
2. Break off the small side tab from the drive blank, making the drive blank into a device bracket (see letter A1).
3. Install the device bracket into the device carrier so that the hollow side of the device bracket is facing down.
4. Secure the device bracket with three screws (see letter A2).
5. Turn over the carrier assembly.
6. Slide a 2.5" SSD into the device bracket and align the screw holes with the right and left rail (see letter A3).
7. Secure the device using four screws (see letter A4).

2.3.8.5 2.5” Hard Disk Drive (HDD) / Solid State Device (SSD) Installation

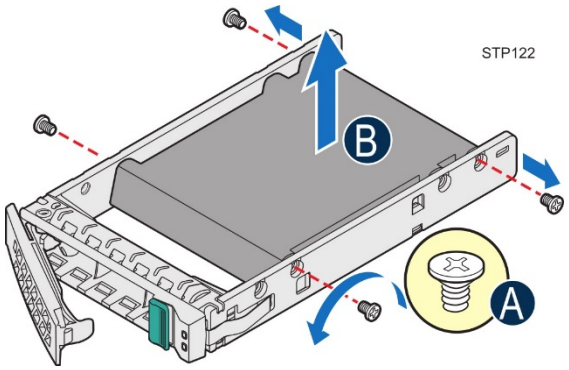


Figure 86. 2.5” Storage Device Installation – Removing the Drive Blank

1. Remove the four screws securing the plastic drive blank to the carrier (see letter A).
2. Remove the drive blank from the carrier (see letter B).

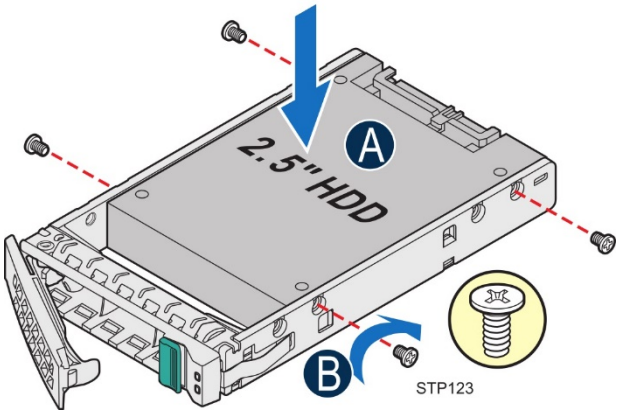


Figure 87. 2.5" Storage Device Installation – Mounting the Drive to the Carrier

3. Install the storage device into the carrier. Verify the connector end of the drive is located towards the back of the carrier (see letter A).
4. Secure the drive to the carrier using four screws (see letter B).

2.3.9 Drive Carrier Extraction, Installation, and Assembly for Tool-less Drive Carriers

Note: To maintain proper system cooling, all externally accessible drive bays must be populated with a drive carrier. Each drive carrier must have a hard disk drive (HDD), Solid State Device (SSD), or a supplied drive blank installed.

2.3.9.1 Drive Carrier Extraction

Figure 88. Drive Carrier Extraction from Chassis

1. Remove the drive carrier from the chassis by first pressing the button on the carrier face plate to release the lever (see Letter "A").
2. Using the lever, pull the carrier from the drive bay (see Letter "B").

2.3.9.2 Drive Carrier Installation

Figure 89. Drive Carrier into Chassis Installation

1. Align the drive assembly with the open drive bay
2. With the lever in the open position, insert the drive assembly into the drive bay (See letter A) and push forward until the drive makes contact with the backplane
3. Complete the drive installation by closing the drive assembly lever until it locks into place (See letter B)

2.3.9.3 2.5” HDD / SSD Drive Carrier Assembly

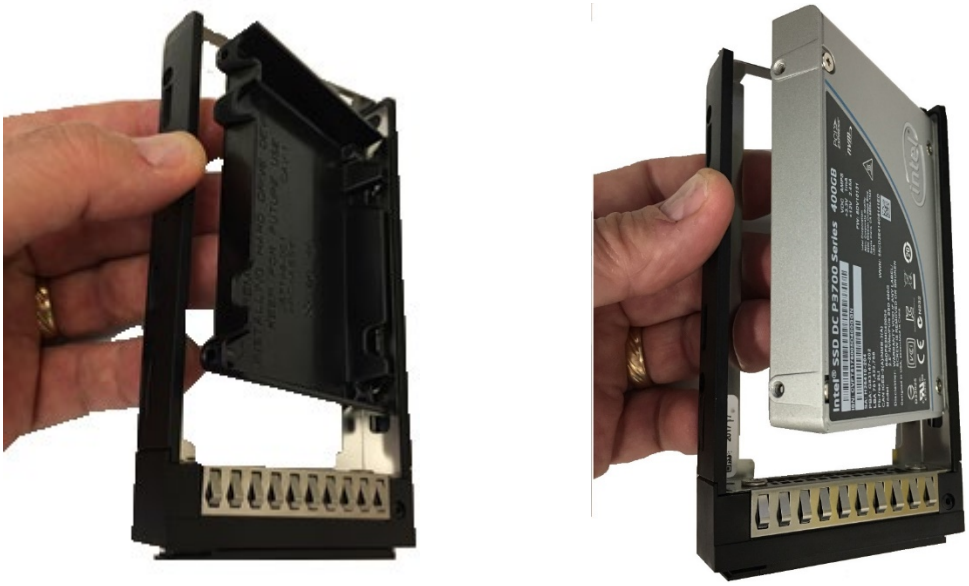


Figure 90. 2.5" Drive Carrier Assembly – Drive / Drive Blank Removal

1. Remove the drive or drive blank from the carrier by gently rotating the top edge of a carrier rail outwards while at the same time pushing the drive or drive blank up from the bottom (as shown above).

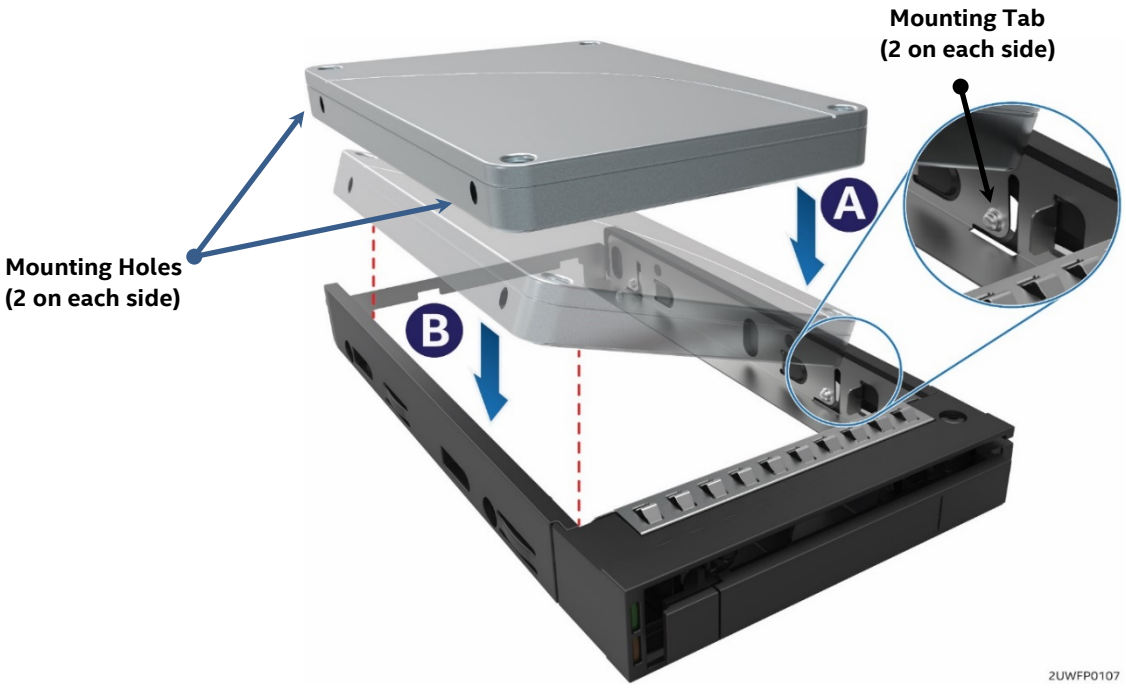


Figure 91. 2.5" Drive Carrier Assembly – Drive Installation to Carrier

2. With the rear drive connector positioned towards the back of the drive carrier, align and position the mounting holes on one side of the drive over the mounting tabs located on the drive carrier side rail (See letter "A")
3. Lower the other side of the drive into the carrier (See letter "B") and press down on the drive until all mounting tabs are locked in place.

Note: The 2.5" drive blank and drive carrier each have an alignment feature (shown above) to ensure proper assembly. When re-installing a drive blank in to the drive carrier, ensure the features are aligned prior to installation. Failure to properly install a drive blank may result with the carrier assembly not fitting properly in to the chassis drive bay.

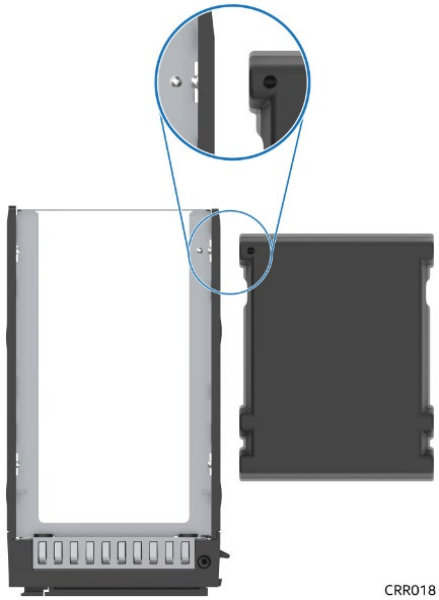


Figure 92. 2.5" Drive Carrier Assembly – Alignment Features

2.3.9.4 3.5” HDD/SSD Drive Carrier Assembly

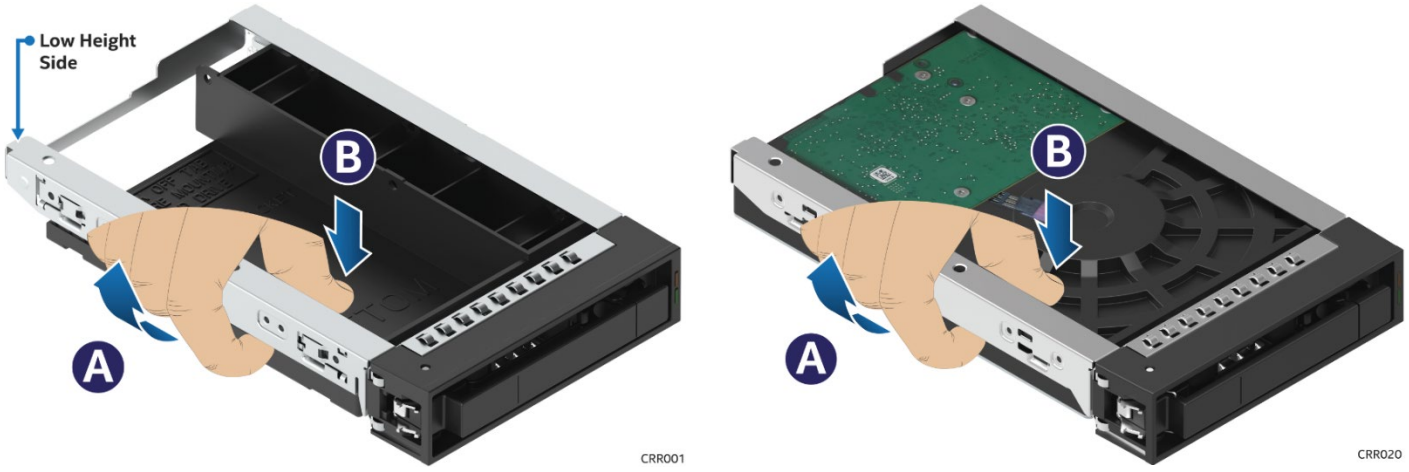


Figure 93. 3.5" Drive Carrier Assembly - Drive / Drive Blank Removal

1. Remove the drive or drive blank from the carrier by holding the carrier assembly top side down in your right hand. Using your left hand, gently rotate the bottom edge of the left rail upwards (see Letter “A”) while at the same time pushing the drive or drive blank down away from the carrier (see Letter “B”).

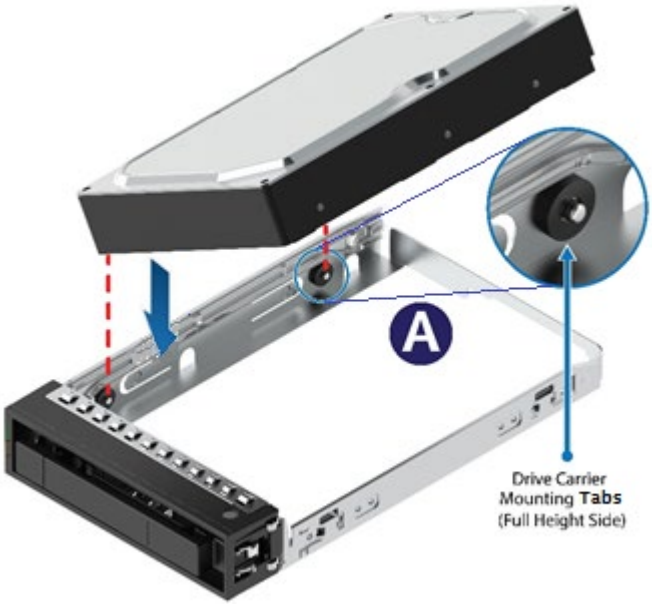


Figure 94. 3.5” Drive Carrier Assembly – Drive Installation to Carrier

2. With the rear drive connector positioned towards the back of the drive carrier, align and position the mounting holes on the left side of the drive over the mounting tabs located on the drive carrier side rail (See letter “A”)
3. Lower the other side of the drive into the carrier and press down until all mounting tabs lock in place.

2.3.9.5 2.5” SSD into a 3.5” Drive Carrier Assembly

The 3.5” drive blank can be used as a 2.5” SSD bracket.

Note: Due to degraded performance and reliability concerns, the use of the 3.5” drive blank as a 2.5” drive bracket is intended to support SSD type storage devices only. Installing a 2.5” hard disk drive into the 3.5” drive blank is not supported.

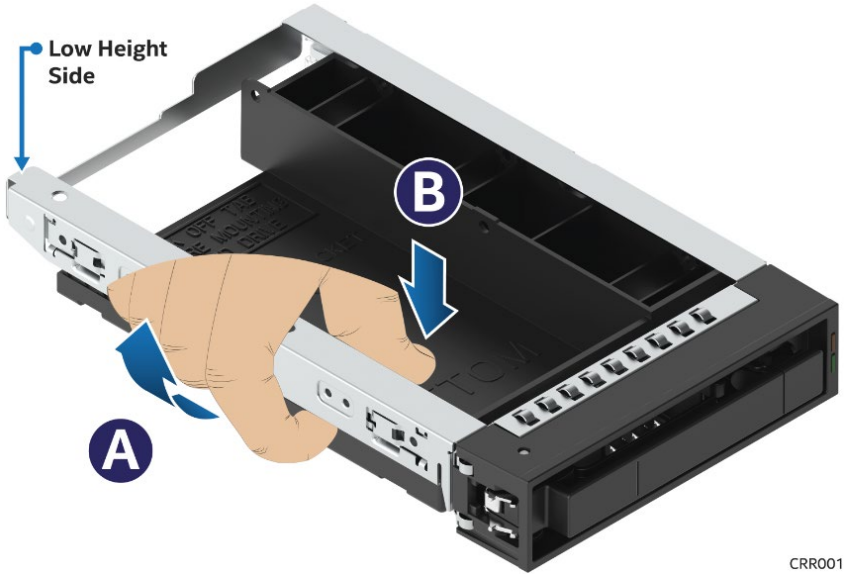


Figure 95. 3.5" Drive Carrier Assembly – Drive Blank Removal

1. Remove the drive blank from the carrier by holding the carrier assembly top side down in your right hand. Using your left hand, gently rotate the bottom edge of the left rail upwards (see Letter “A”) while at the same time pushing the drive blank down away from the carrier (see Letter “B”).

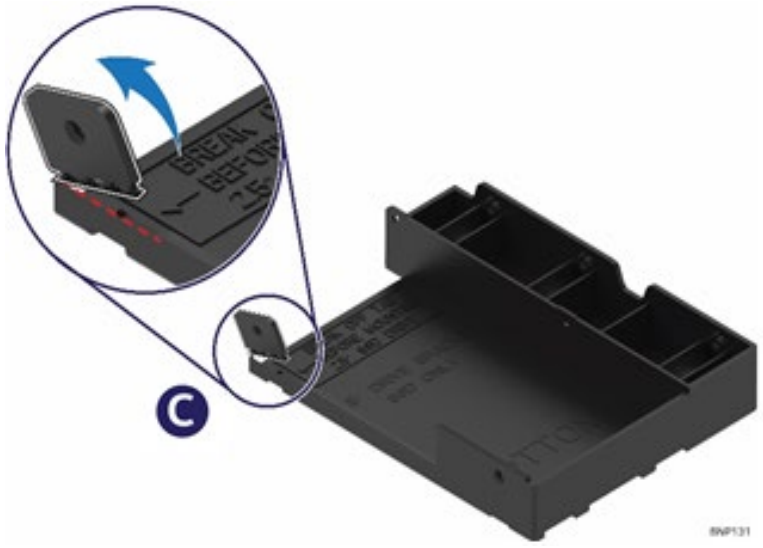


Figure 96. 3.5" Drive Carrier to 2.5” SSD Bracket – Tab Removal

2. Break off the small side tab from the side of the drive blank, making the drive blank into a 2.5” drive bracket (see Letter “C”).

Note: Once the side tab is removed, it cannot be re-attached to the drive blank

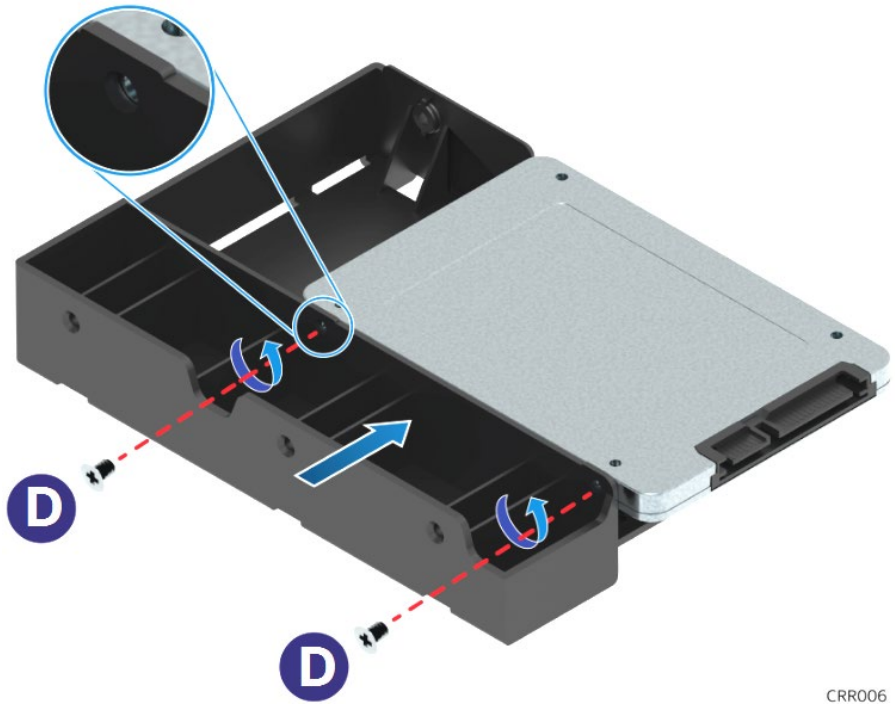


Figure 97. 3.5" Drive Carrier to 2.5" SSD Bracket – Mount SSD to Bracket

3. Mount and secure a 2.5” SSD to the drive bracket using two screws at the locations shown above (See letter “D”).

Note – New drive carriers with drive blanks installed, will include a bag containing four (4) mounting screws.

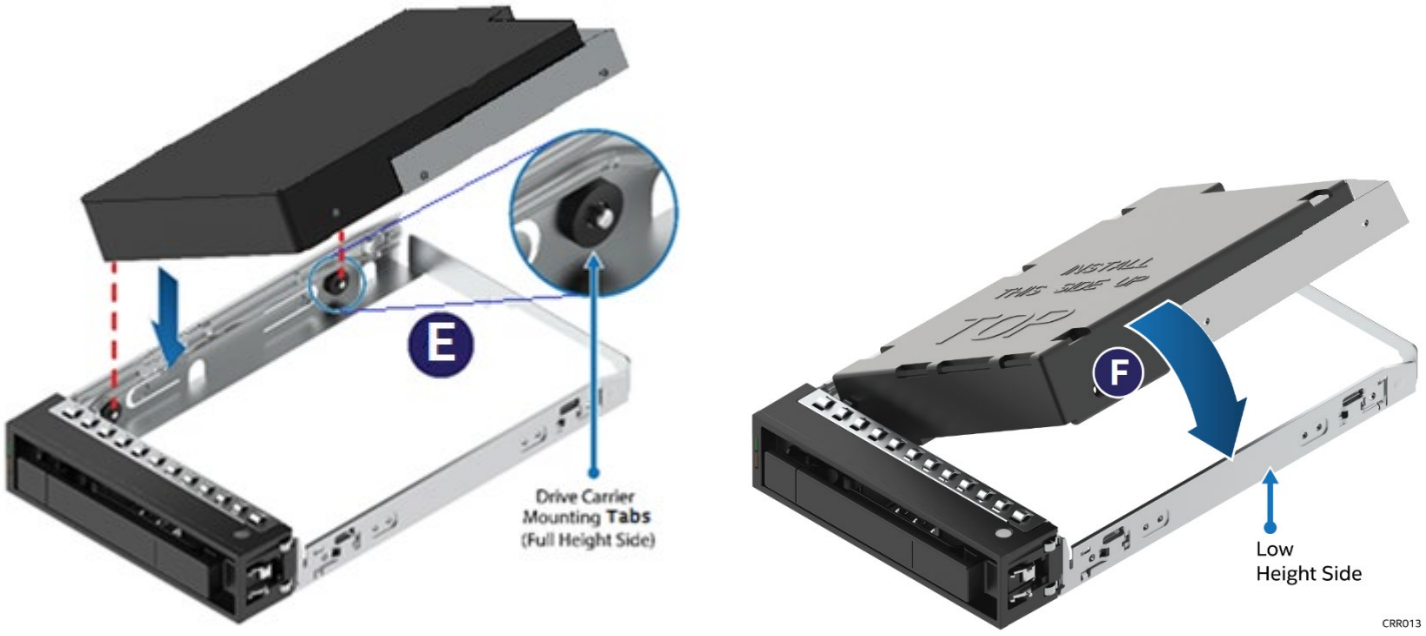


Figure 98. 3.5" Drive Carrier to 2.5” SSD Bracket – Mount Bracket Assembly to Carrier

4. With the rear drive connector positioned towards the back of the drive carrier, align and position the mounting holes on the left side of the drive bracket over the mounting tabs located on the drive carrier side rail (See letter “E”)

5. Lower the other side of the drive into the carrier and press down until all mounting tabs lock in place. (See letter ‘F’)
6. Turn the drive assembly over.

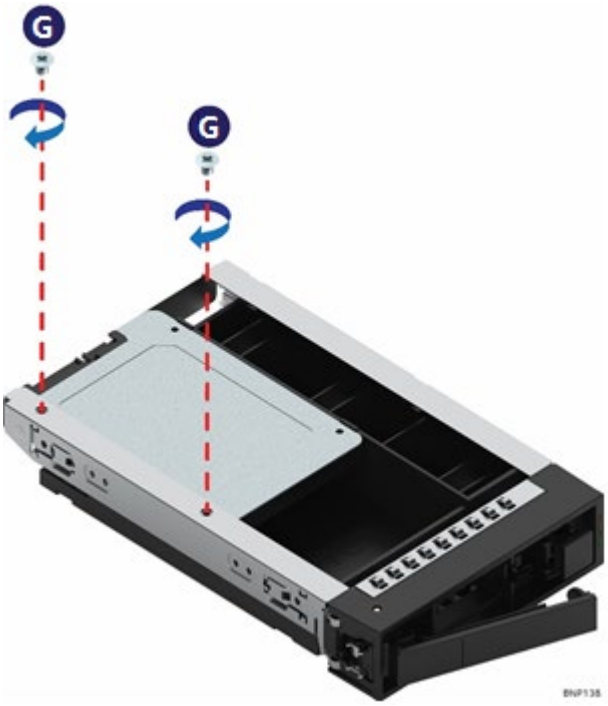


Figure 99. 3.5" Drive Carrier to 2.5" SSD Bracket – Secure SSD to Carrier

7. Using two (2) screws, secure the SSD to the carrier side rail (See letter “G”)

2.4 Converting the Pedestal Chassis to Rack Mount Chassis

2.4.1 Removing the Front Panel Module

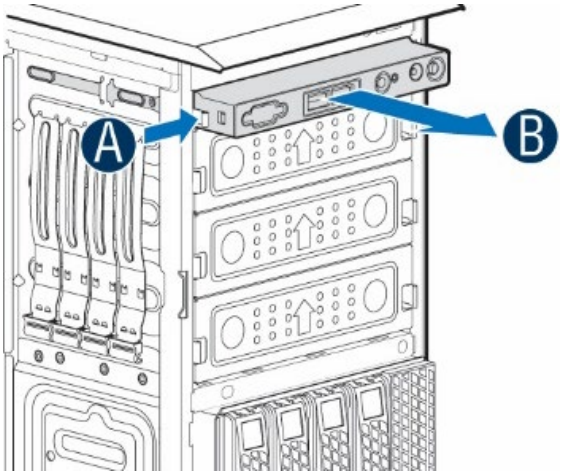


Figure 100. Removing the Front Panel Module

1. Press the clip (see letter A).
2. Pull the front panel module outside of the chassis (see letter B).

2.4.2 Removing the EMI Shields for 5.25" Drive Slots

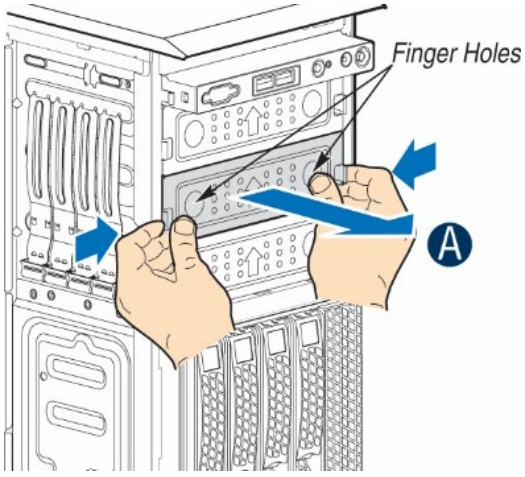


Figure 101. Removing the EMI Shields for 5.25" Drive Slots

1. Press the latches on the sides.
2. Pull the filler outside of the chassis (see letter A).

2.4.3 Removing the Cosmetic Top Board

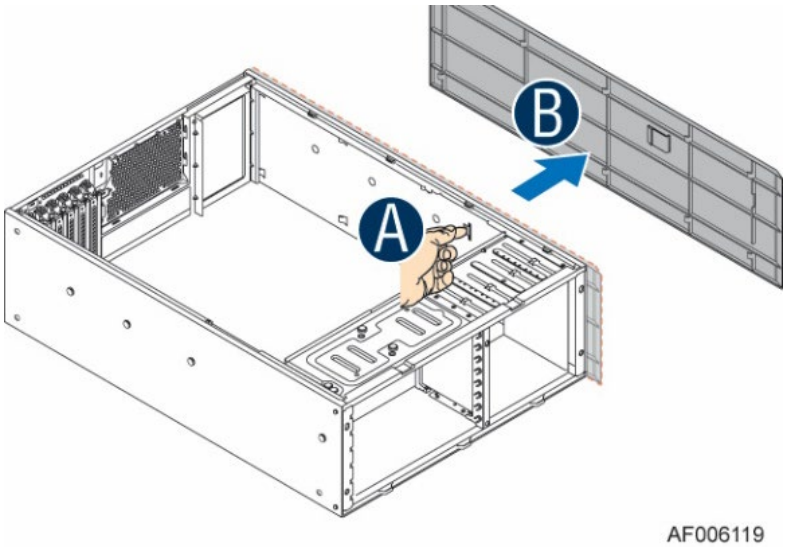


Figure 102. Removing the Cosmetic Top Board

1. Press the clip (see letter A).
2. Separate the top board from the chassis (see letter B).

2.4.4 Installing the Front Panel Module

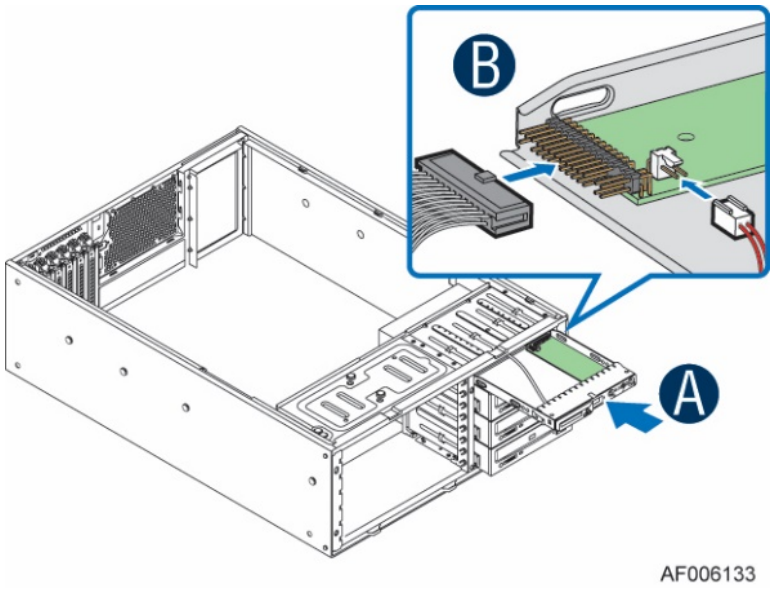


Figure 103. Installing the Front Panel Module

1. Slide the front panel on the bay (see letter A).
2. Connect the SSI 24/30 pin (depending on system configuration) and the power cables (see letter B).

2.4.5 Installing a 5.25" Drive (Optional)

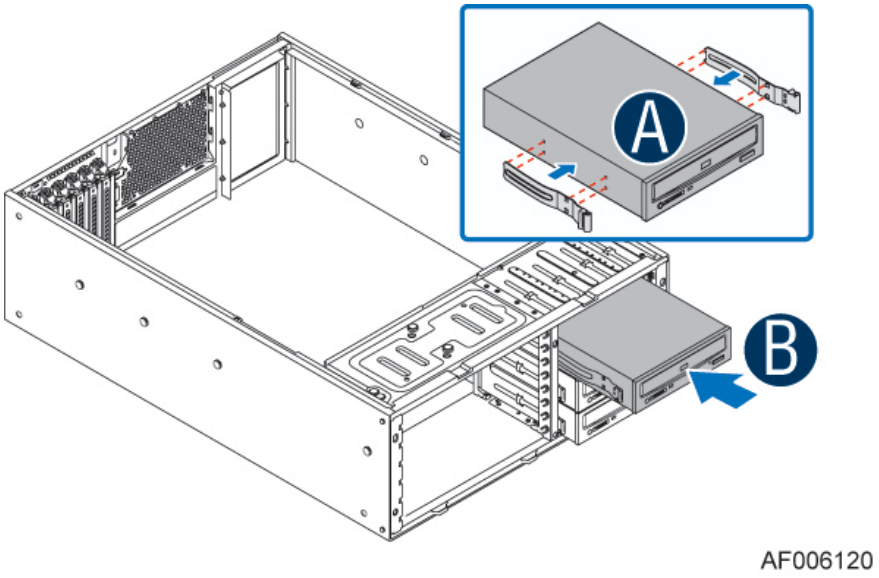


Figure 104. Installing a 5.25" Drive

1. Attach the slides (included with the chassis) to the optical drive by pressing the slides firmly into the side dimples on the optical drive (see letter A).
2. Insert the drive into the device bay until the slides lock into place (see letter B).

2.4.6 Installing the Rack Bezel Frame

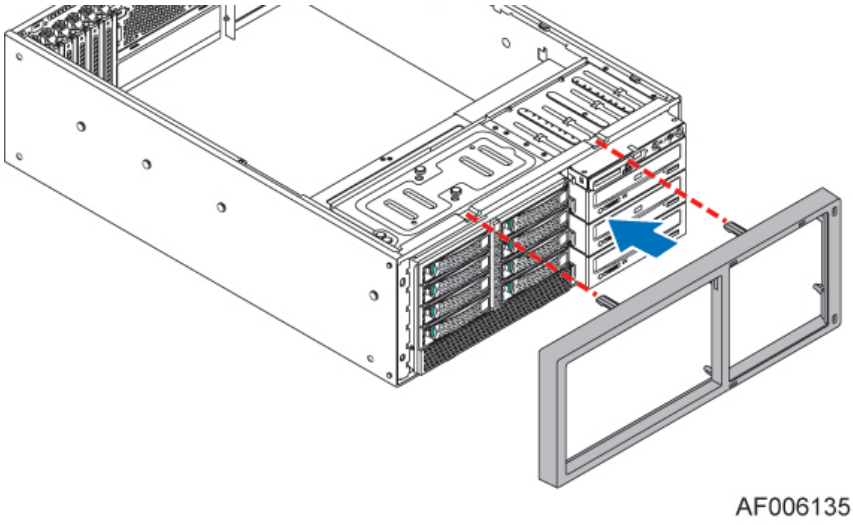


Figure 105. Installing the Rack Bezel Frame

1. Install the rack bezel frame aligning the holding pins on the bezel with the slots in the chassis.

Note: The rack bezel frame is different from the pedestal bezel frame.

2.4.7 Installing the Rack Mount Handles and Bezel

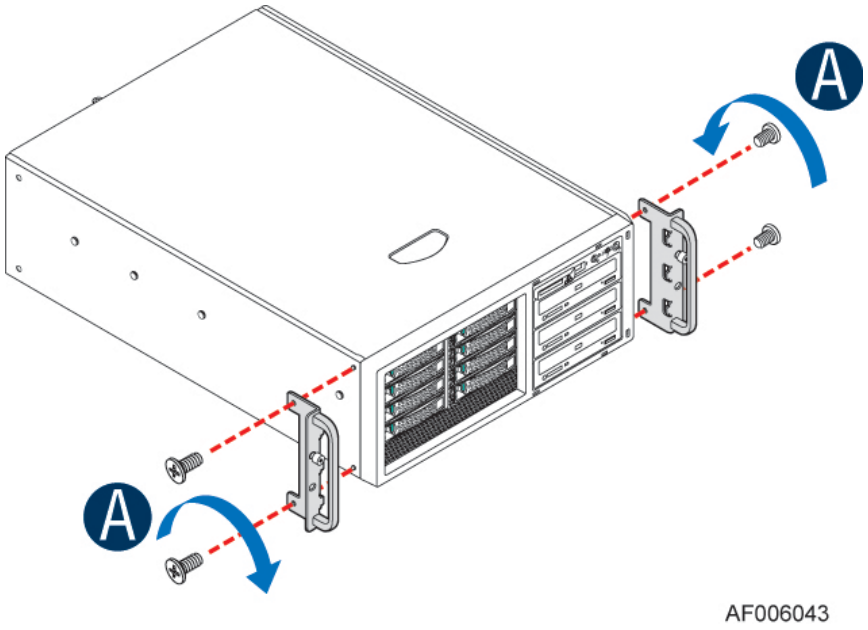


Figure 106. Installing the Rack Mount Handles

1. Align the screw holes in the rack handles with the screw holes in the chassis.
2. Secure the handles with screws (see letter A).

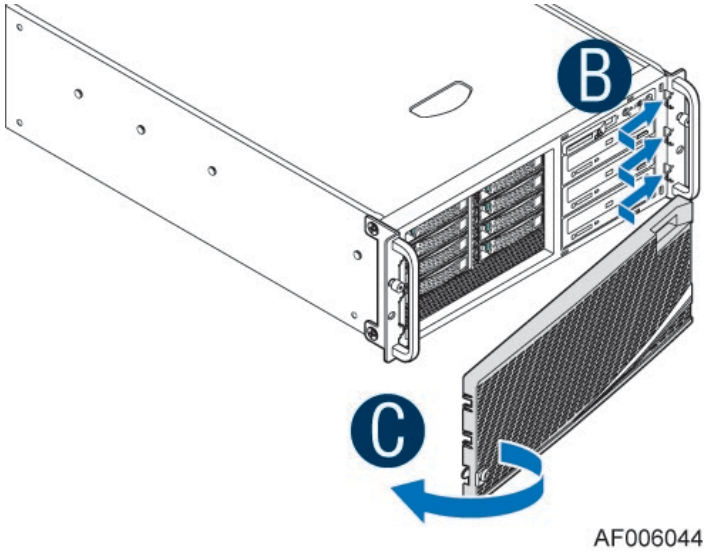


Figure 107. Installing the Rack Mount Bezel

3. Slide the right side of the rack bezel first, aligning its edge with the notches on the bezel frame (see letter B).
4. With the right side of the bezel in place, push the left side of the bezel until it snaps into place (see letter C).

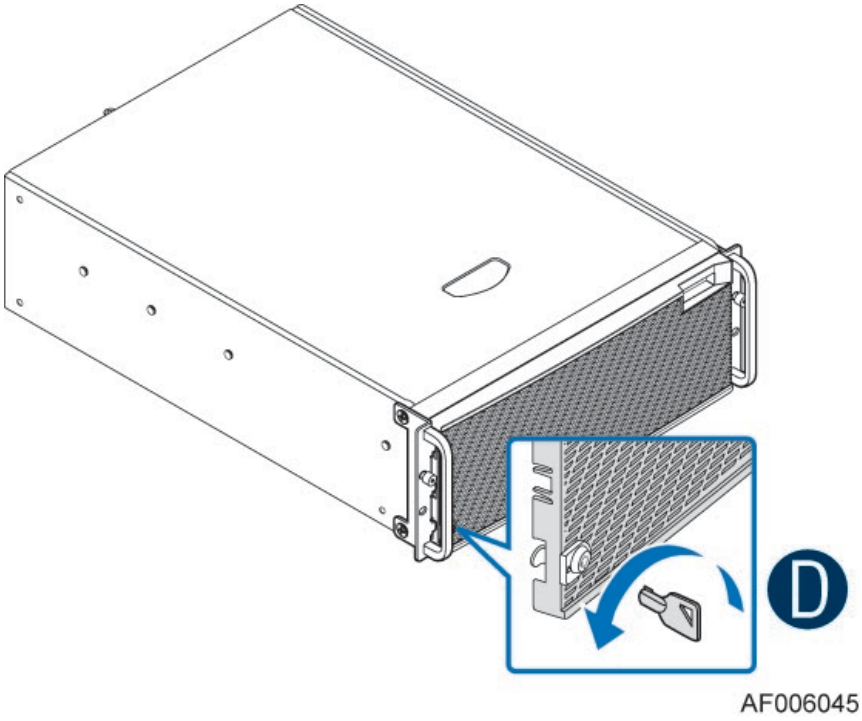


Figure 108. Locking the Rack Mount Bezel

5. Lock the front bezel by inserting the key that comes included with the rack bezel door kit (IPC-AUPBEZEL4UD) and turning it anti-clockwise.

3. Option and Accessory Kit Integration and Service

Purpose

This chapter provides instructions for the integration of system components within a server chassis that has the server board and other system components pre-installed. It includes installation instructions for supported system options and other available accessory option kits.

Before You Begin

Before working with a server product, observe the safety and ESD precautions found in the **Warnings** section at the beginning of this manual.

Tools and Supplies Needed

- Anti-static wrist strap and conductive foam pad (recommended)
- Phillips* (cross head) screwdriver (#2 bit)

System Reference

All references to left, right, front, top, and bottom assume you are facing the front of the chassis.

Cable Routing

See Appendix B for reference.

Instruction Format

Each procedure described in this section follows an “illustration-first” format. This format gives you the option to follow a quicker path to system integration by first seeing an illustration of the intended procedure. If necessary, you can then follow the step-by-step instructions that accompany each procedure.

3.1 Optical Drive – Installation and Removal

This section provides installation and removal instructions for an installed SATA optical drive for systems that support the option.

3.1.1 Optical Drive Installation

Note: The optical drive is NOT Hot-Swappable. Before removing or replacing the drive, first take the server out of service, turn off all peripheral devices connected to the system, turn off the system by pressing the power button, and unplug the power cord from the system or wall outlet.

1. Remove the chassis side cover by following the instructions in Section 1.2.1.

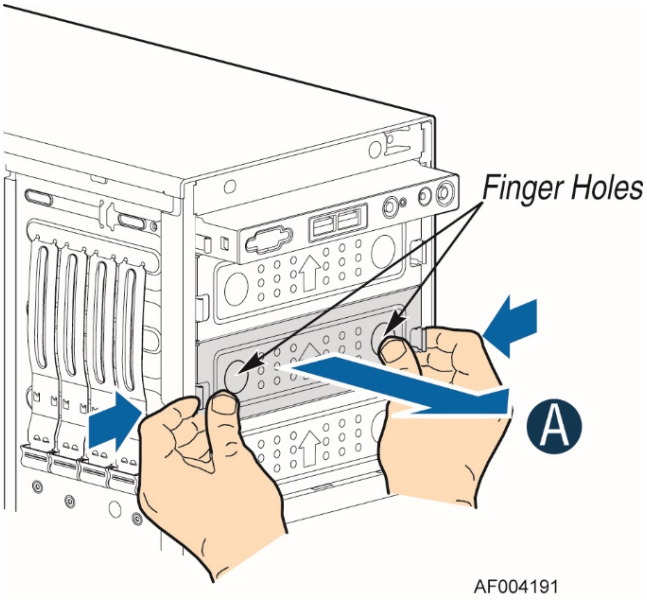


Figure 109. Removing the EMI Shield

2. Remove the EMI shield (see letter A).

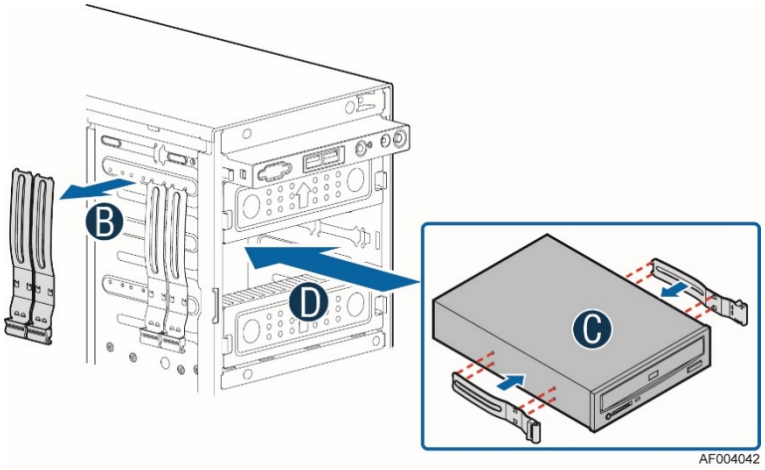


Figure 110. Installing the Optical Drive

3. Locate the slides from the chassis side (see letter B). Attach the slides to the optical drive by pressing the slides firmly into the side dimples on the optical drive (see letter C). slide the drive into the device bay until it snaps into place (see letter D).
4. Locate the power and data cables and connect them to the optical drive.

3.1.2 Optical Drive Removal

Note: The optical drive is NOT Hot-Swappable. Before removing or replacing the drive, first take the server out of service; turn off all peripheral devices connected to the system, turn off the system by pressing the power button, and unplug the power cord from the system or wall outlet. If you are not installing a device at this location, install a filler panel to maintain proper system cooling.

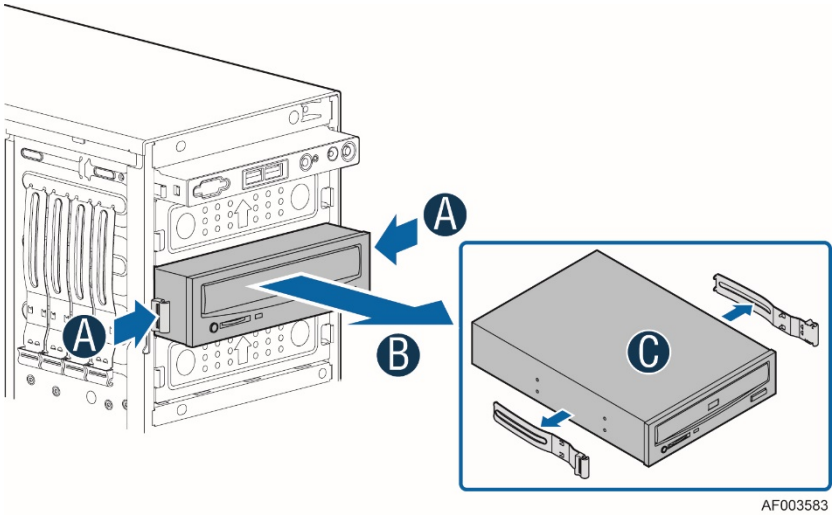


Figure 111. Removing the Optical Drive

1. Disconnect the power and data cables from the optical drive.
2. Press on the slide release latches (see letter A) and pull the optical drive or slide assembly from the chassis (see letter B). Remove the slides from the optical drive (see letter C).

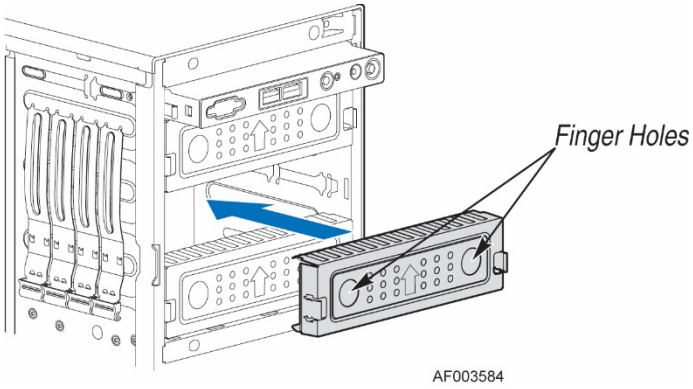
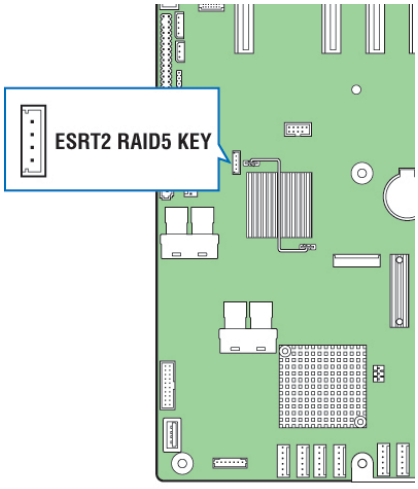


Figure 112. Re-inserting the Empty EMI Shield

3. If you do not replace an optical drive with another drive, reinsert an EMI shield into the chassis.

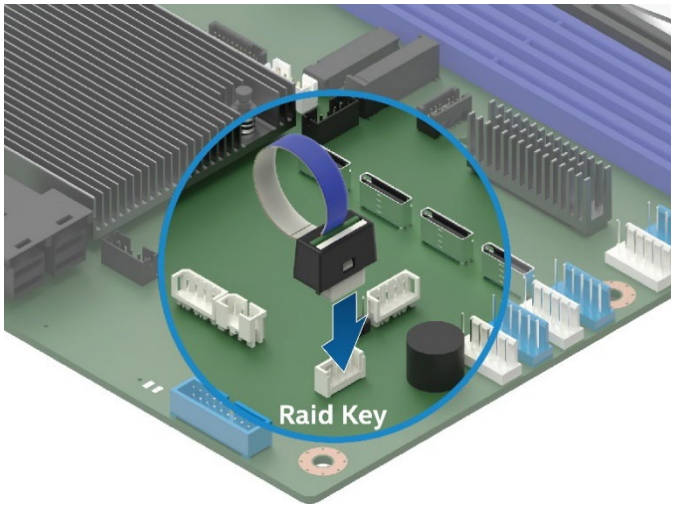
3.2 ESRT2 RAID5 Key – Installation / Removal

3.2.1 Installing the ESRT2 RAID 5 Key



S2600CW

Server Board Family



S2600ST

Server Board Family

Figure 113. ESRT2 RAID 5 Key Location

1. Remove the ESRT2 RAID 5 Key from its packaging.
2. Locate the key connector shown in Figure 105.
3. To install the key, place it over the connector and confirm the orientation of the key matches that of the connector.
4. Press the key down onto the connector.

3.2.2 Removing the ESRT2 RAID 5 Key

1. Power off the system and disconnect the power cable(s).
2. Remove the chassis side cover.
3. Using the key pull tab, pull the key up until it disengages from the connector.

3.3 Intel® VROC Key Installation/Removal (S2600ST Server Board Family Only)

3.3.1 Installing the Intel® VROC Key

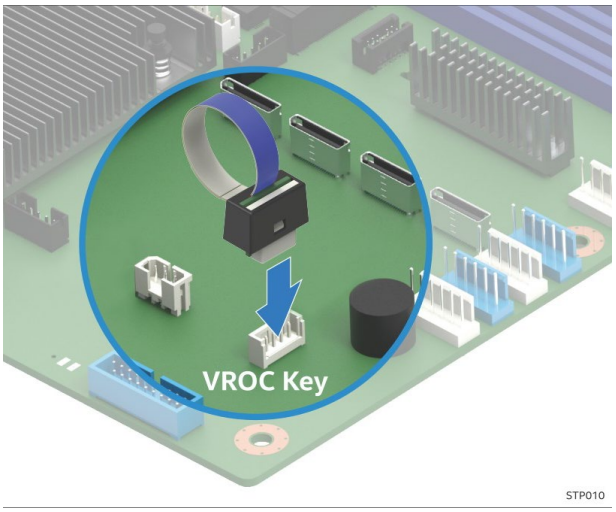


Figure 114. VROC Key Location

1. Remove the ESRT2 RAID 5 Key from its packaging.

2. Locate the key connector shown in Figure 107.
3. To install the key, place it over the connector and confirm the orientation of the key matches that of the connector.
4. Press the key down onto the connector.

3.3.2 Removing the Intel® VROC Key

1. Power off the system and disconnect the power cable(s).
2. Remove the chassis side cover.
3. Using the key pull tab, pull the key up until it disengages from the connector.

3.4 LSI IMR RAID5 Key – Installation / Removal (S2600CW Server Board Family Only)

3.4.1 Installing the LSI IMR RAID 5 Key

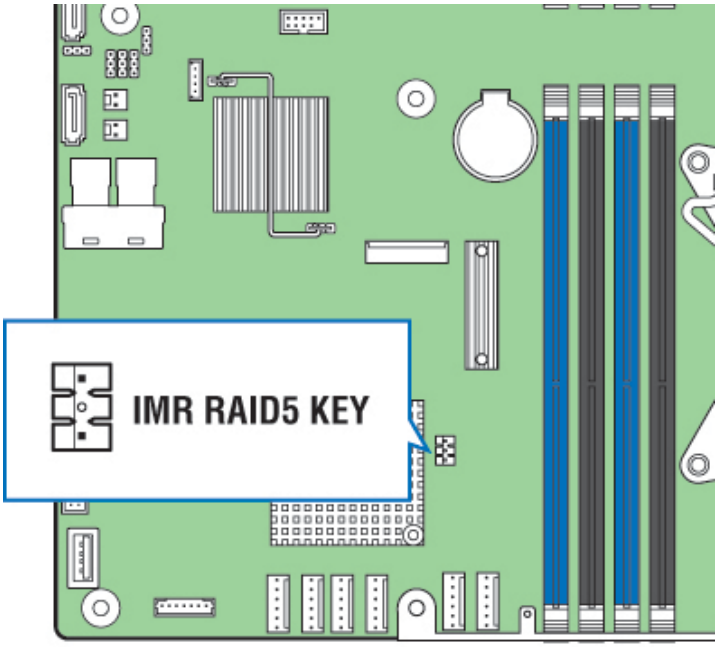


Figure 115. IMR RAID 5 Key Location

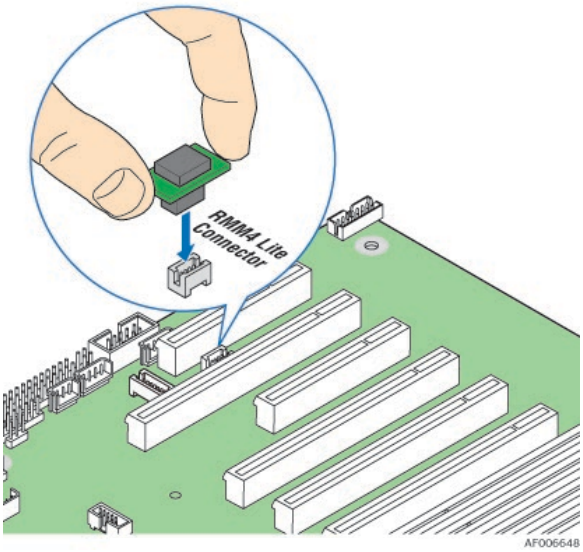
1. Remove the LSI IMR RAID 5 Key from its packaging.
2. Locate the key connector shown in Figure 108.
3. To install the key, place it over the connector and confirm the orientation of the key matches that of the connector.
4. Press the key down onto the connector.

3.4.2 Removing the LSI IMR RAID 5 Key

1. Power off the system and disconnect the power cable(s).
2. Remove the chassis side cover.
3. Using the key pull tab, pull the key up until it disengages from the connector.

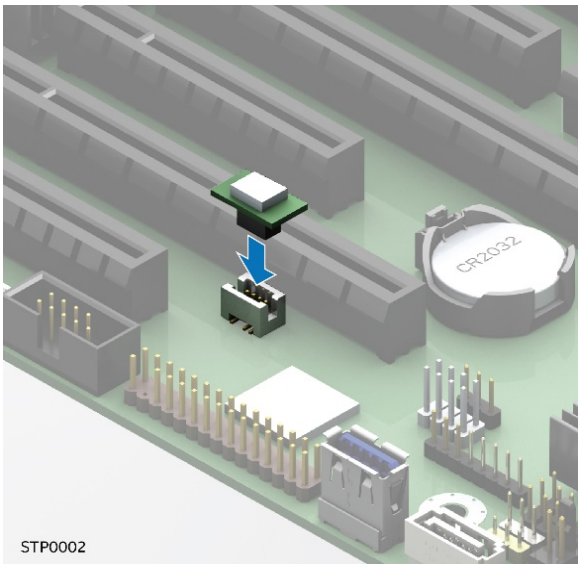
3.5 Intel® Remote Management Module 4 Lite Key – Installation / Removal

3.5.1 Intel® RMM4 Lite Key Installation



S2600CW

Server Board Family



S2600CW

Server Board Family

Figure 116. Installing the Intel® RMM4 Lite

1. Remove the Intel® RMM4 Lite key from its packaging.
2. Locate the Intel® RMM4 Lite connector on the server board between the first two PCIe* slots.
3. Place the Intel® RMM4 Lite key over the connector and match the orientation of the key to that of the connector.
4. Press the key down onto the connector.

3.5.2 Intel® RMM4 Lite Key Removal

1. Power off the system and disconnect the power cable(s).
2. Remove the chassis side cover.
3. Carefully grasp the key and pull it up until it disengages from the connector.

3.6 Trusted Platform Module (TPM) Installation

3.6.1 For S2600CW Server Board Family

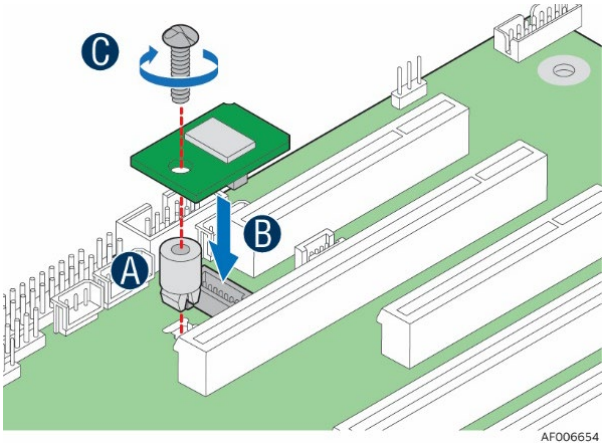


Figure 117. Platform Module (TPM) Installation – S2600CW Board Family

1. Locate the TPM module connector on the server board near the first PCIe* slot.
2. Install the stand-off to the server board mounting hole (see letter A).
3. Place the TPM module over the connector, match the orientation and press the key down onto the connector (see letter B).
4. Secure the TPM module to the stand-off with the screw (see letter C).

3.6.2 For S2600ST Server Board Family

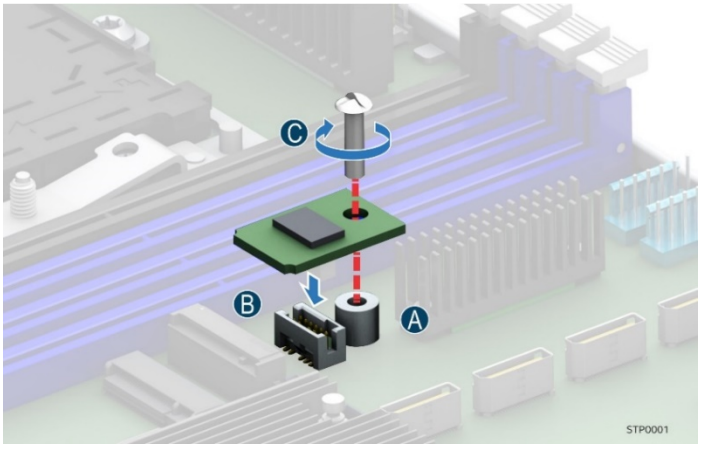


Figure 118. Trusted Platform Module (TPM) Installation – S2600ST Board Family

1. Locate the TPM module connector on the server board next to the DIMM slots.
2. Install the standoff to the server board mounting hole (see letter A).
3. Place the TPM module over the connector, match the orientation and press the key down onto the connector (see letter B).
4. Secure the TPM module to the stand-off with the screw (see letter C).

3.7 M.2 Storage Device Installation

3.7.1 For S2600CW Server Board Family

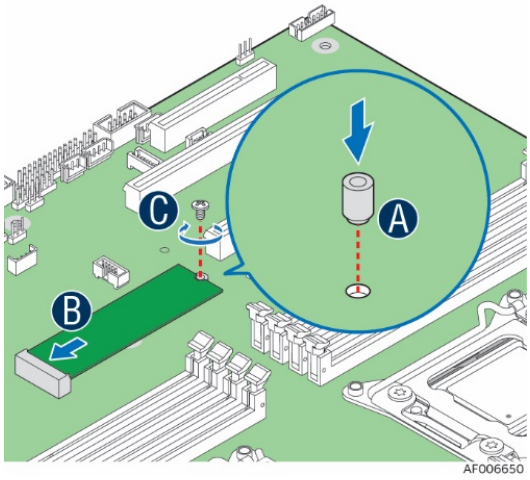


Figure 119. M.2 Storage Device Installation - S2600CW Board Family

1. Locate the M.2 connector on the server board near the DIMM slot.
2. Install the stand-off to the server board mounting hole (see letter A).
3. Slide the M.2 device into the connector (see letter B).
4. Secure the M.2 module to the stand-off with the screw (see letter C).

3.7.2 For S2600ST Server Board Family

The server board supports two M.2 storage devices in a stacked configuration secured by a bracket. The following illustration shows the location for both the connectors and the bracket.

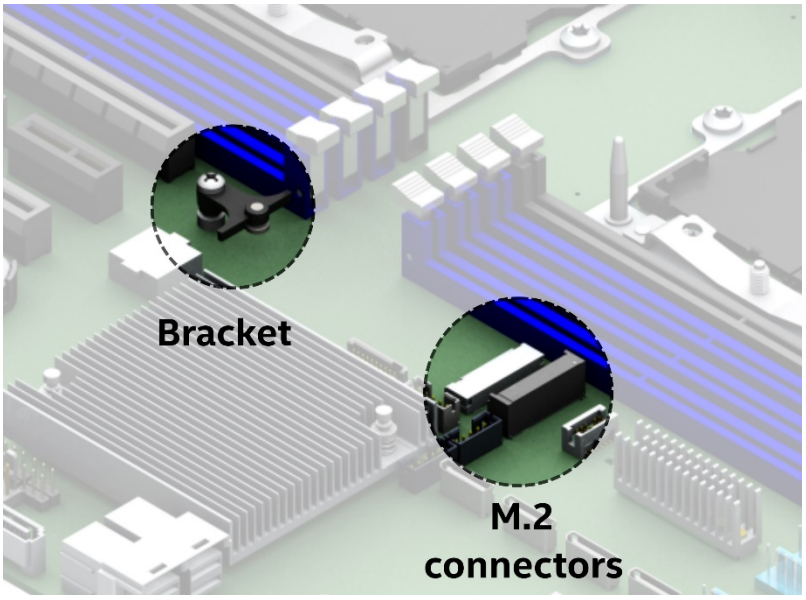


Figure 120. M.2 Storage Device Installation - S2600ST Board Family

3.7.2.1 Installing One M.2 Device (Single Configuration)

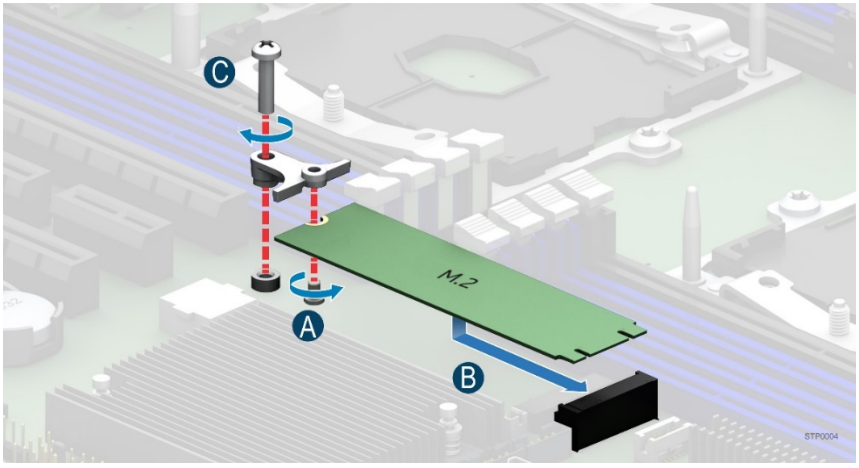


Figure 121. Installing One M.2 Storage Device – S2600ST Board Family

1. Locate the top M.2 connector on the server board near the DIMM slots.
2. Remove the bracket.
3. Attach the bracket to the M.2 device using the screw (see letter A).
4. Slide the M.2 device into the connector (see letter B).
5. Secure the M.2 device to the server board with the screw (see letter C).

3.7.2.2 Installing Two M.2 Devices (Dual Configuration)

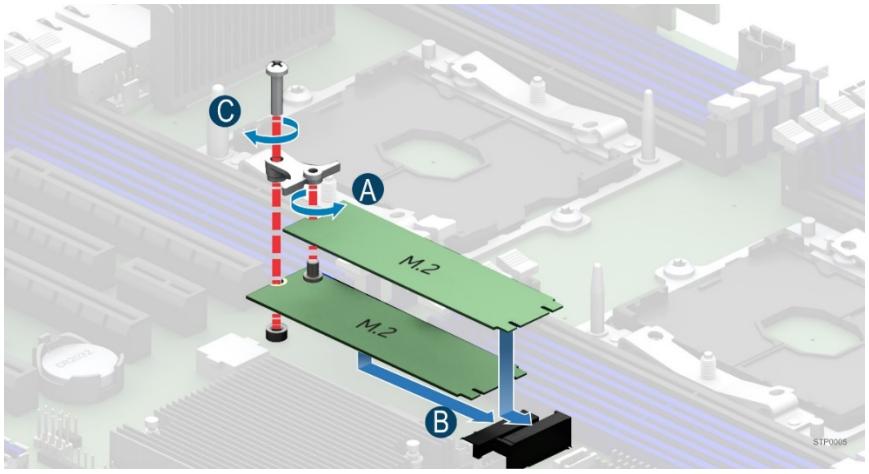


Figure 122. Installing Two M.2 Storage Devices (Dual Configuration)

1. Locate the M.2 connectors on the server board near the DIMM slots.
2. Remove the bracket.
3. Attach the bracket to the M.2 device that will be installed on the top connector using the screw (see letter A).
4. Slide the M.2 device that is to be installed on the bottom connector first and then the device to be installed on the top connector (see letter B).
5. Secure the M.2 devices to the server board with the screw (see letter C).

3.8 LAN Riser Installation (S2600ST Server Board Family Only)

The LAN Riser features two SFP+ ports and can be installed in any of the S2600ST models. A dedicated slot aligned with PCIe* Slot 5 is provided for the accessory card to communicate with the PCH and the BMC; therefore, a second processor is not required when the LAN riser is installed.

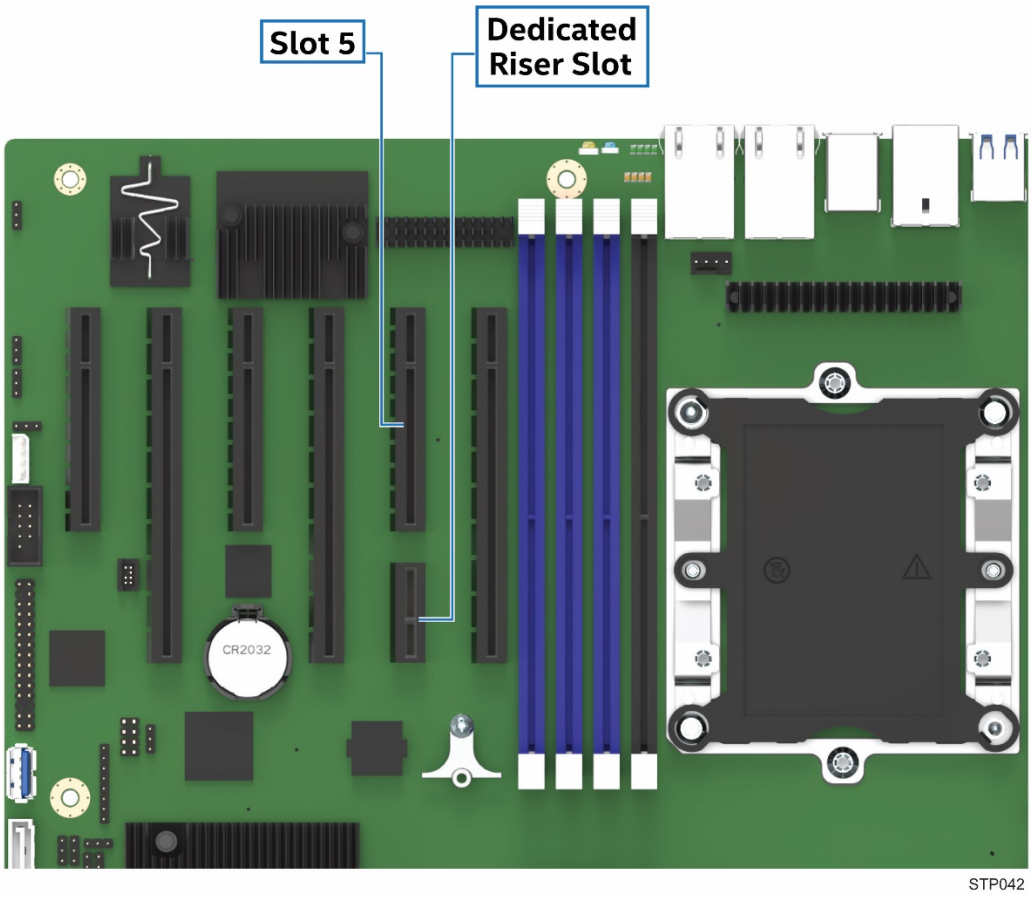


Figure 123. Dedicated Riser Slot Location

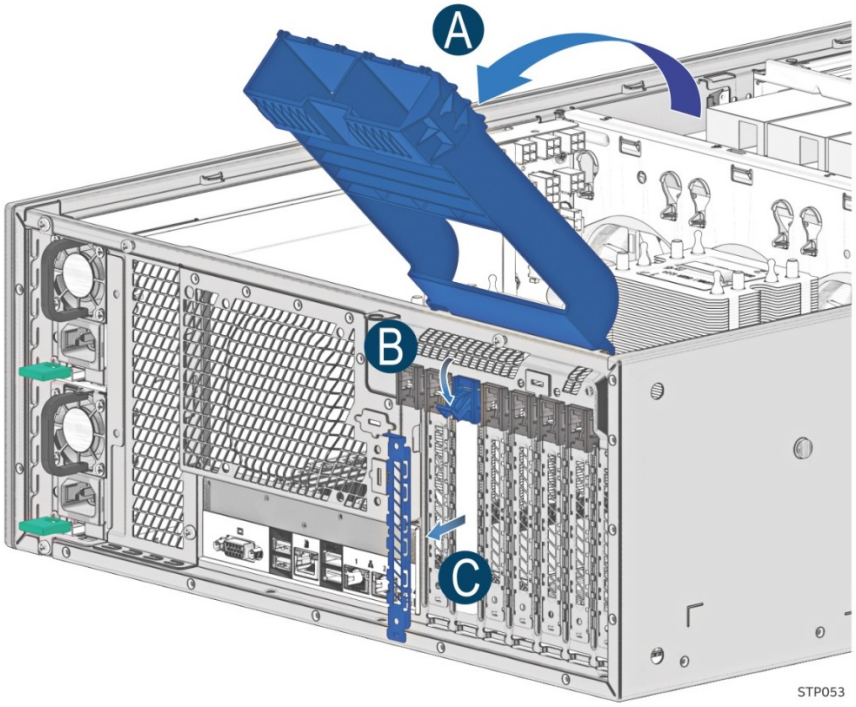


Figure 124. Installing the LAN Riser 1/3

To install the LAN Riser:

1. Remove the chassis side cover following instructions in Section 1.2.1.
2. Remove the air duct following instructions in Section 1.2.2.1.
3. Lift and turn the GPGPU retainer outwards (see letter A).
4. Press the PCIe* retainer down and outwards to put it in a released position (see letter B).
5. Locate the filler corresponding to Slot 5 on the server board and remove it (see letter C).

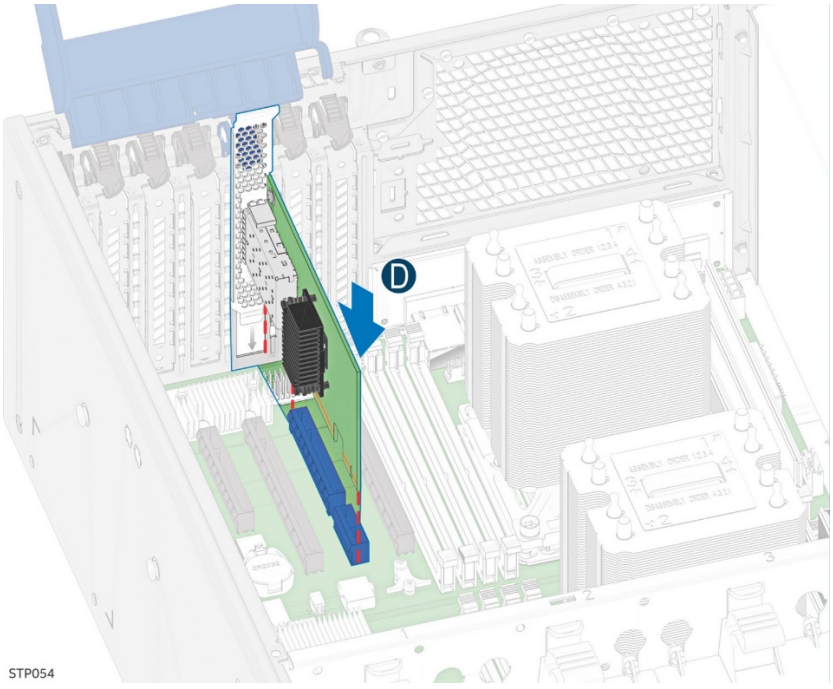


Figure 125. Installing the LAN Riser 2/3

6. Install the LAN riser in PCIe* Slot 5 on the server board (see letter D).

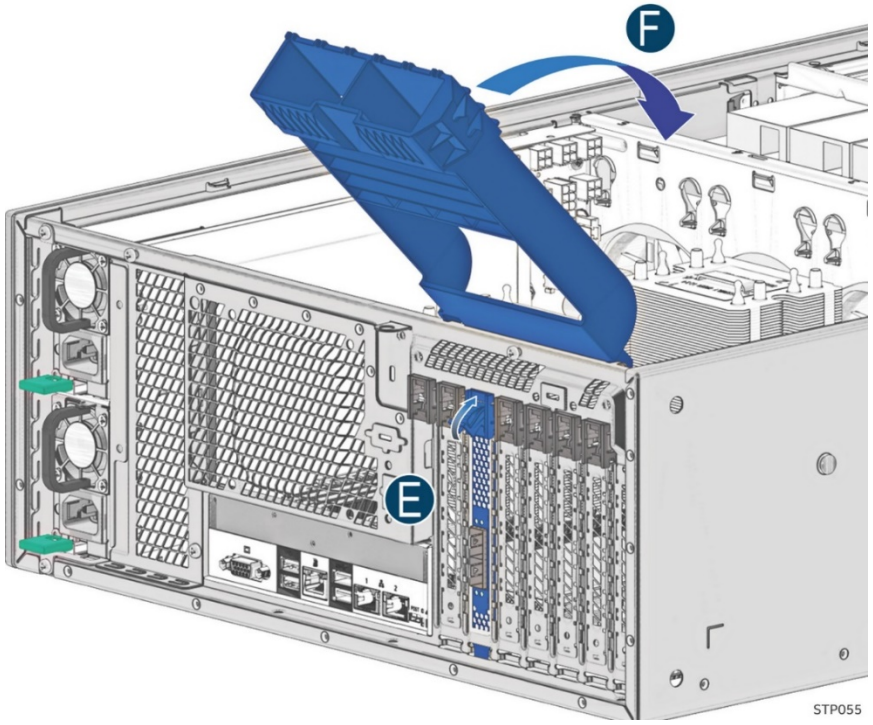


Figure 126. Installing the LAN Riser 3/3

7. Secure the LAN riser PCIe* retainer (see letter E).
8. Return the GPGPU retainer to its original position (see letter F).

3.9 BBU Bracket Installation / Removal

The Battery Backup Unit (BBU) bracket (**iPC – AXXSTBBUBRKT**) is an optional accessory kit that supports up to 3 Raid Maintenance Free Backup Units (RMFBU) and can be installed in any of the 5.25” device bays.

Refer to the Intel® Server Board S2600ST Product Family Configuration guide to see available RMFBU kits.

3.9.1 BBU Bracket Installation

1. Remove the chassis side cover by following the instructions in Section 1.2.1.
2. Remove the EMI shield in the drive bay by following instructions in section 3.1.1.

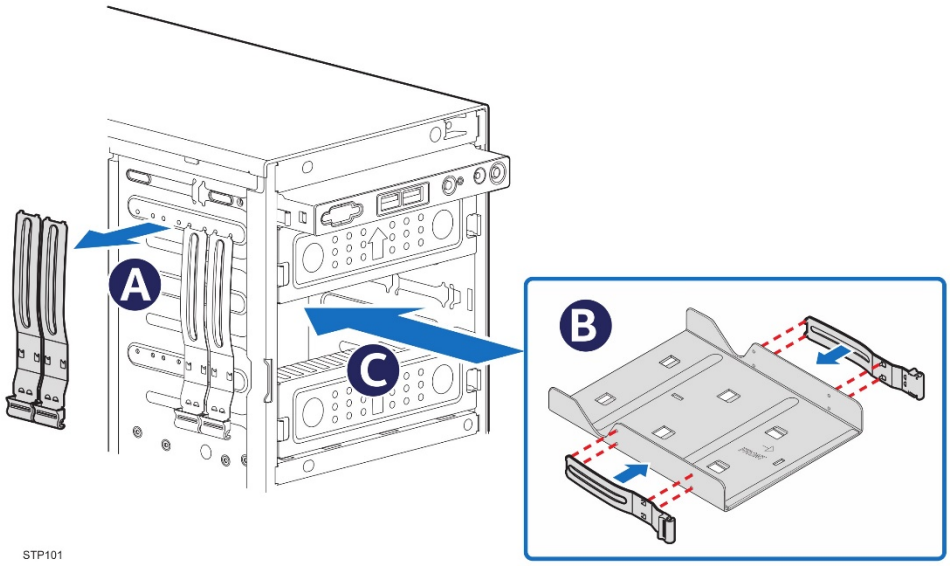


Figure 127. Installing the BBU Bracket

3. Locate the slides from the chassis side (see letter A). Attach the slides to the BBU bracket by pressing the slides firmly into the side dimples on the BBU bracket (see letter B). Insert the bracket/slide assembly into the device bay until the slides lock into place (see letter C).

3.9.2 BBU Bracket Removal

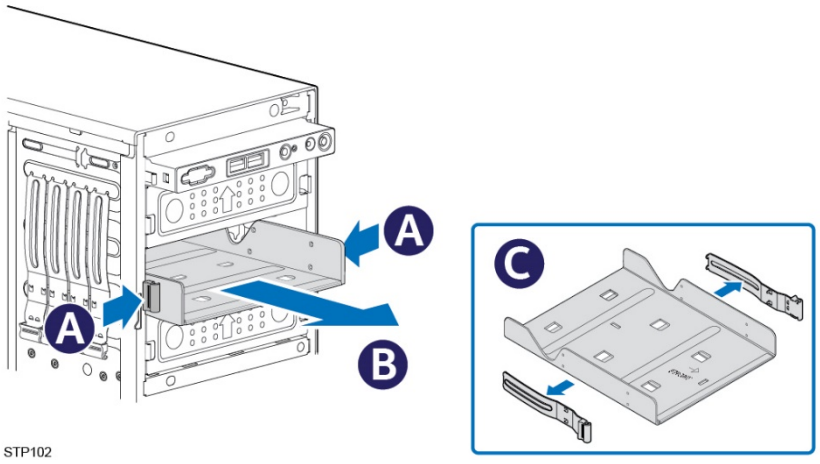


Figure 128. Removing the BBU Bracket

1. Press on the slide release latches (see letter A) and pull the BBU bracket or slide assembly from the chassis (see letter B). Remove the slides from the BBU bracket (see letter C).
2. If you do not replace BBU bracket with another one, reinsert an EMI shield into the chassis by following instructions in section 3.1.2.

3.10 Connecting the Aux Power-In Cable (S2600ST Server Board Family and P4304XXMUXX chassis only)

By default, the server board can provide up to 180 W of total power to the six PCIe* add-in card slots. To support power requirements above this limit, the server board includes one white 2x2-pin power-in connector that can be used to deliver up to an additional 216 W of additional power to the server board. On the Intel chassis **P4304XXMUXX**, this connector is cabled to a matching 2x2 connector on the power distribution board. A power budget for the complete system should be performed to determine how much supplemental power is available to support any high power add-in cards. This cable is included on the accessory kit **iPC – AXXSTPHIKIT**.

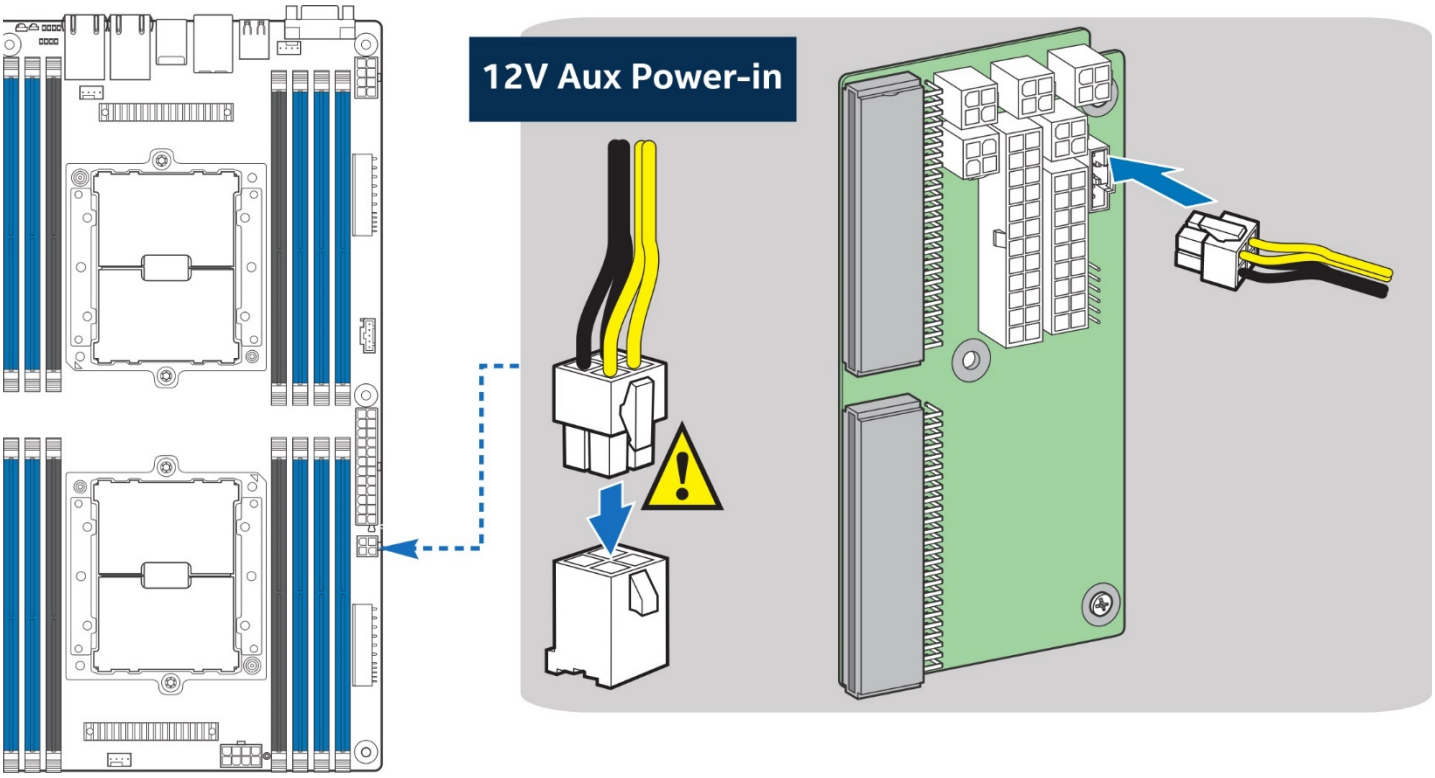


Figure 129. Connecting Aux Power-In Cable – Only for S2600ST Server Board Family

1. Connect one of the ends of the 2x2 pin cable connector to the server board close to the server edge (silkscreen labeled “AUX_PWR_IN”).
2. Connect the other end of the cable to any of the 2x2 pin cable connectors available on the power distribution board in the chassis.

4. System Software Updates and Configuration

4.1 Updating the System Software Stack

The system requires a software stack to operate. This includes a BIOS, BMC firmware, ME firmware, and FRU and SDR data. A default software stack is loaded during the system manufacturing process. However, it may not be the latest available. For best operation and system reliability, it is highly recommended to update the system software stack to the latest available. Download the latest system software stack at this Intel web site:

http://downloadcenter.intel.com

At a minimum, after the initial configuration, you **MUST** update the system's FRU and SDR data to ensure that the embedded platform management sub-system is configured properly. Update the system's FRU and SDR data by running the **FRUSDR Utility**. Properly loaded FRU and SDR data allows platform management to monitor the appropriate system sensors used to determine proper system cooling, best performance, and accurate error reporting. The **FRUSDR Utility** is included in the platform's System Update Package (SUP) which can be downloaded from the Intel web site. The SUP includes full system update instructions.

4.2 Using the BIOS Setup Utility

This section describes how to access and navigate the embedded **<F2> BIOS Setup Utility**. This utility can be used to view and configure system settings that determine how the server operates.

4.2.1 Entering BIOS Setup

To enter the BIOS Setup using a keyboard (or emulated keyboard), press the <F2> function key during boot time when the OEM or **Intel Logo Screen** or the **POST Diagnostic Screen** is displayed.

Notes:

At intial system power-on, a USB Keyboard is not functional until the system initializes the USB controller during the power-on self-test (POST) process. When the USB controller is initialized, the system beeps once. Only after that time will the key strokes from a USB Keyboard be recognized allowing for access into the **<F2> BIOS Setup Utility**.

The following message is displayed on the Diagnostic Screen or under the **Quiet Boot Logo Screen**:

"Press <F2> to enter setup, <F6> Boot Menu, <F12> Network Boot"

Press the <F2> key so that the system eventually loads the **BIOS Setup Utility** and displays the **BIOS Setup Main Menu Screen**.

Should serious system errors occur during the POST process, the regular system boot stops, and the system loads the **BIOS Setup Utility** and displays the **Error Manager Screen**. The **Error Manager Screen** lists and provides information about the specific boot errors detected.

4.2.2 No Access to the BIOS Setup Utility

If the **BIOS Setup Utility** is not accessible by pressing the <F2> key or another access method, you may need to restore the BIOS default settings.

4.2.3 Navigating the BIOS Setup Utility

The **BIOS Setup Utility** consists of several menu screens, each holding either informational fields and/or configurable system setup options. The bottom right portion of each menu screen provides a list of commands used to navigate through the **Setup Utility**. These commands are displayed at all times. If no Administrator or User passwords have been set, all available settings are configurable and can be set by anyone with access to the **BIOS Setup Utility**.

NOTE: System settings that are not configurable because of security settings or configuration limit are greyed out and not accessible.

Table 3. BIOS Setup: Keyboard Command Bar

Key	Option	Description
<Enter>	Execute Command	The <Enter> key is used to activate submenus when the selected feature is a submenu or to display a pick list if a selected option has a value field or to select a subfield for multi-valued features like time and date. If a pick list is displayed, press the <Enter> key to select the currently highlighted item, undo the pick list, and return the focus to the parent menu.
<Esc>	Exit	The <Esc> key provides a mechanism for backing out of any field. When you press the <Esc> key while editing any field or selecting features of a menu, you re-enter the parent menu. Press the <ESC> key from any sub-menu to re-enter the parent menu. When you press the <Esc> key in any major menu, the Exit Confirmation window is displayed and you are asked whether changes can be discarded. If you select “No” and press the <Enter> key or if you press the <Esc> key, you return to your original location without affecting any existing settings. If you select “Yes” and press the <Enter> key, you exit the setup, and the BIOS returns to the main **System Options Menu** screen.
↑	Select Item	The UP arrow is used to select the previous value in a pick list or the previous option in a menu item's option list. Activate the selected item by pressing the <Enter> key.
↓	Select Item	The DOWN arrow is used to select the next value in a menu item’s option list or a value field’s pick list. Activate the selected item by pressing the <Enter> key.
← →	Select Menu	The LEFT and RIGHT arrow keys are used to move between the major menu pages. The keys have no effect when a sub-menu or pick list is displayed.
<Tab>	Select Field	The <Tab> key is used to move between fields. For example, you can use <Tab> to move from hours to minutes in the Time item in the main menu.
–	Change Value	The minus key on the keypad is used to change the value of the current item to the previous value. Press this key to scroll through the values in the associated pick list without displaying the full list.
+	Change Value	The plus key on the keypad is used to change the value of the current menu item to the next value. Press this key to scroll through the values in the associated pick list without displaying the full list. On 106-key Japanese keyboards, the plus key has a different scan code than the plus key on the other keyboards but has the same effect.

Key	Option	Description
<F9>	Setup Defaults	Press the <F9> key to display: Load Optimized Defaults? Yes No If "Yes" is highlighted and you press <Enter>, all setup fields are set to their default values. If "No" is highlighted and you press <Enter>, or, if you press the <Esc> key, you return to your location before pressing <F9> without affecting existing field values.
<F10>	Save and Exit	Press the <F10> key to display: Save configuration and reset? Yes No If "Yes" is highlighted and you press <Enter> all changes are saved and you exit the Setup. If "No" is highlighted and you press <Enter> or the <Esc> key, you return to your location before pressing <F10> without affecting any existing values.

5. System Packaging Assembly Instructions

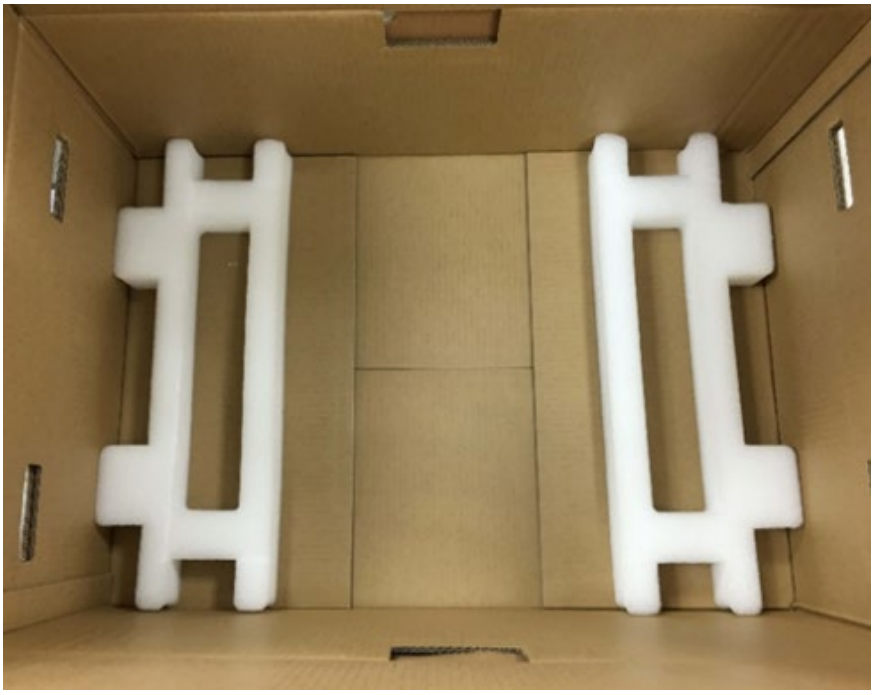
The original Intel packaging in which the server system was delivered, is designed to provide protection to a fully configured system and was tested to meet ISTA (International Safe Transit Association) Test Procedure 3A (2008). The packaging was also designed to be re-used for shipment after system integration has been completed.

The original packaging includes two layers of boxes – an inner box and the outer shipping box, and various protective inner packaging components. The boxes and packaging components are designed to function together as a protective packaging system. When reused, all of the original packaging material must be used, including both boxes and each inner packaging component. In addition, all inner packaging components MUST be reinstalled in the proper location to ensure adequate protection of the system for subsequent shipment.

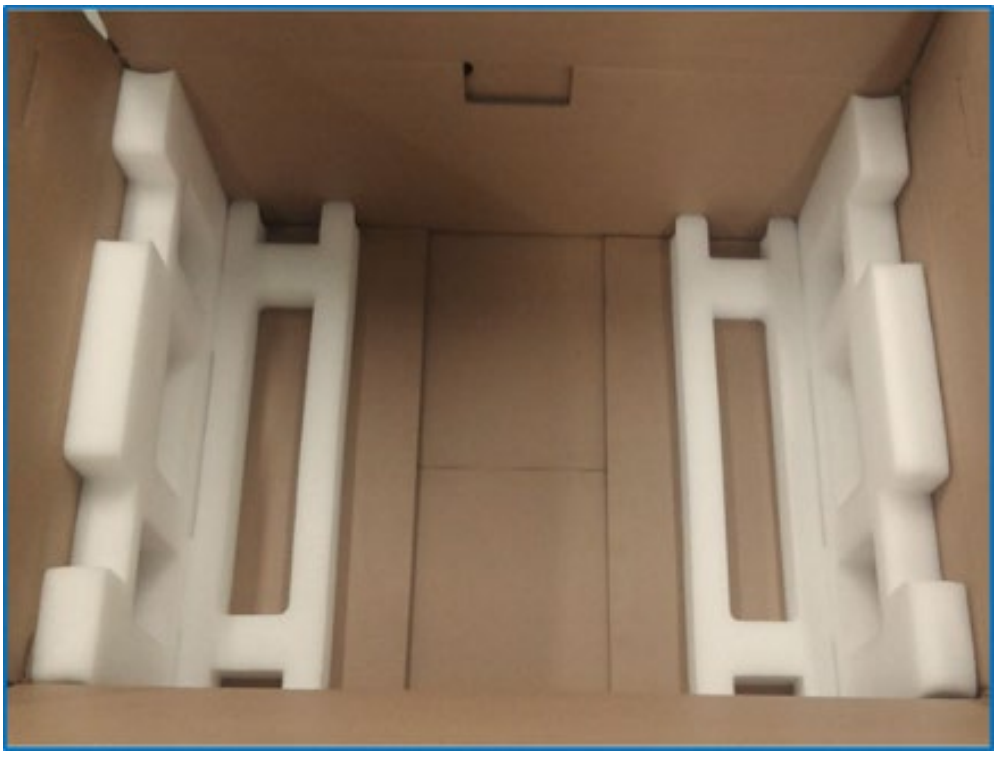
Note: The design of the inner packaging components does not prevent improper placement within the packaging assembly. There is only one correct packaging assembly that will allow the package to meet the ISTA (International Safe Transit Association) Test Procedure 3A (2008) limits.

Failure to follow the specified packaging assembly instructions may result in damage to the system during shipment.

1. Place two foam inserts into the inner box as shown. Note foam insert orientation.

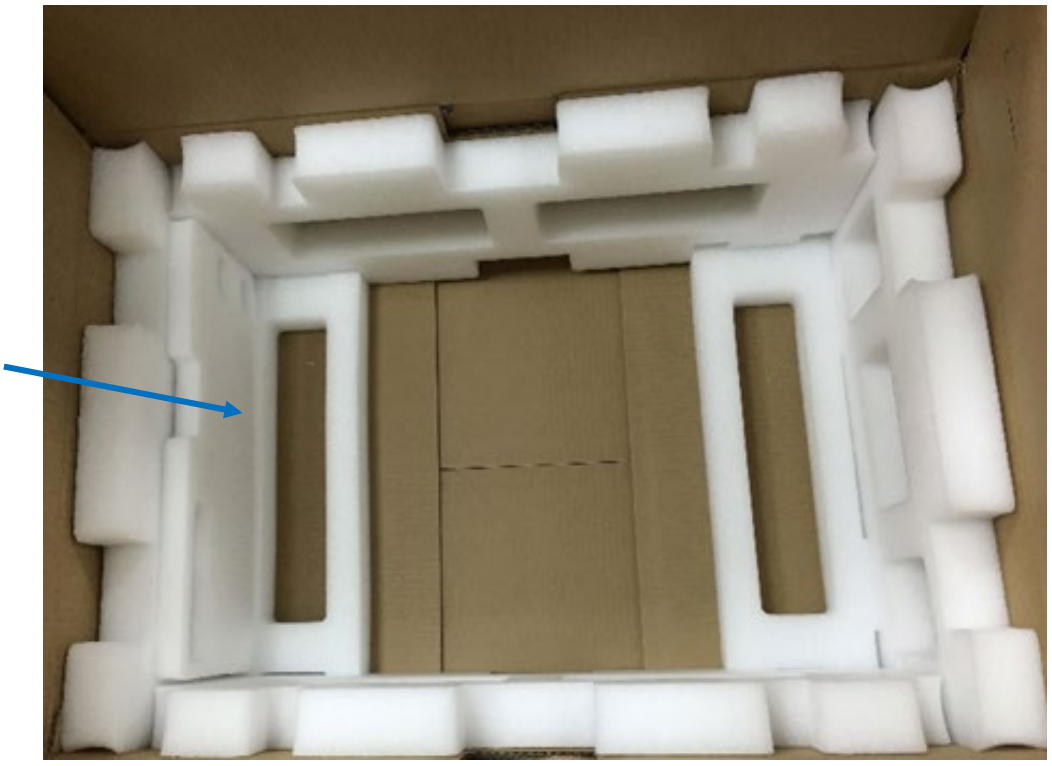


2. Place the two pieces of side wall foam as shown.



3. Place two more pieces of side wall foam as shown.

4. Place the foam insert as shown.



5. Carefully place the system into the shipping bag and tape the bag shut.
6. Carefully lower the system into the inner shipping box as shown.

7. Fold the top flaps of the inner box closed, end flaps first, followed by side flaps.

8. Fold the top flaps of the outer box closed, end flaps first, followed by the side flaps.
9. Tape the outer box using an H-pattern. Across the center first, followed by both ends.

6. System Service - System Features Overview

This chapter provides a reference to locate and identify the features associated with the Intel® Server Board S2600CW and S2600ST product families, and Intel® Server Chassis P4304XXMFEN2/P4304XXMUXX product family.

Obtain additional information for this product family from the following Intel documents which can be downloaded from the following Intel web site: http://www.intel.com/support

- Intel® Server Board S2600CW Technical Product Specification
- Intel® Server Board S2600ST Technical Product Specification
- Intel® Server Chassis P4304XXMFEN2/P4304XXMUXX Technical Product Specification

6.1 System Feature Reference Diagrams

This section gives a high-level overview of the Intel® Server Chassis P4304XXMFEN2/P4304XXMUXX product family. It provides illustrations and diagrams showing the location of important components, features, and connections found throughout the server chassis.

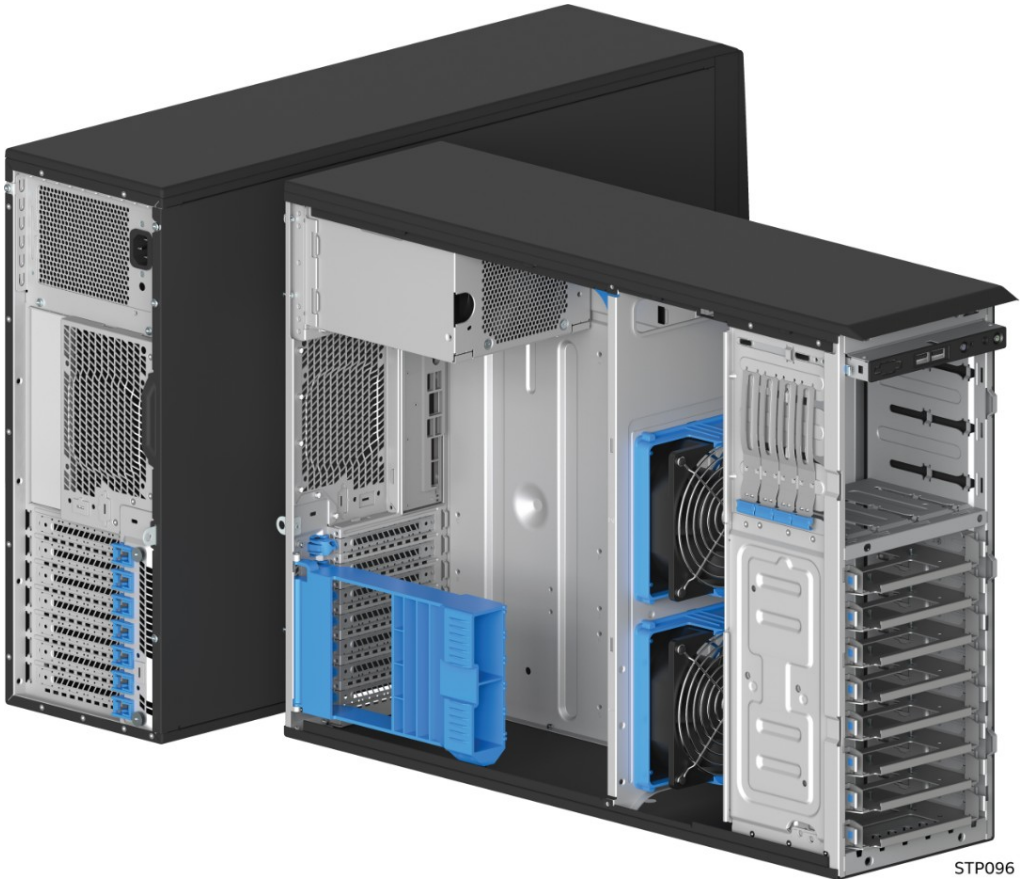


Figure 130. Intel® Server Chassis P4304XXMFEN2 Overview

Figure 131. Intel® Server Chassis P4304XXMUXX Overview

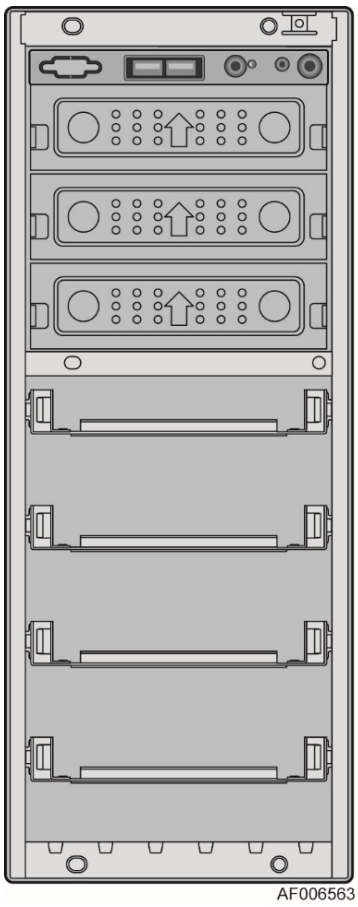
6.1.1 Front Drive Bay Options

- For S2600CW board family:

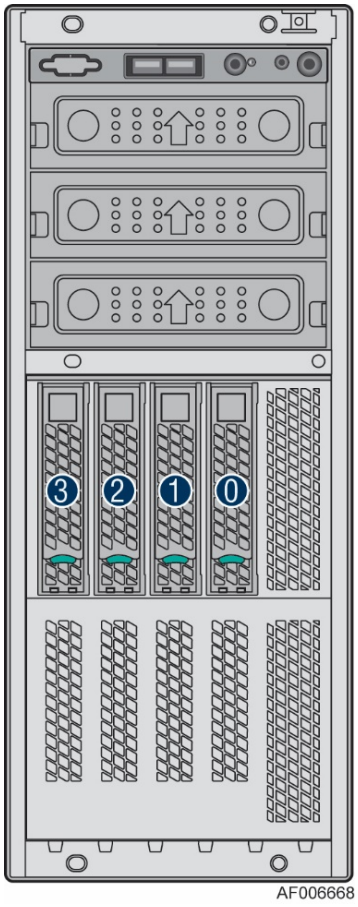
Basic Configuration: Four 3.5” fixed drive trays are the default chassis configuration.

Upgrade Option: One 3.5” drive bay with Hot-Swap backplane. Supports up to 4x3.5” drives.

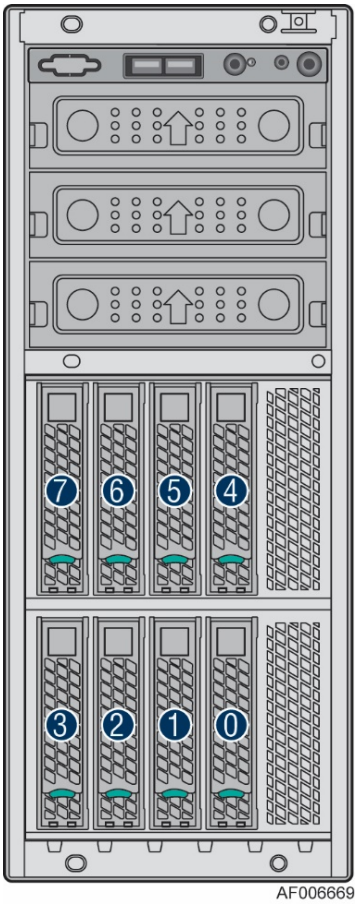
Upgrade Option: Two 3.5” drive bays with Hot-Swap backplanes. Support up to 8x3.5 drives.



Basic Configuration

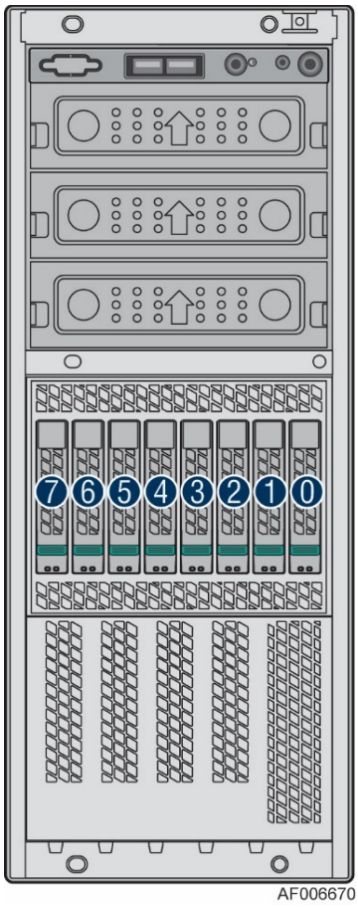


4x3.5 Upgrade Option

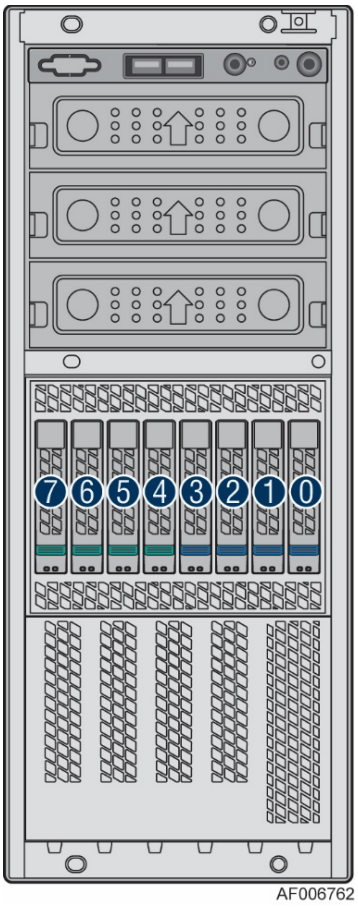


8x3.5 Upgrade Option

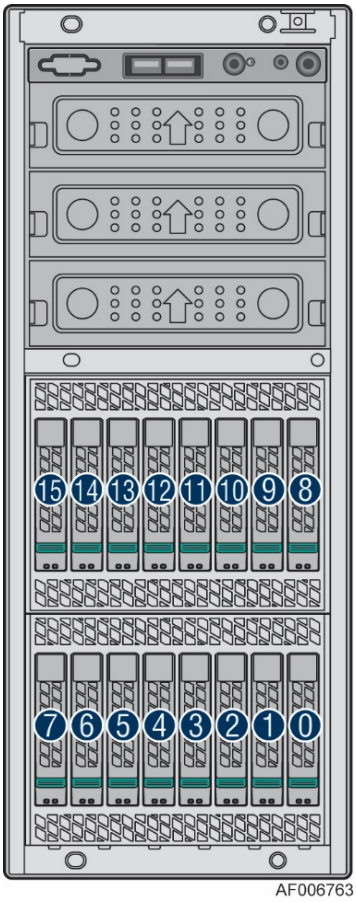
- **Upgrade Option:** One 2.5” drive bay with Hot-Swap backplane. Supports up to 8x2.5” drives (SAS/SATA).
- **Upgrade Option:** One 2.5” drive bay with Hot-Swap backplane. Supports up to 4x2.5” drives (SAS/SATA) with green latch for Hot-Swap support and 4x2.5 PCIe* SSDs (NVMe) with blue latch (Hot-Swap not supported) for Intel® S2600CW Server Board Product Family only.)
- **Upgrade Option:** Two optional 2.5” drive bay with Hot-Swap backplanes supporting up to 16x2.5” drives (SAS/SATA).



8x2.5 Upgrade Option



8x2.5 NVMe Combo Upgrade Option



16x2.5 Upgrade Option

- For S2600ST board family:

Basic Configuration: Four 3.5” fixed drive trays are the default chassis configuration.

Upgrade Option: One 3.5” drive bay with Hot-Swap backplane. Supports up to 4x3.5” drives.

Upgrade Option: Two 3.5” drive bays with Hot-Swap backplanes. Support up to 8x3.5 drives.

Basic Configuration

4x3.5 Upgrade Option

8x3.5 Upgrade Option

- **Upgrade Option:** One optional 2.5” drive bay with Hot-Swap backplane. Supports up to 8x2.5” drives (SAS/SATA/NVMe).
- **Upgrade Option:** One 2.5” drive bay with dual port Hot-Swap backplane. Supports up to 8x2.5” SAS drives.
- **Upgrade Option:** Two optional 2.5” drive bay with Hot-Swap backplanes supporting up to 16x2.5” drives (SAS/SATA).

8x2.5 Upgrade Option

16x2.5 Upgrade Option

6.1.2 Control Panel Features

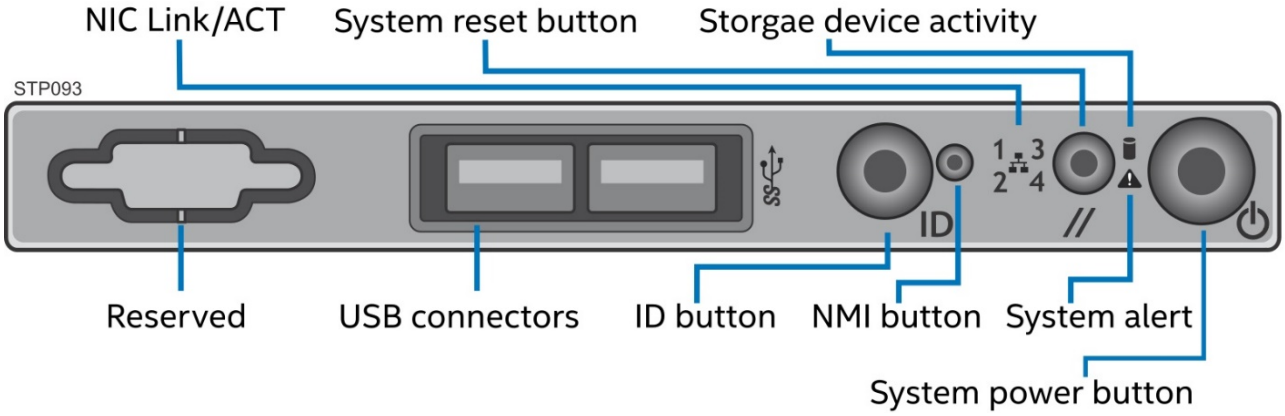


Figure 132. P4304XXMFEN2/P4304XXMUXX Front Panel

6.1.3 Back Panel Features

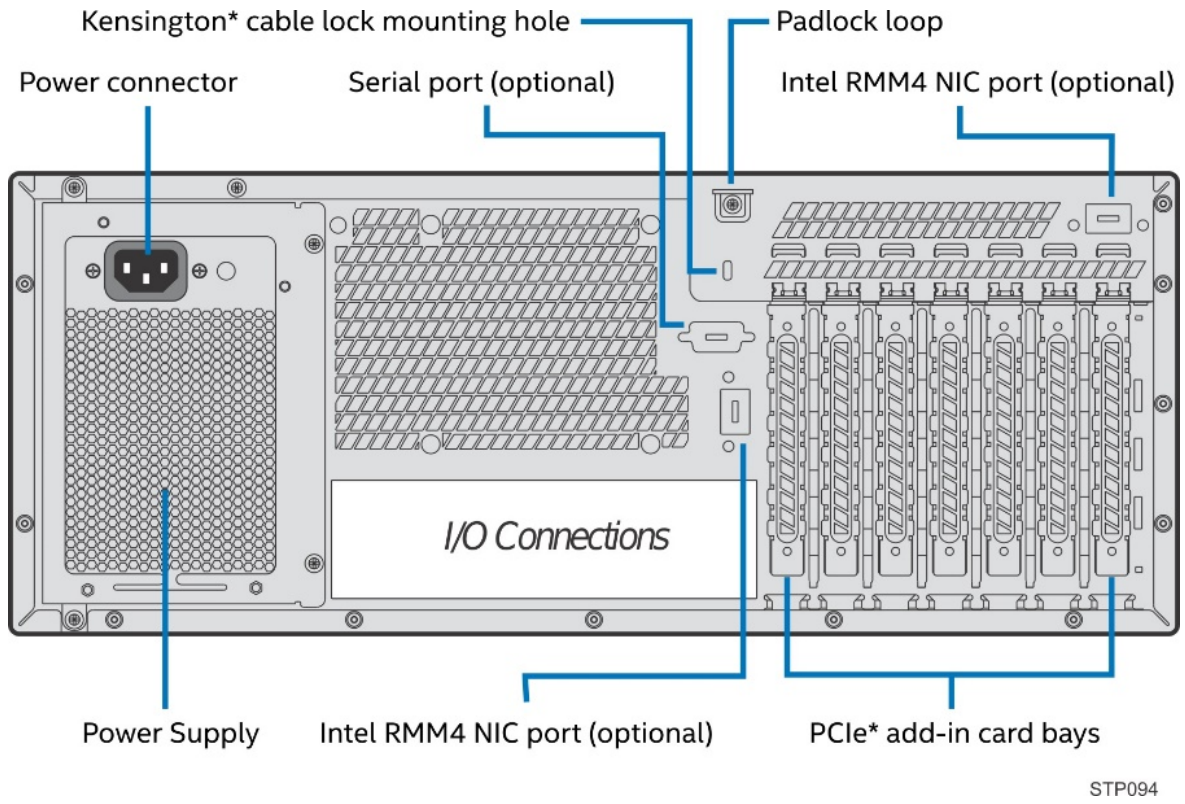


Figure 133. P4304XXMFEN2 Back Panel

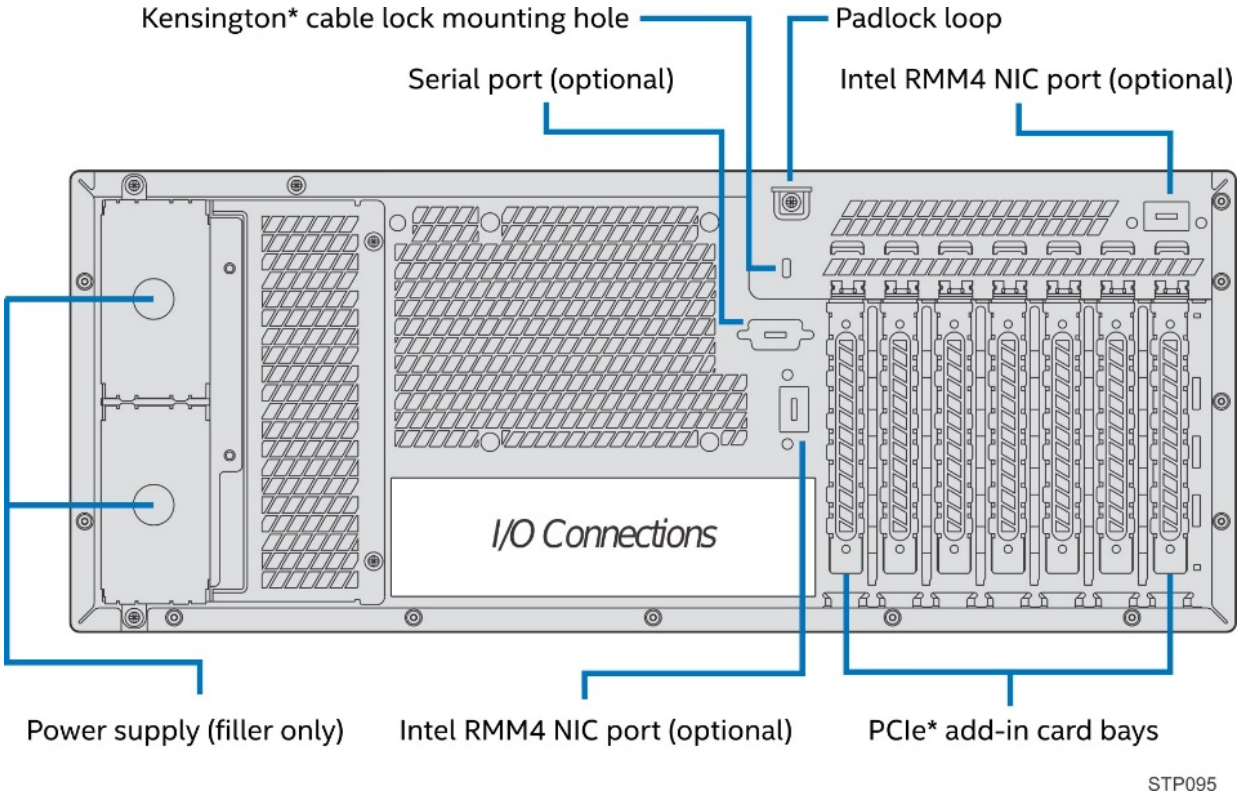


Figure 134. P4304XXMUXX Back Panel

6.1.4 Server Board Features

6.1.4.1 S2600CW Server Board Family

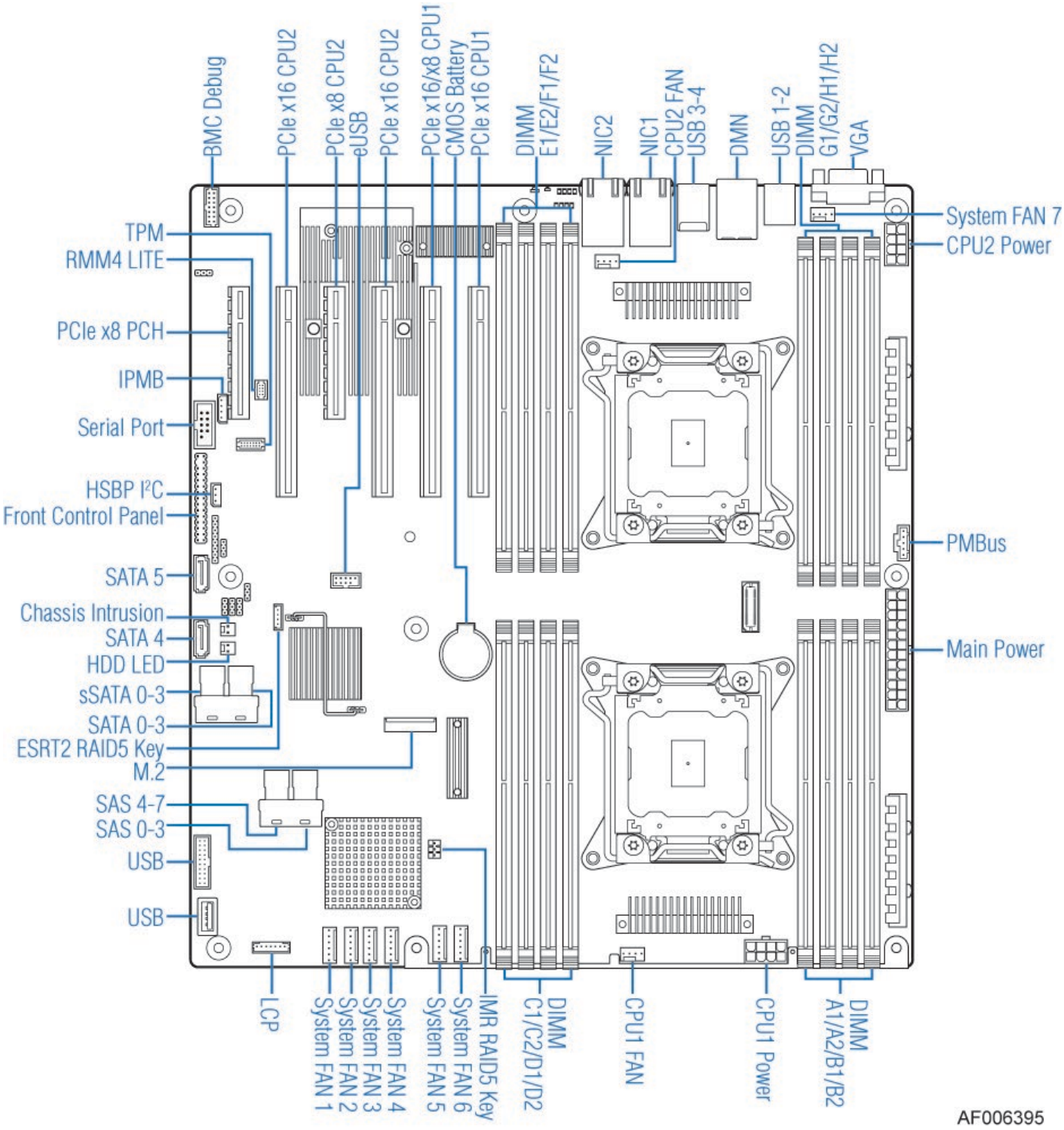
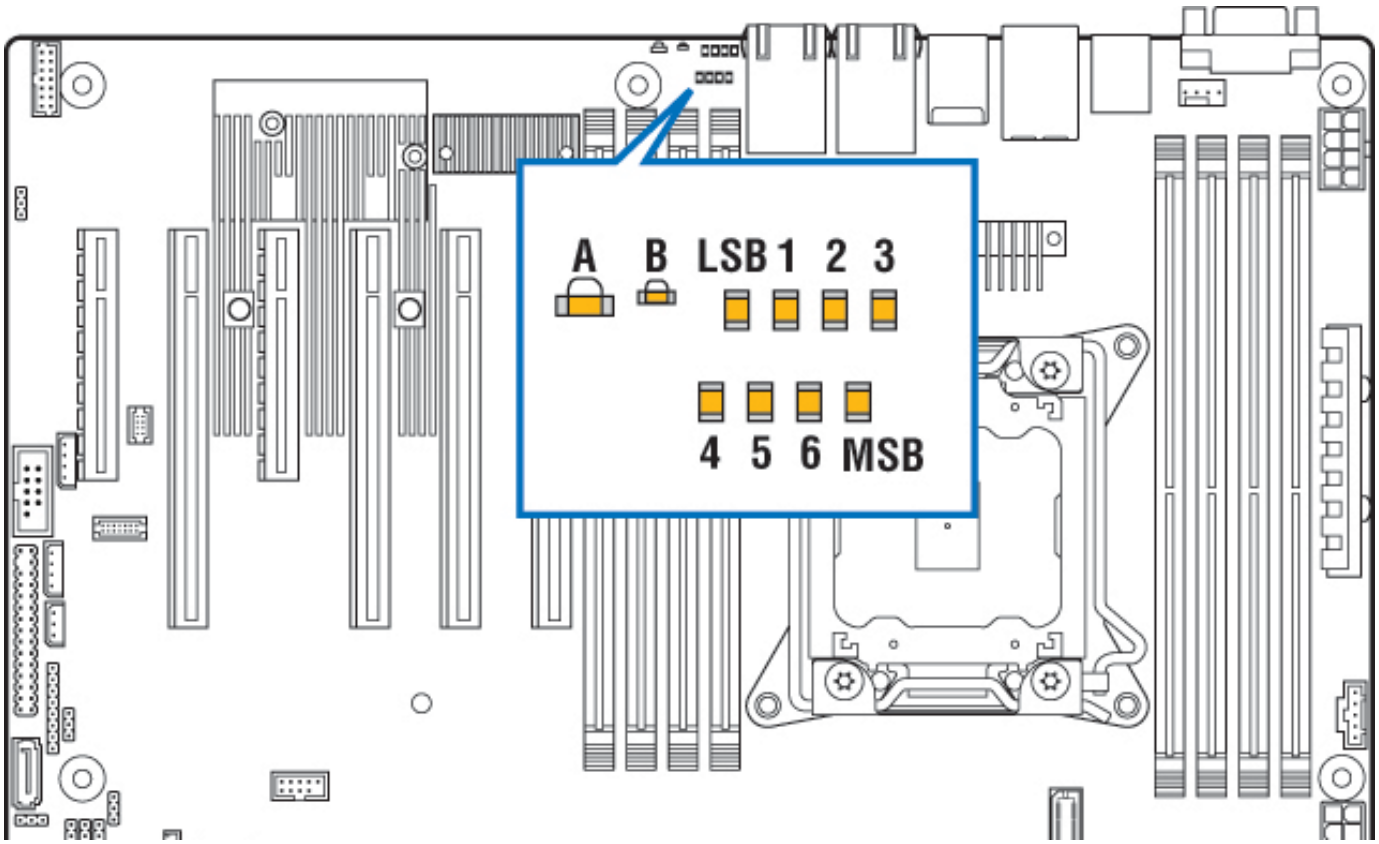


Figure 135. Server Board Feature Identification



Callout	Description
A	System Status LED
B	System ID LED
LSB 1 2 3 4 5 6 MSB	POST Code Diagnostic LEDs

Figure 136. Intel® Light-Guided Diagnostic LEDs – Server Board

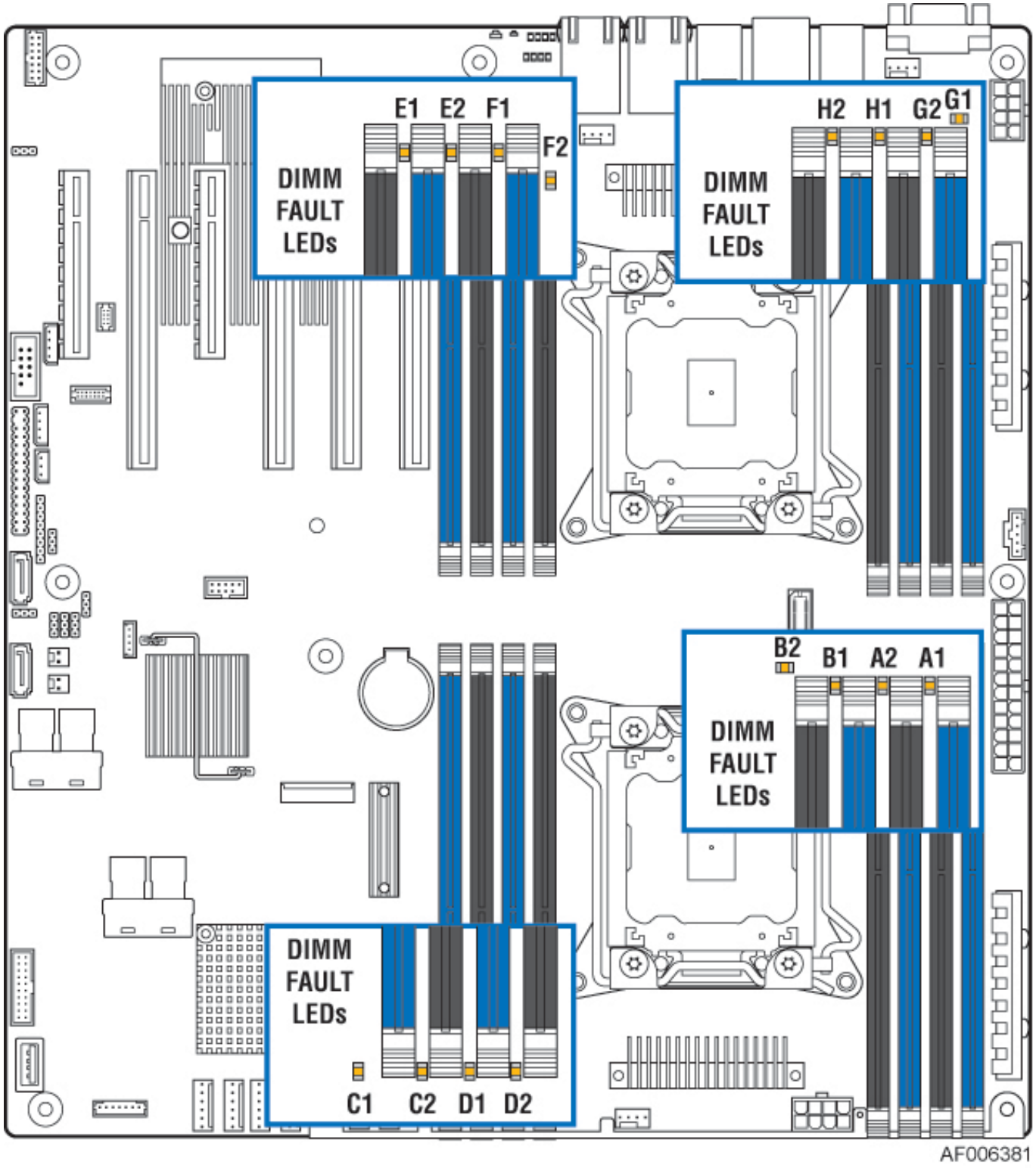


Figure 137. DIMM Fault LEDs

6.1.4.2 S2600ST Server Board Family

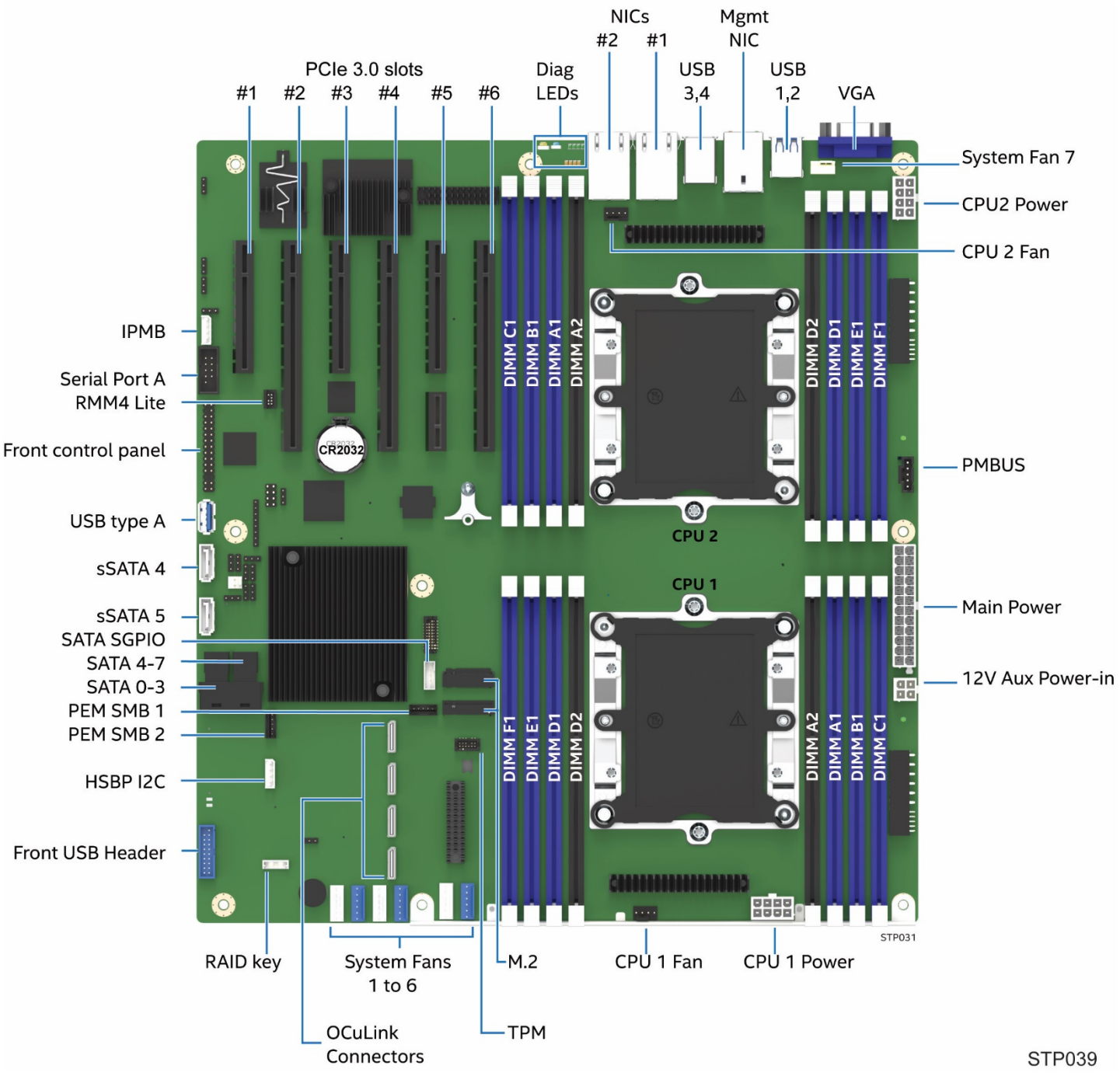


Figure 138. Server Board Feature Identification

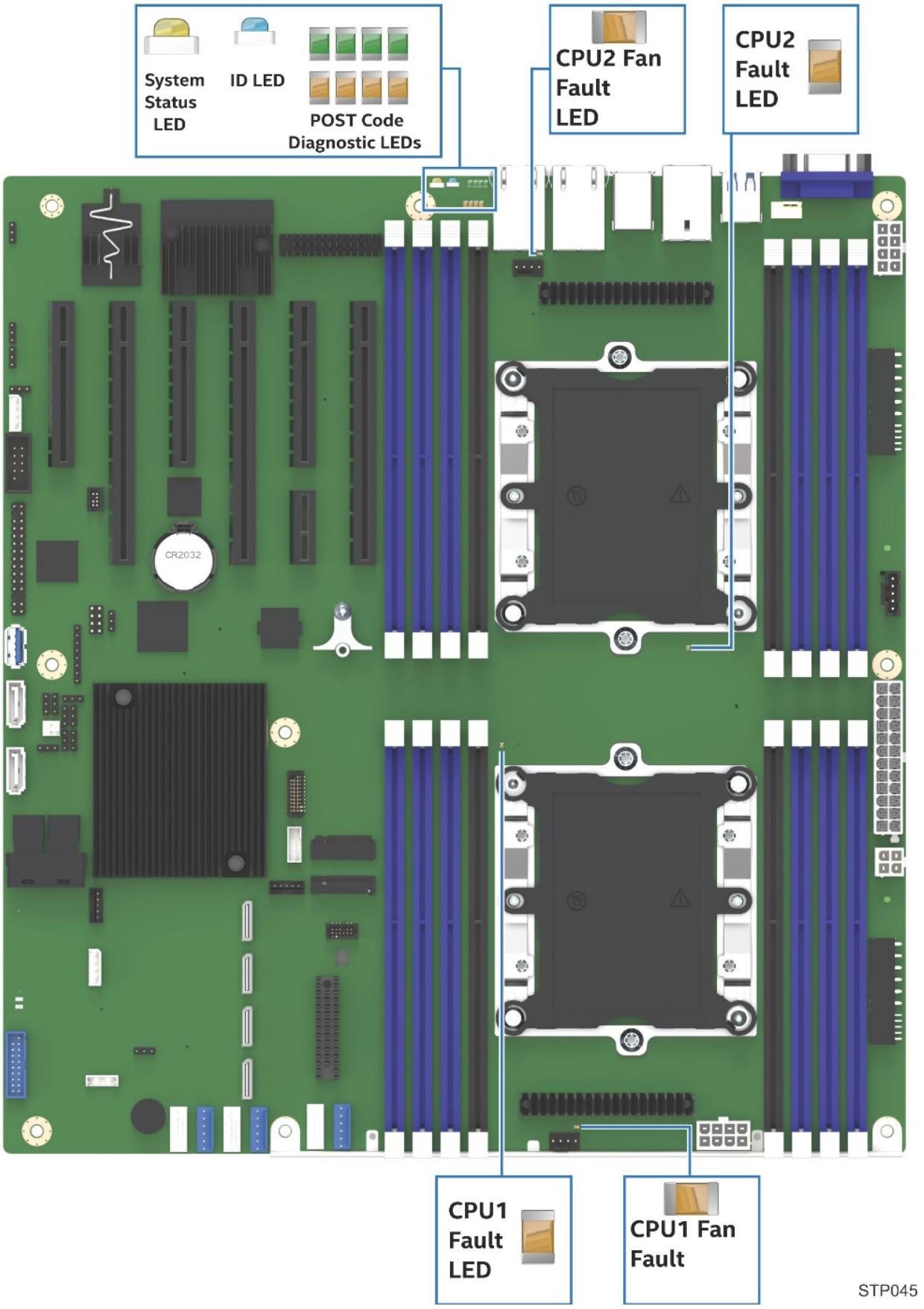


Figure 139. Intel® Light-Guided Diagnostic LEDs – Server Board

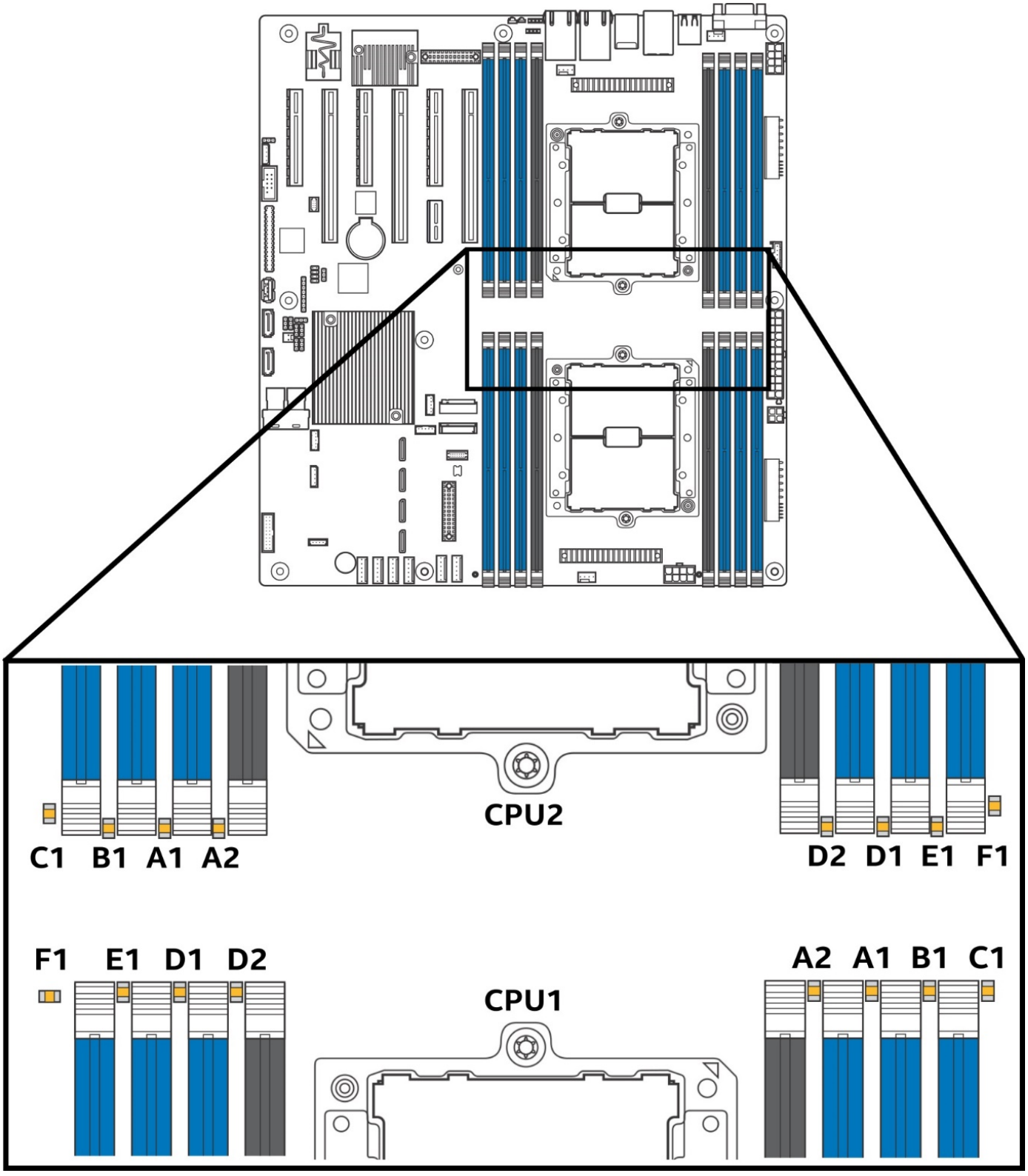


Figure 140. DIMM Fault LEDs

6.2 System Configuration and Recovery Jumpers

6.2.1 S2600CW Server Board Family

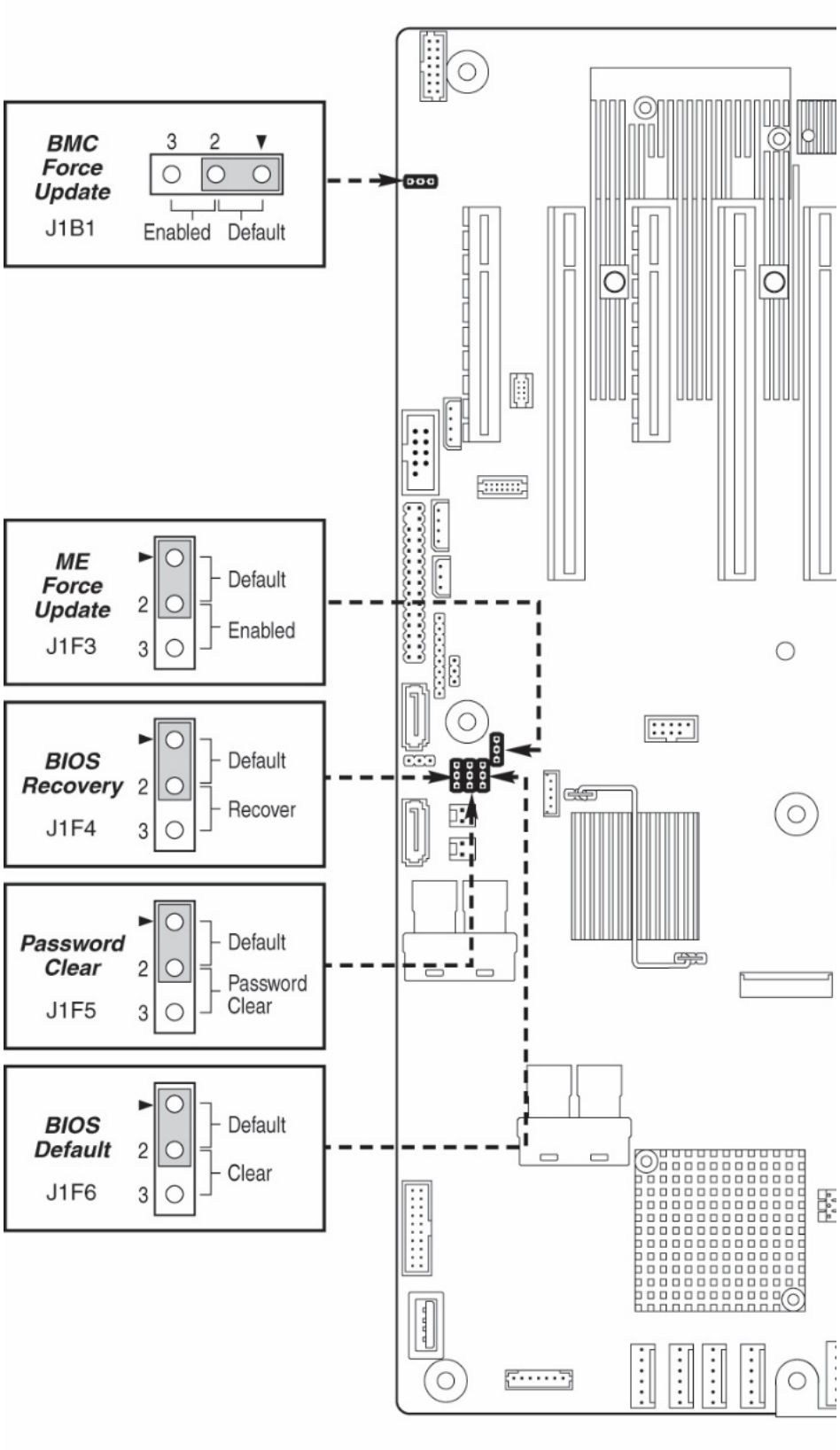


Figure 141. System Configuration and Recovery Jumpers

Jumper Name	Jumper Purpose
BIOS Recover	In the unlikely event the system BIOS gets corrupted, the system automatically loads an embedded backup image of the BIOS. If for any reason the BIOS backup is not automatically installed, the BIOS recovery jumper can force the system to boot to the uEFI shell and allow a manual BIOS update. With the system powered off, move the jumper block from Pins 1-2 (default) to Pins 2-3. Power on the system. The system boots into the embedded uEFI shell, allowing for a BIOS update using the standard BIOS update files included in the System Update Package (SUP). When the update is complete, power down the system and move the jumper block back to its default position over Pins 1-2.
ME Force Update	To place the system in a ME Force Update Mode, power off the system and move the jumper block to Pins 2-3. When set, this option disables all but the essential Management Engine functions. The default setting for this option is to install the jumper block over Pins 1-2.
Password Clear	To clear both the Administrator and User passwords (as set in BIOS Setup), power off the system and move the jumper block to Pins 2-3. Power on the system. The passwords are cleared within five to ten seconds. Power off the system and move the jumper block back to its default position over Pins 1-2.
BIOS Default	To reset all BIOS setup options back to factory defaults, power off the system and move this jumper block to Pins 2-3. Power on the system and allow the system to complete the Power-On Self-Test (POST) process. Power off the system. Move the jumper block back to its default position over Pins 1-2.
BMC Force Update	To place the system in a BMC Force Update Mode, power off the system and move the jumper block to Pins 2-3. When set, this option disables all but the essential baseboard management functions. The default setting for this option is to install the jumper block over Pins 1-2.

6.2.2 S2600ST Server Board Family

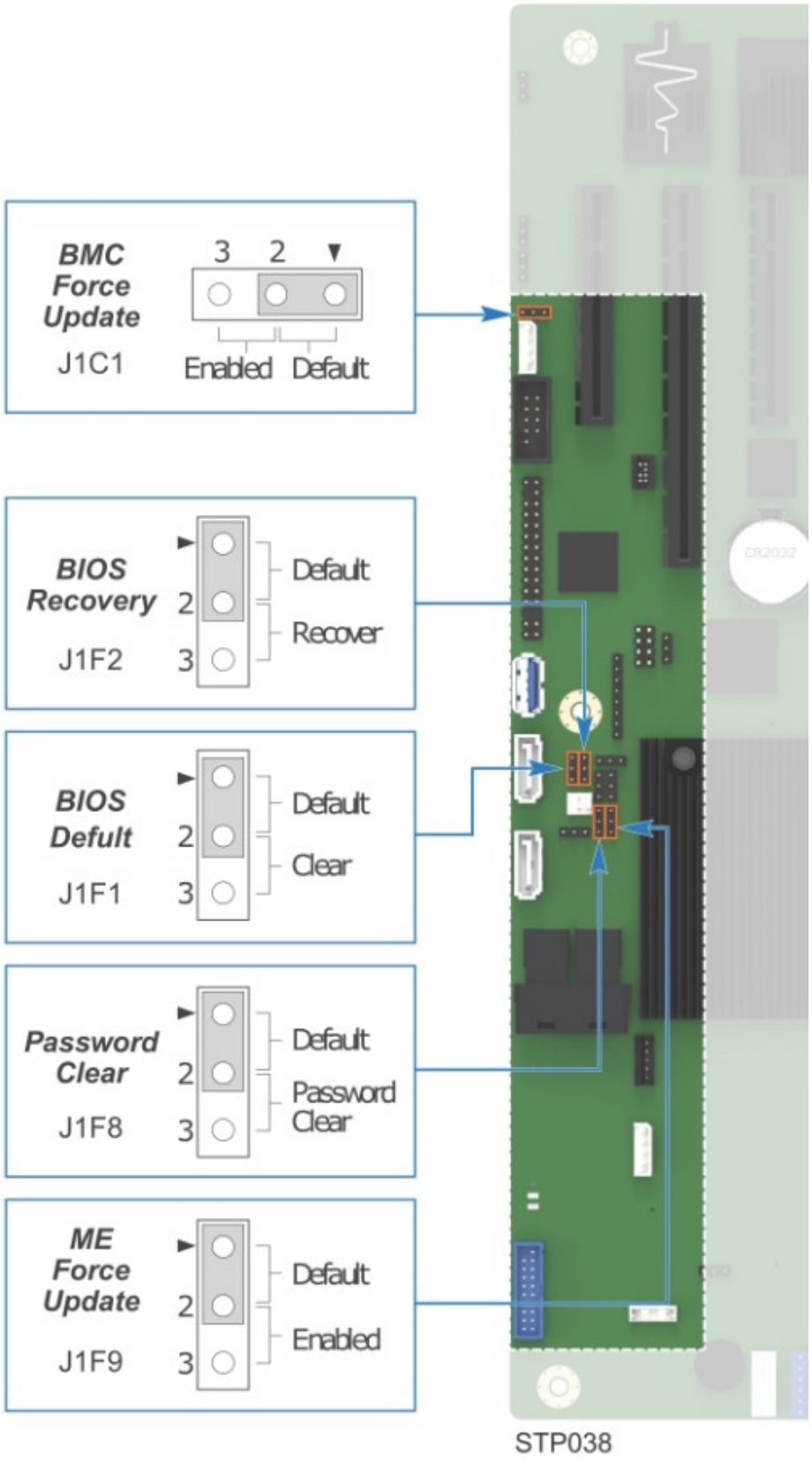


Figure 142. Configuration and Recovery Jumpers

6.2.2.1 BIOS Default Jumper Block

This jumper resets BIOS options, configured using the <F2> BIOS Setup Utility, back to their original default factory settings.

Note: This jumper does not reset Administrator or User passwords. In order to reset passwords, the Password Clear jumper must be used

---

1. Power down the server and unplug the power cord(s)
2. Remove the system top cover and move the “BIOS DFLT” jumper from pins 1 - 2 (default) to pins 2 - 3 (Set BIOS Defaults)
3. Wait 5 seconds then move the jumper back to pins 1 - 2
4. Re-install the system top cover
5. Re-Install system power cords

Note: The system will automatically power on after AC is applied to the system.

---

6. During POST, access the <F2> BIOS Setup utility to configure and save desired BIOS options

---

Note: After resetting BIOS options using the BIOS Default jumper, the Error Manager Screen in the <F2> BIOS Setup Utility will display two errors:
0012 System RTC date/time not set
5220 BIOS Settings reset to default settings

Note: also that the system time and date may need to be reset.

6.2.2.2 Password Clear Jumper Block

This jumper causes both the User password and the Administrator password to be cleared if they were set. The operator should be aware that this creates a security gap until passwords have been installed again through the <F2> BIOS Setup utility. This is the only method by which the Administrator and User passwords can be cleared unconditionally. Other than this jumper, passwords can only be set or cleared by changing them explicitly in BIOS Setup or by similar means. No method of resetting BIOS configuration settings to default values will affect either the Administrator or User passwords.

1. Power down the server. For safety, unplug the power cord(s)
2. Remove the system top cover
3. Move the “Password Clear” jumper from pins 1 - 2 (default) to pins 2 - 3 (password clear position)
4. Re-install the system top cover and re-attach the power cords
5. Power up the server and access the <F2> BIOS Setup utility
6. Verify the password clear operation was successful by viewing the Error Manager screen. Two errors should be logged:
   5221 Passwords cleared by jumper
   5224 Password clear jumper is set
7. Exit the BIOS Setup utility and power down the server. For safety, remove the AC power cords
8. Remove the system top cover and move the “Password Clear” jumper back to pins 1 - 2 (default)
9. Re-install the system top cover and reattach the AC power cords.
10. Power up the server

11. Strongly recommended: Boot into <F2> BIOS Setup immediately, go to the Security tab and set the Administrator and User passwords if you intend to use BIOS password protection

6.2.2.3 Management Engine (ME) Firmware Force Update Jumper Block

When the ME Firmware Force Update jumper is moved from its default position, the ME is forced to operate in a reduced minimal operating capacity. This jumper should only be used if the ME firmware has gotten corrupted and requires re-installation. The following procedure should be followed.

Note: System Update files are included in the System Update Packages (SUP) posted to Intel's Download center web site. http://downloadcenter.intel.com

---

1. Turn off the system.
2. Remove the AC power cords

Note: If the ME FRC UPD jumper is moved with AC power applied to the system, the ME will not operate properly.

---

3. Remove the system top cover
4. Move the "ME FRC UPD" Jumper from pins 1 - 2 (default) to pins 2 - 3 (Force Update position)
5. Re-install the system top cover and re-attach the AC power cords
6. Power on the system
7. Boot to the EFI shell
8. Change directories to the folder containing the update files
9. Update the ME firmware using the following command:
   iflash32 /u /ni <version#>_ME.cap
10. When the update has successfully completed, power off the system
11. Remove the AC power cords
12. Remove the system top cover
13. Move the "ME FRC UPD" jumper back to pins 1-2 (default)
14. Re-attach the AC power cords
15. Power on system

6.2.2.4 BMC Force Update Jumper Block

The BMC Force Update jumper is used to put the BMC in Boot Recovery mode for a low-level update. It causes the BMC to abort its normal boot process and stay in the boot loader without executing any Linux code.

This jumper should only be used if the BMC firmware has gotten corrupted and requires re-installation. The following procedure should be followed:

Note: System Update files are included in the System Update Packages (SUP) posted to Intel's Download center web site. http://downloadcenter.intel.com

---

1. Turn off the system.
2. Remove the AC power cords

Note: If the BMC FRC UPD jumper is moved with AC power applied to the system, the BMC will not operate properly.

---

3. Remove the system top cover

4. Move the “BMC FRC UPD” Jumper from pins 1 - 2 (default) to pins 2 - 3 (Force Update position)
5. Re-install the system top cover and re-attach the AC power cords
6. Power on the system
7. Boot to the EFI shell
8. Change directories to the folder containing the update files
9. Update the BMC firmware using the following command:
   FWPIAUPD -u -bin -ni -b -o -pia -if=usb <file name.BIN>
10. When the update has successfully completed, power off the system
11. Remove the AC power cords
12. Remove the system top cover
13. Move the “BMC FRC UPD” jumper back to pins 1-2 (default)
14. Re-attach the AC power cords
15. Power on system
16. Boot to the EFI shell
17. Change directories to the folder containing the update files
18. Re-install the board/system SDR data by running the FRUSDR utility
19. After the SDRs have been loaded, reboot the server

6.2.2.5 BIOS Recovery Jumper

When the BIOS Recovery jumper block is moved from its default pin position (pins 1-2), the system will boot using a backup BIOS image to the uEFI shell, where a standard BIOS update can be performed. See the BIOS update instructions that are included with System Update Packages (SUP) downloaded from Intel’s download center web site. This jumper is used when the system BIOS has become corrupted and is non-functional, requiring a new BIOS image to be loaded on to the server board.

Note: The BIOS Recovery jumper is ONLY used to re-install a BIOS image in the event the BIOS has become corrupted. This jumper is NOT used when the BIOS is operating normally and you need to update the BIOS from one version to another.

The following procedure should be followed.

Note: System Update Packages (SUP) can be downloaded from Intel’s download center web site. http://downloadcenter.intel.com

---

1. Turn off the system
2. For safety, remove the AC power cords
3. Remove the system top cover
4. Move the “BIOS Recovery” jumper from pins 1 - 2 (default) to pins 2 - 3 (BIOS Recovery position)
5. Re-install the system top cover and re-attach the AC power cords
6. Power on the system
7. The system will automatically boot to the EFI shell. Update the BIOS using the standard BIOS update instructions provided with the system update package
8. After the BIOS update has successfully completed, power off the system. For safety, remove the AC power cords from the system
9. Remove the system top cover
10. Move the BIOS Recovery jumper back to pins 1-2 (default)
11. Re-install the system top cover and re-attach the AC power cords
12. Power on the system and access the <F2> BIOS Setup utility
13. Configure desired BIOS settings
14. Hit the <F10> key to save and exit the utility

7. System Service – FRU Replacement

7.1 System Fan Assembly Removal / Installation

System fan assembly removal is required whenever routing cables inside the chassis from back to front or from front to back, or when server board replacement is necessary.

7.1.1 System Fan Assembly Removal

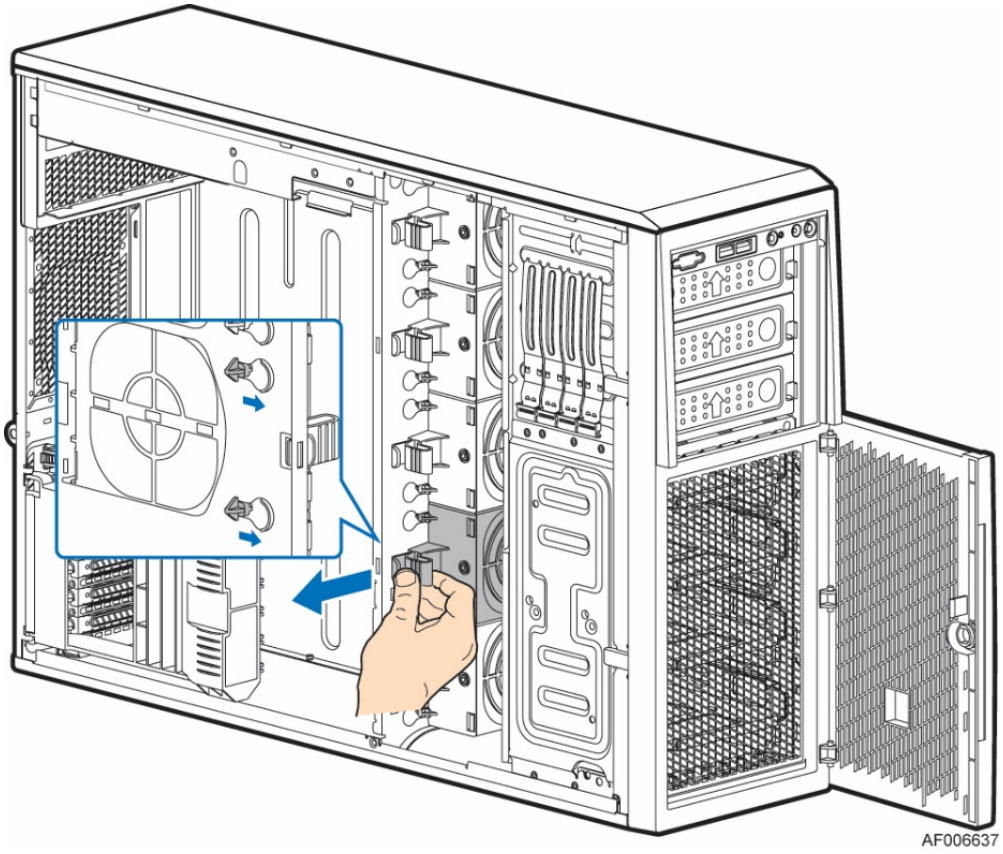


Figure 143. Hot-Swap System Fan Removal

1. Press the latch handle located on the top of the fan until the latch is fully disengaged from the fan bracket.
2. Lift the fan away from the fan bracket.

To Remove the Fixed System Fan (CPU fan or PCIe* fan) from P4304XXMFEN2

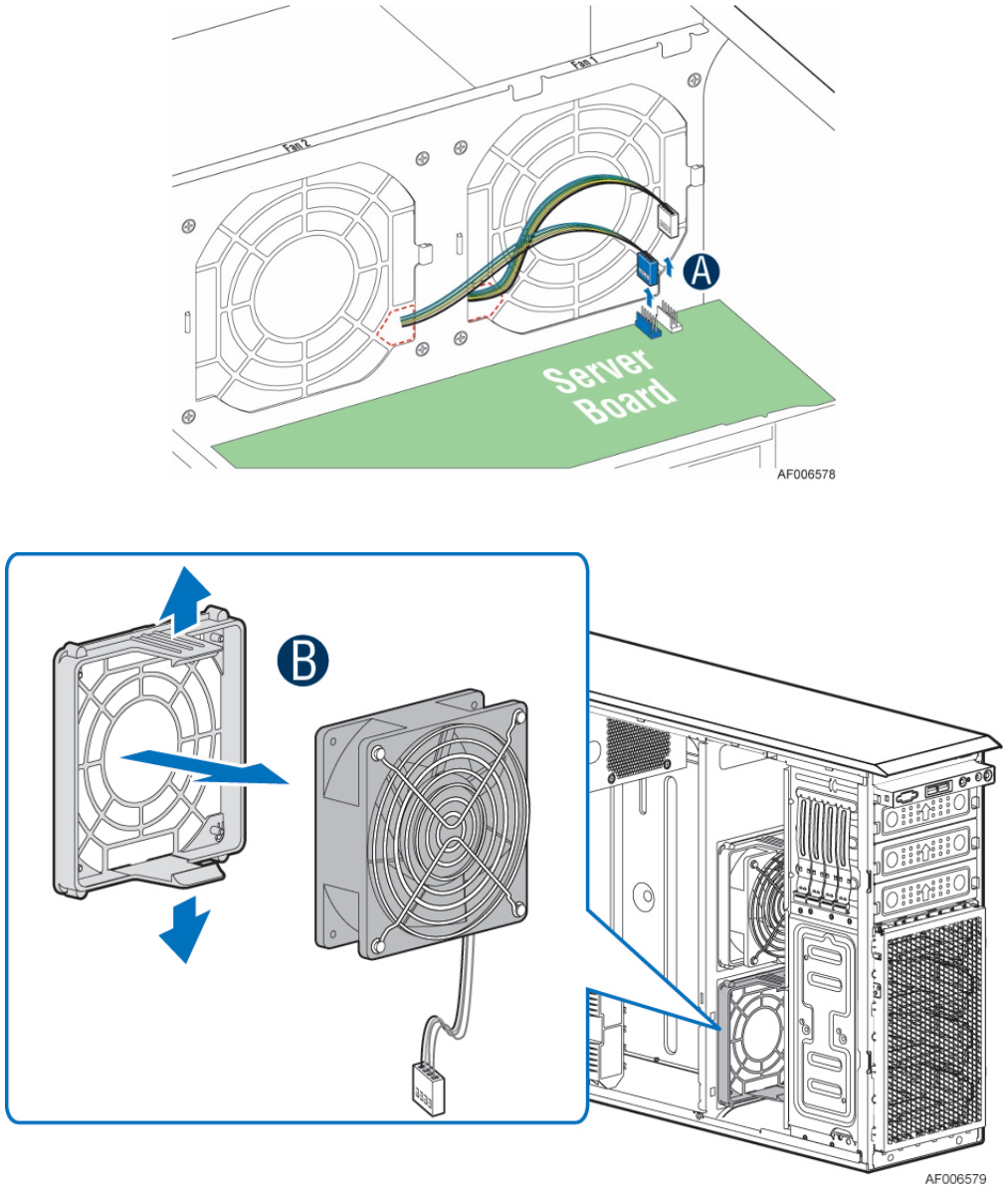


Figure 144. Fixed System Fan Removal

1. Unplug the fan cable from the server board (see letter A).
2. Disengage the two locking tabs on both sides of the fan holder to release the system fan (see letter B).
3. Separate the fan from the fan holder.

7.1.2 System Fan Assembly Installation

To Install the Hot-Swap System Fan on P4304XXMUXX

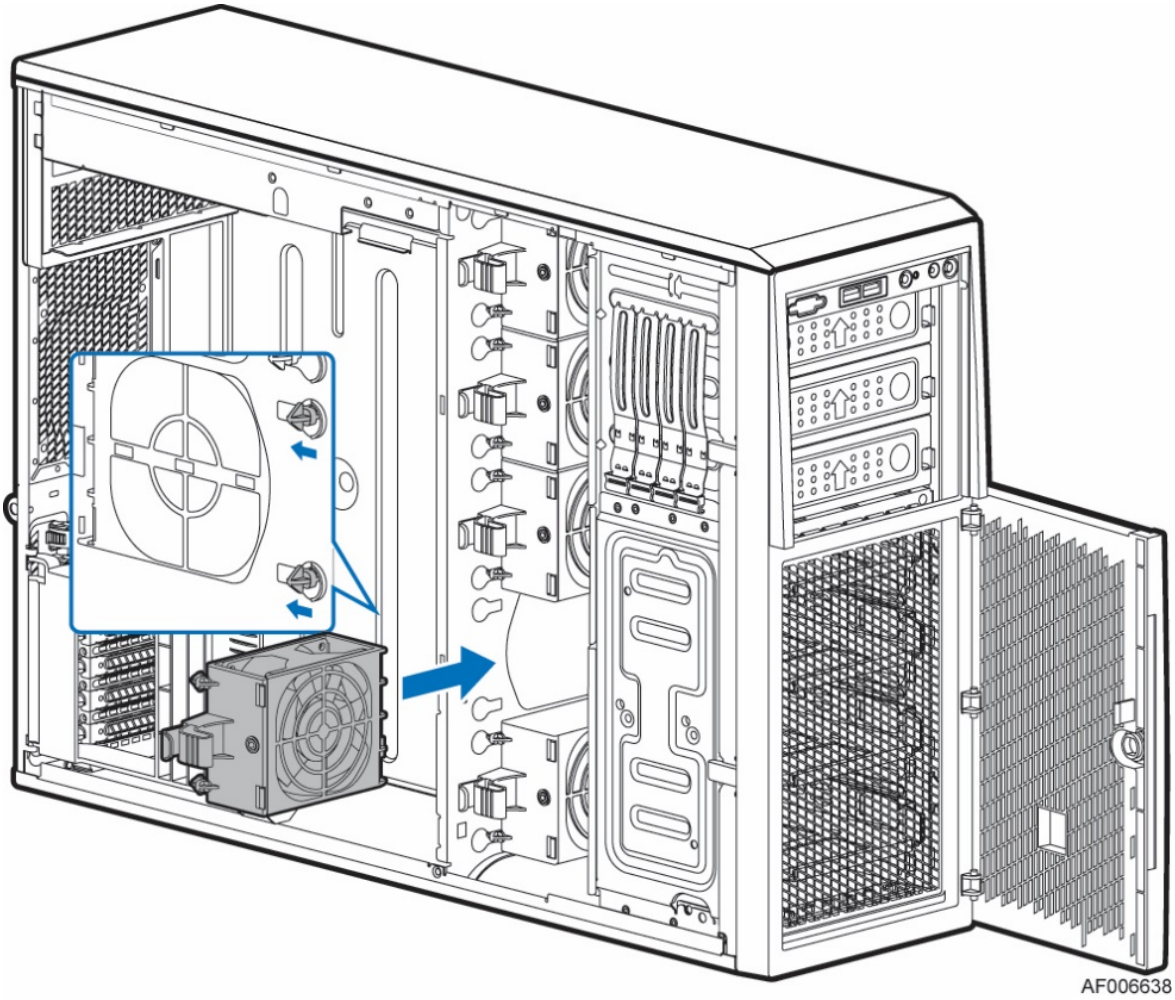


Figure 145. Hot-Swap System Fan Installation

1. Align the two guide pins on the top back side of the fan with the key slots located on the fan bracket.
2. Carefully lower the fan so the guide pins slide lower into the openings.
3. Continue to push down the fan until the latch on the top of the fan clicks and locks the fan in place.

To Install the Fixed System Fan on P4304XXMFEN2

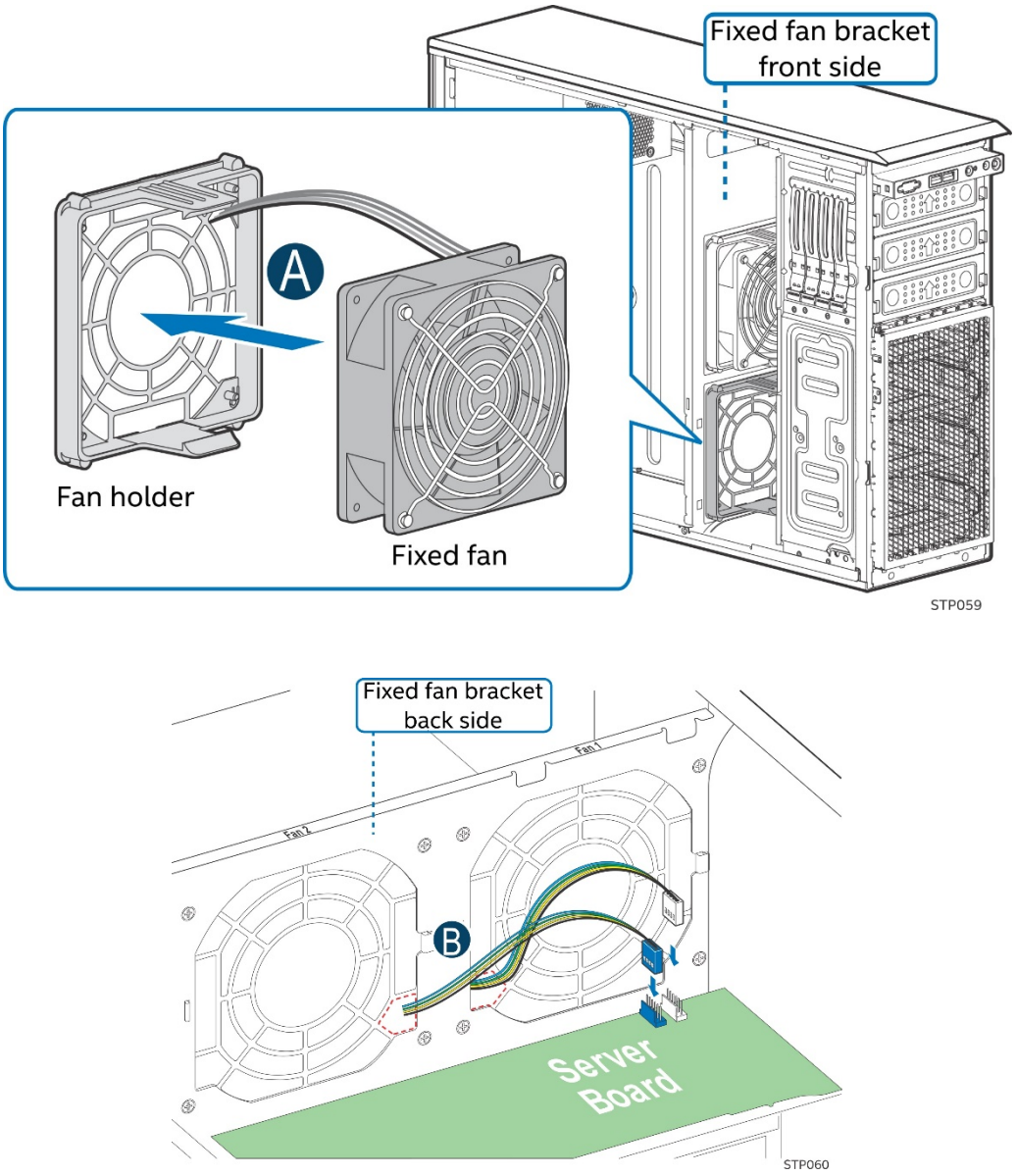


Figure 146. Fixed System Fan Installation

1. Route the fixed fan cable through the fan holder from front to back using the holes to the corner closer to the center of the fan bracket assembly (see letter A).
2. Align the fan with the fan holder and press the fan until it clicks and fits into place.
3. Connect the fan cable to the system fan connector on the server board. The PCIe* fan connects to the fan connector labeled as SYS_FAN_1; the CPU fan connects to the fan connector labeled as SYS_FAN_2 (see letter B).

7.2 Replacing the System Battery

The battery on the server board powers the Real Time Clock for up to 10 years in the absence of power. When the battery starts to weaken, it loses voltage, and stored server settings and system clock and date settings may be lost.

Battery Specification:

- Lithium
- 3V
- Coin CR-2032

Contact your customer service representative or dealer for a list of approved devices.

Warning: Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the equipment manufacturer. Discard used batteries according to manufacturer's instructions.

Advarsel: Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.

Advarsel: Lithiumbatteri - Eksplosjonsfare. Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten. Brukt batteri returneres apparatleverandøren.

Varning: Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.

Varoitus: Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

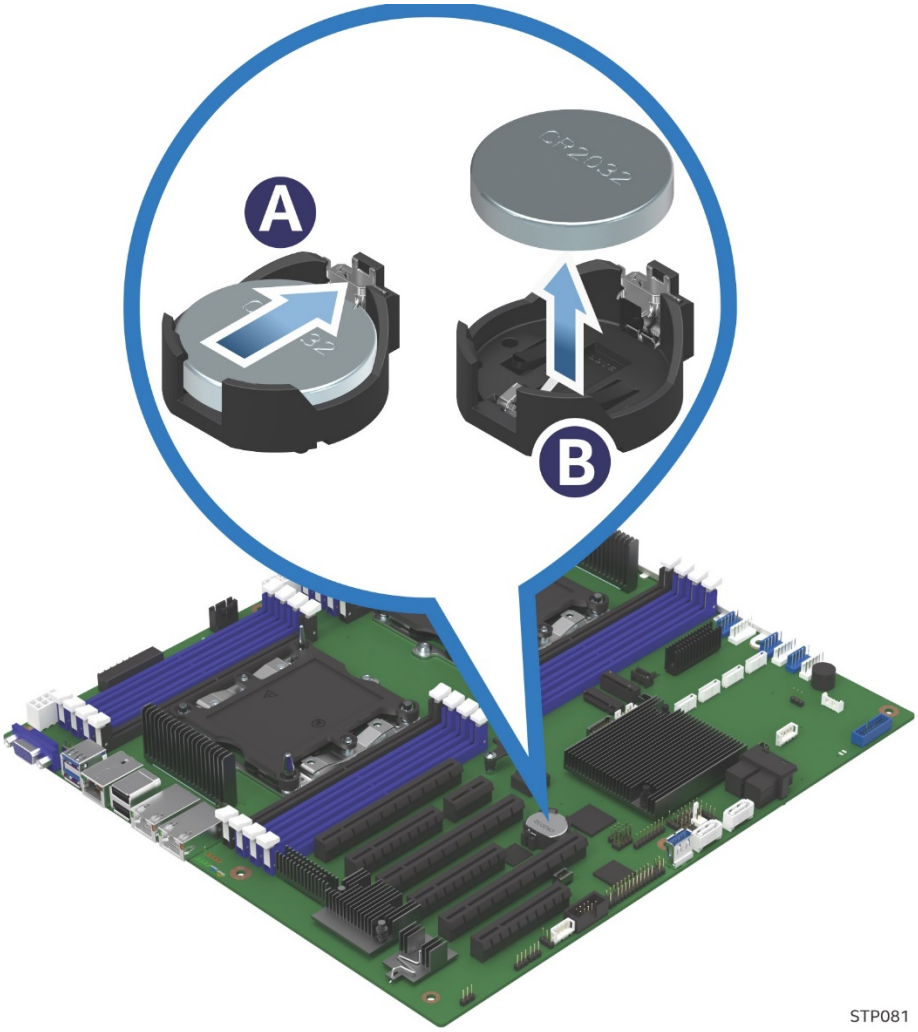


Figure 147. Replacing the Backup Battery

1. Locate the battery on the server board.
2. Gently press the metal clip as shown to release the battery (see letter “A”).
3. Remove the battery from the plastic socket (see letter “B”).
4. Dispose of the battery according to local ordinance.
5. Remove the new lithium battery from its package, and, being careful to observe the correct polarity, insert it in to the battery socket.

Note: Access the **<F2> BIOS Setup Utility**, set it on the proper setting, and save this setting. Setting must be set to restore configuration settings

7.3 Replacing the Standard Front Panel

7.3.1 Removing the Front Panel

1. Remove the chassis side cover following instructions in Section 1.2.1.
2. Remove the front bezel following instructions in Section 2.3.1.

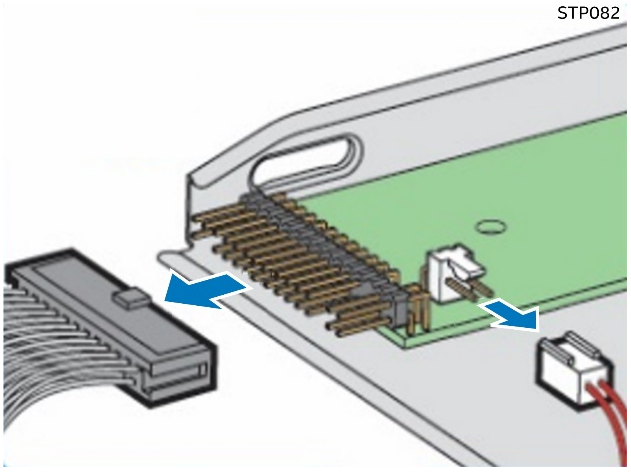


Figure 148. Disconnecting the Front Panel Module

3. Reach behind the front panel module and disconnect the flat ribbon front panel cable and the intrusion switch cable.

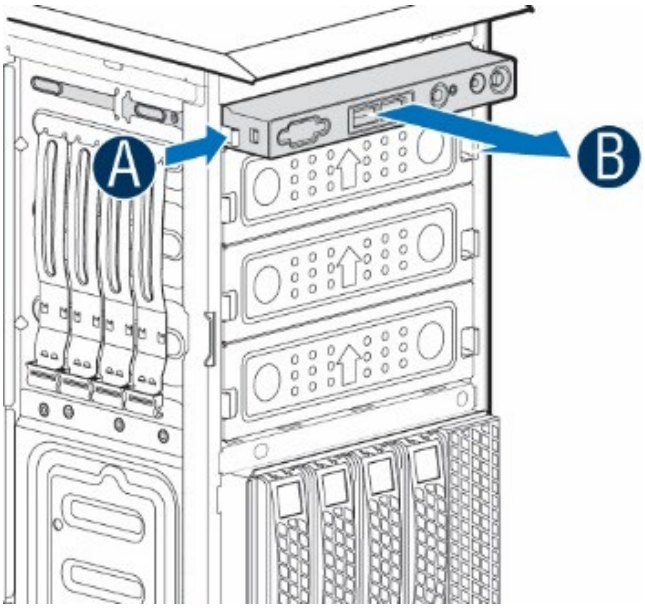


Figure 149. Removing the Front Panel Module

4. Press the clip (see letter A).
5. Pull the front panel module outside of the chassis (see letter B).

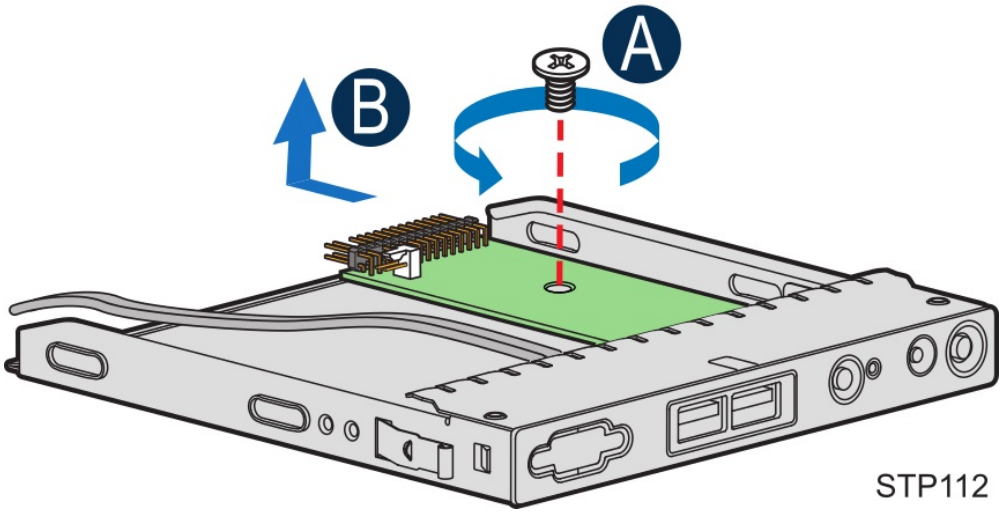


Figure 150. Removing the Front Panel Board

6. Unscrew the front panel board (see letter A).
7. Remove the front panel board from the module tray (see letter B).

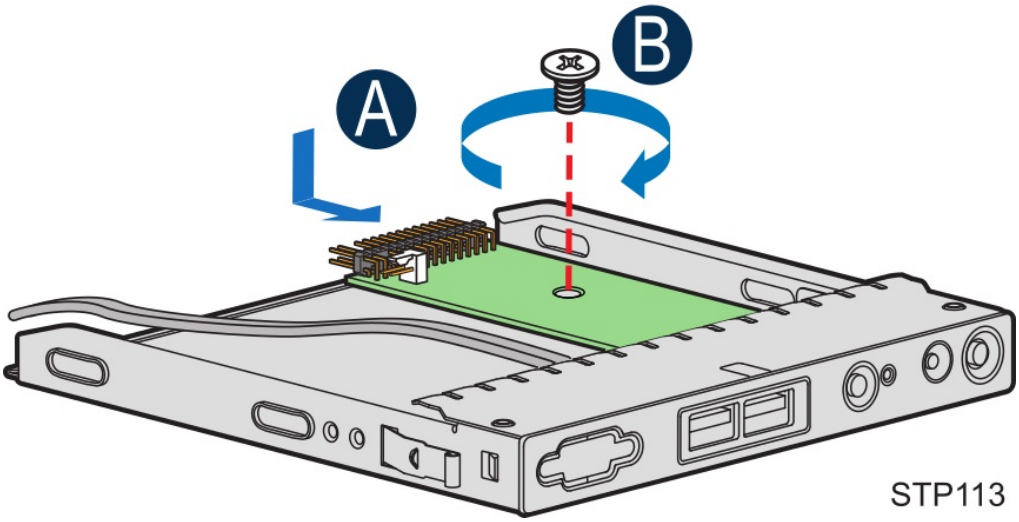


Figure 151. Installing the Front Panel Board

8. Remove the new front panel board from its packaging.
9. Install the front panel board in the module tray (see letter A).
10. Secure the front panel board with the screw (see letter B).

7.3.2 Installing the Front Panel Module

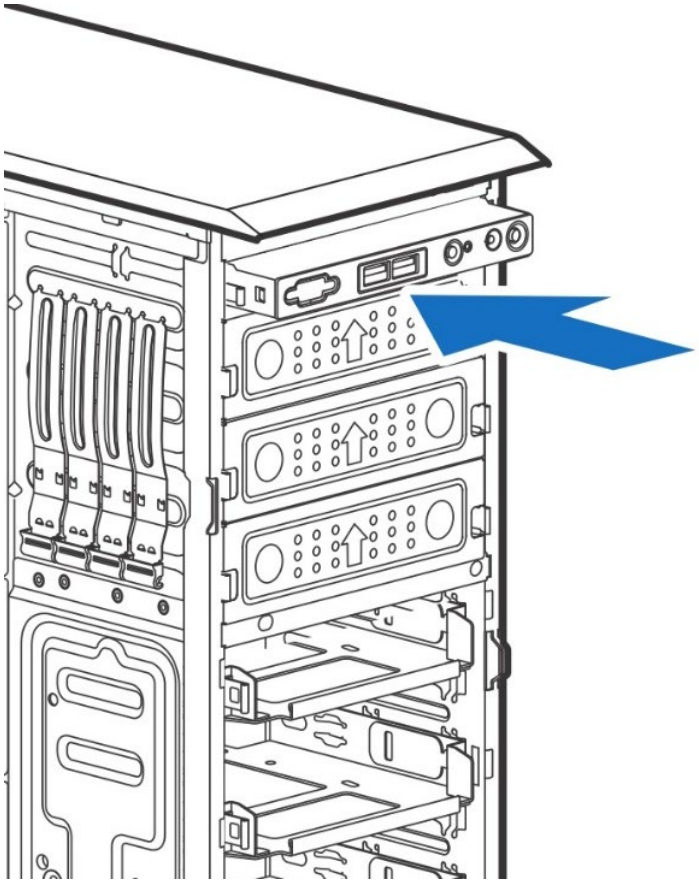


Figure 152. Installing the Front Panel

1. Slide the front panel module in the chassis until it snaps into place.

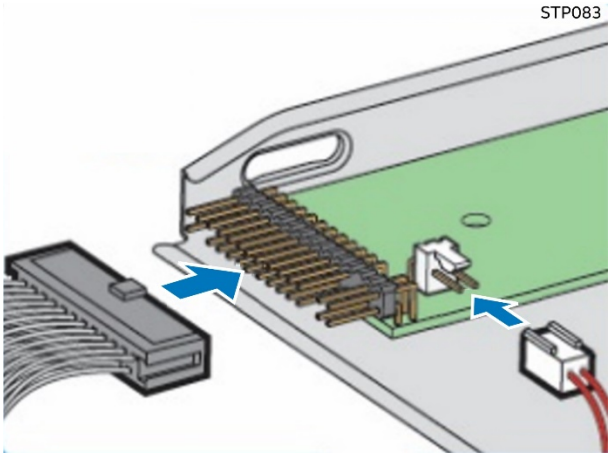


Figure 153. Connecting the Front Panel

2. Connect the flat ribbon front panel cable and the 2-pin chassis intrusion cable to the front panel board.
3. Install the front bezel following instructions in Section 2.3.2.
4. Install the chassis side cover following instructions in Section 1.2.1.

7.4 Replacing the Server Board

7.4.1 Server Board Removal

1. Power off system and remove power cords from each power supply module installed.
2. Disconnect all externally attached cables.
3. Remove the chassis side cover by following instructions in section 1.2.1
4. Remove air duct by following instructions in section 1.2.2.1.
5. Disconnect all cables attached to PCIe* add-in cards (if installed).
6. Remove all options installed onto the server board including (if installed): Intel® RAID 5 option key, Intel® RMM 4 Lite key, TPM Module, and any installed PCIe* add-in cards.
7. Remove processors by following instructions in section 2.1.
8. Remove all DIMMs by following instructions in section 2.2.3.
9. Disconnect and clear from the server board area all cables attached to connectors on the server board

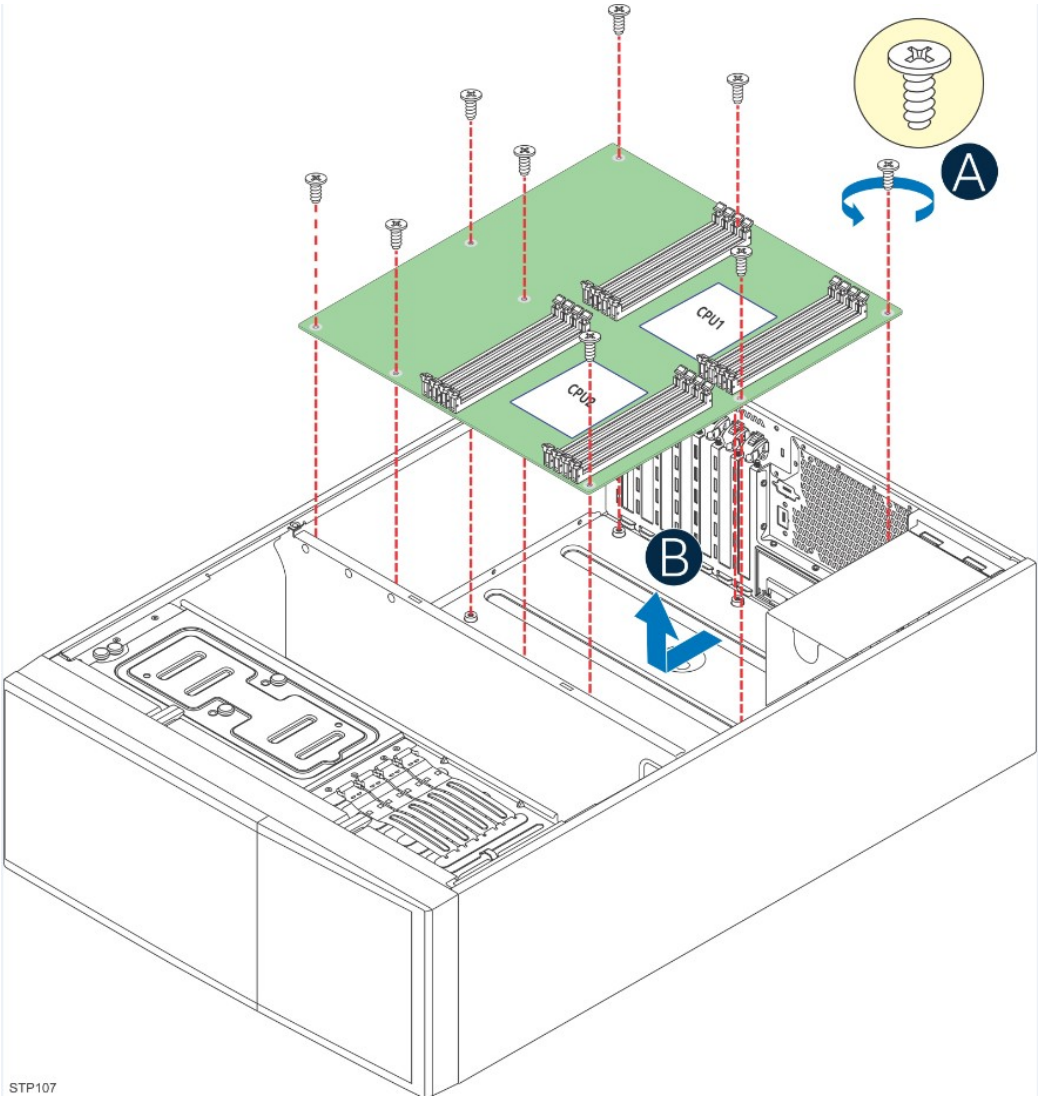


Figure 154. Server Board Removal

10. Remove nine screws used to secure the server board to the chassis (see Letter A).
11. Carefully lift the server board from the chassis and place it into an anti-static bag (see letter B).

7.4.2 Server Board Installation

Note: Follow ESD precautions outlined at the beginning of this manual.

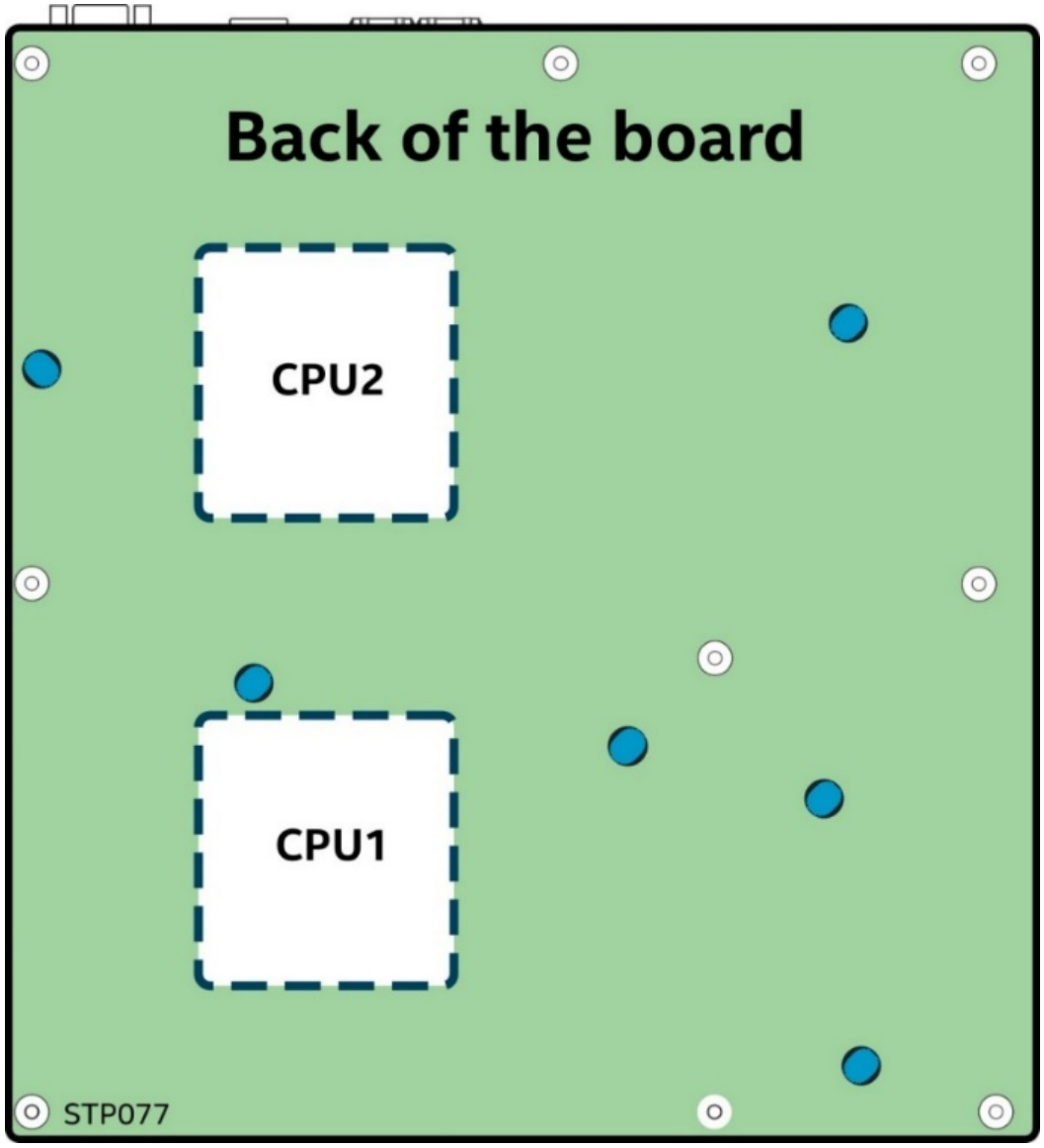


Figure 155. Bumper Position on Server Board

1. Remove the server board from its anti-static bag.
2. Attach the bumpers to the back of the server board. They are identified with blue circles as shown in the above illustration.

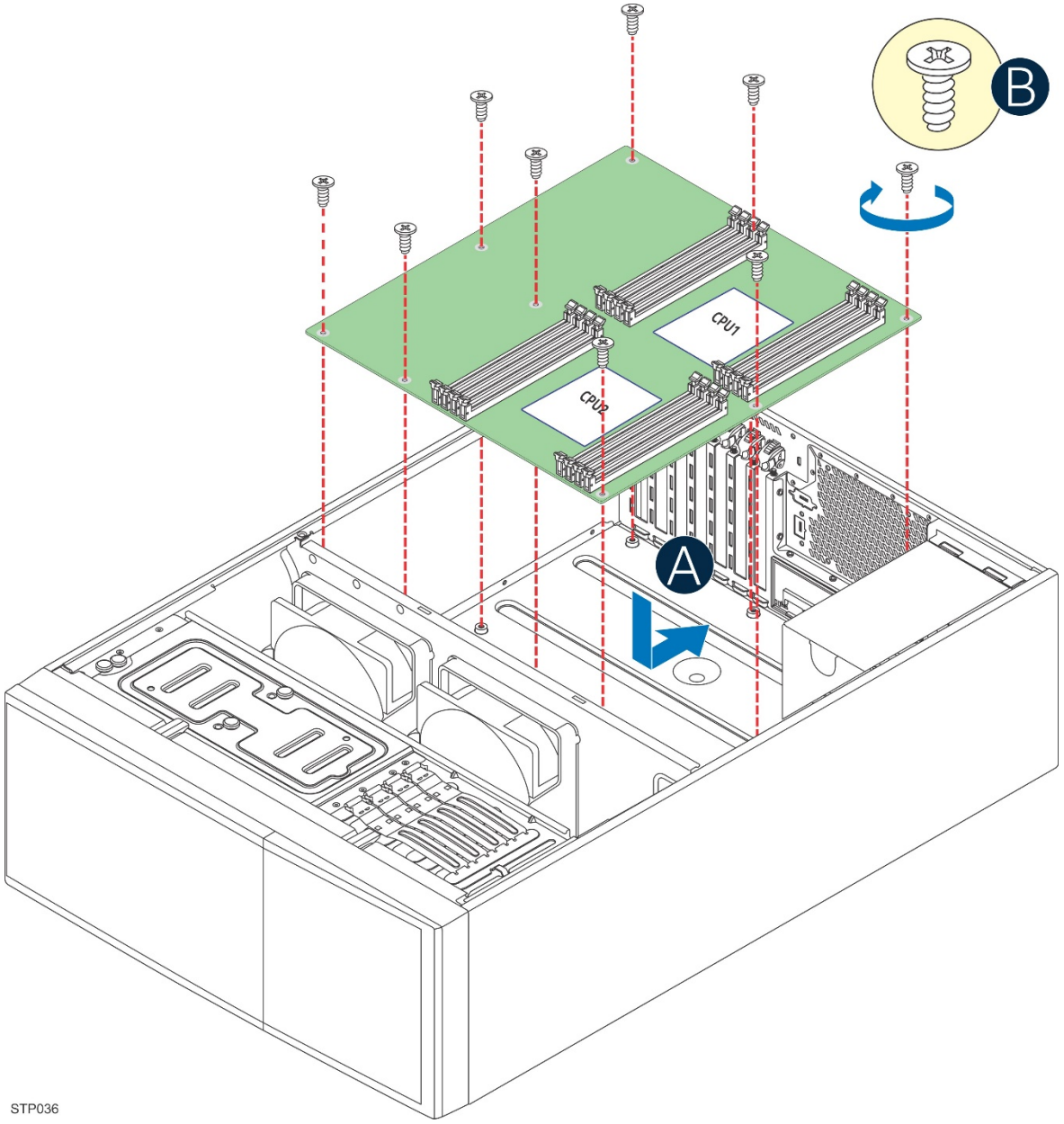


Figure 156. Server Board Installation

1. Carefully move aside any cables around the chassis base to clear the area for server board placement.
2. Carefully lower the server board into the chassis so that the rear I/O connectors of the server board align with it and are fully seated into the matching holes on the chassis back panel (see letter A).
3. The server board is accurately placed when rear I/O connectors (NIC connectors, USB connectors, and VGA connector) align with the IO shield openings and properly fit into it.
4. Fasten down the server board with nine screws using 8 in/lbs torque (see letter B).

Appendix A. *Getting Help*

If you encounter an issue with your server chassis, follow these steps to obtain support:

1. Visit the following Intel support web page:

   http://www.intel.com/support/

   This web page provides 24x7 support when you need it to get the latest and most complete technical support information on all Intel Enterprise Server and Storage Platforms. Information available at the support site includes:

   — Latest BIOS, firmware, drivers, and utilities

   — Product documentation and installation and quick start guides

   — Full product specifications, technical advisories, and errata

   — Compatibility documentation for memory, hardware add-in cards, chassis support matrix, and operating systems

   — Server and chassis accessory parts list for ordering upgrades or spare parts

   — A searchable knowledge base to search for product information throughout the support site

2. If you are still unable to obtain a solution to your issue, send an email to Intel's technical support center using the online form available at:

   http://www.intel.com/support/feedback.htm?group=server.

3. Last, contact an Intel support representative using one of the support phone numbers available at http://www.intel.com/support/feedback.htm?group=server (charges may apply).

   NOTE: Intel also offers Channel Program members around-the-clock 24x7 technical phone support on Intel® server boards, server chassis, server RAID controller cards, and Intel® Server Management at http://www.intel.com/reseller/.

Note: You will need to log in to the Reseller site to obtain the 24x7 number.

Warranty Information

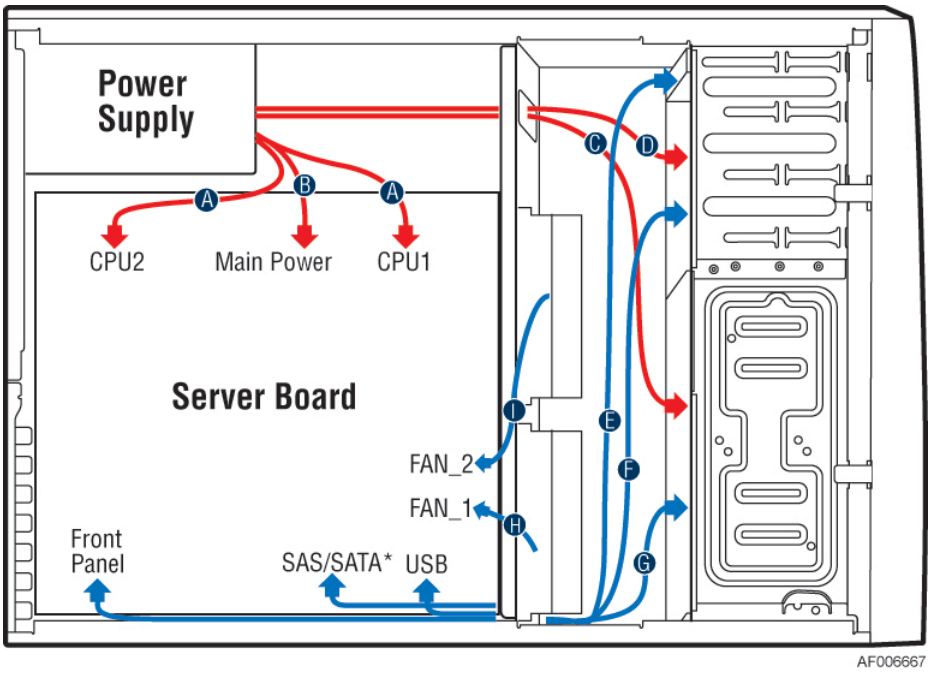
To obtain warranty information, visit the following Intel web site:

http://www.intel.com/support/warranty

Appendix B. *System Cabling Routing Diagrams*

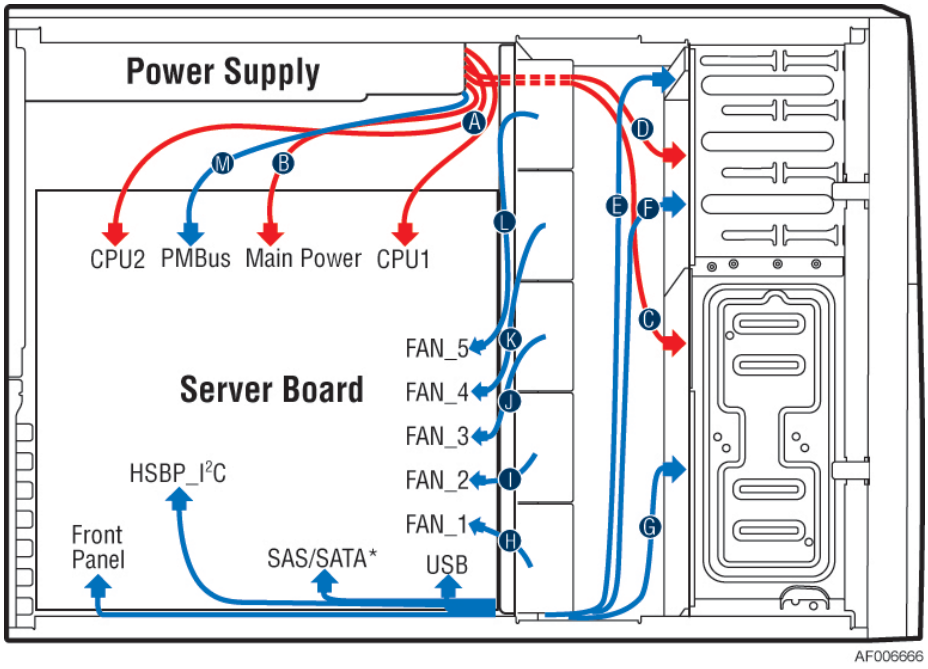
All cables in the system that need to be routed from front to back, should be routed using the cable channels along each chassis sidewall as shown in the illustrations on this section. When routing cables from front to back, avoid routing ANY cables through the center of the system or in the area between the system fans and the DIMM slots. Cable connection instructions provided in this section are presented in the recommended order in which they should be installed. Make sure you are following the appropriate cable routing according to your board family.

- For P4304XXMFEN2, route the power cables for HDD/ODD bays through the opening on the system fan bracket, close to the chassis side wall; for P4304XXMUXX, route power cables for HDD/ODD bays under the 5th system fan.
- Route the front panel cable, SAS/SATA data cable(s), USB cable (to the front panel); route the HSBP_I²C (optional) between the first system fan and the chassis sidewall.
- You must manage the system main power cable and CPU power cables under the notch of the air duct before you can install the air duct properly.



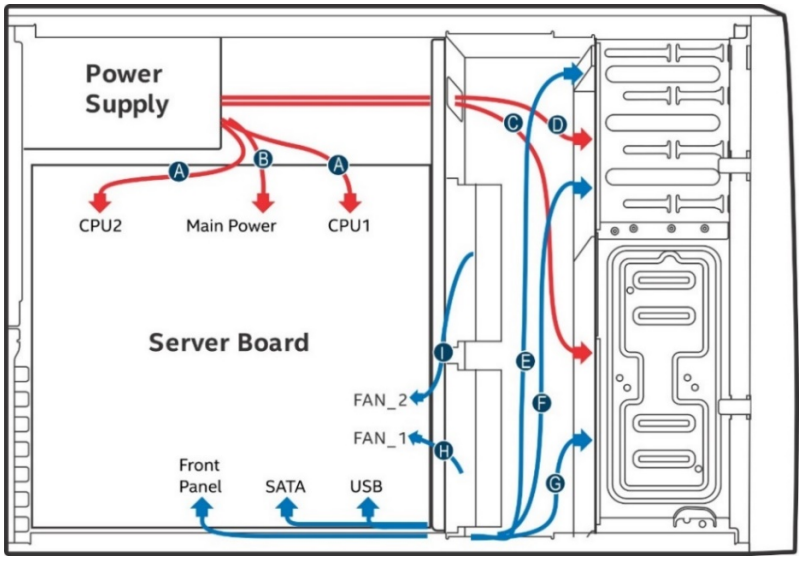
A	CPU1/2 power cable	B	Main power cable	C	SSD/HDD drive bay power cable (SAS/SATA)
D	ODD drive bay power cable	E	Front panel and USB cable	F	ODD data cable
G	SSD/HDD drive bay data cable (SATA)	H	FAN_1 cable (PCIe* fan)	I	FAN_2 cable (CPU fan)

Figure 157. P4304XXMFEN2 Cable Routing - S2600CW Server Board Family



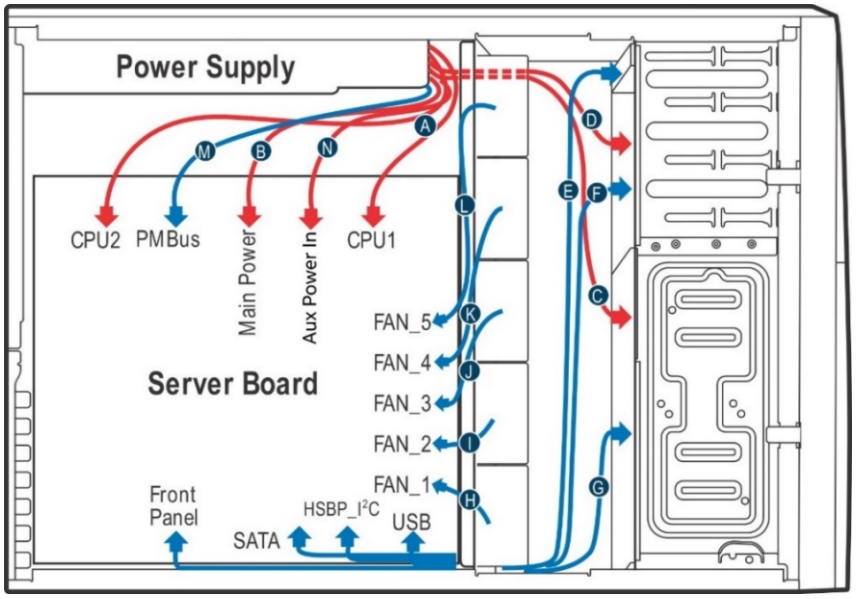
A	CPU1/2 power cable	B	Main power cable	C	SSD/HDD drive bay power cable (SAS/SATA)
D	ODD drive bay power cable	E	Front panel and USB cable	F	ODD data cable
G	SSD/HDD drive bay data cable (SATA)	H, I, J, K, L	FAN_n cables	M	PMBus cable

Figure 158. P4304XXMUXX Cable Routing - S2600CW Server Board Family



A	CPU1/2 power cable	B	Main power cable	C	SSD/HDD drive bay power cable (SAS/SATA)
D	ODD drive bay power cable	E	Front panel and USB cable	F	ODD data cable
G	SSD/HDD drive bay data cable (SATA)	H	FAN_1 cable (PCIe* fan)	I	FAN_2 cable (CPU fan)

Figure 159. P4304XXMFEN2 Cable Routing - S2600ST Server Board Family



A	CPU1/2 power cable	B	Main power cable	C	SSD/HDD drive bay power cable (SAS/SATA)
D	ODD drive bay power cable	E	Front panel and USB cable	F	ODD data cable
G	SSD/HDD drive bay data cable (SATA)	H, I, J, K, L	FAN_n cables	M	PMBus cable
N	Aux Power In				

Figure 160. P4304XXMUXX Cable Routing - S2600ST Server Board Family

Appendix C. *System Status LED Operating States and Definition*

The server board includes a bi-color System Status LED which is tied directly to the System Status LED on the front panel. This LED indicates the current health of the server. Possible LED states include solid green, blinking green, blinking amber, and solid amber.

When AC power is first applied to the system, the status LED turns solid amber and then immediately changes to blinking green to indicate that the BMC is booting. If the BMC boot process completes with no errors, the status LED changes to solid green. When the server is powered down (transitions to the DC-off state or S5), the BMC is still on standby power and retains the sensor and front panel status LED state established before the power-down event.

Table 4. System Status LED State Definitions

Color	State	Criticality	Description
Off	System is not operating	Not ready	System is powered off (AC and/or DC). System is in EuP Lot6 Off Mode. System is in S5 Soft-Off State.
Green	Solid on	OK	Indicates that the system is running (in S0 State) and its status is "Healthy." The system is not exhibiting any errors. AC power is present, and BMC has booted and manageability functionality is up and running. After a BMC reset in conjunction with the Chassis ID solid ON, the BMC is booting Linux*. Control has passed from BMC uBoot to BMC Linux* itself. It remains in this state for ~10-~20 seconds.
Green	~1 Hz blink	Degraded - System is operating in a degraded state although still functional or system is operating in a redundant state but with an impending failure warning	System degraded: Redundancy loss such as power supply or fan. Applies only if the associated platform subsystem has redundancy capabilities. Fan warning or failure when the number of fully operational fans is less than minimum number needed to cool the system. Non-critical threshold crossed – Temperature (including HSBP temp), voltage, input power to power supply, output current for main power rail from power supply and Processor Thermal Control (Therm Ctrl) sensors. Power supply predictive failure occurred while redundant power supply configuration was present. Unable to use all of the installed memory (more than 1 DIMM installed). Correctable Errors over a threshold and migrating to a spare DIMM (memory sparing). This indicates that the system no longer has spared DIMMs (a redundancy lost condition). Corresponding DIMM LED lit. In mirrored configuration, when memory mirroring takes place and system loses memory redundancy. Battery failure. BMC executing in uBoot. (Indicated by chassis ID blinking at 3Hz). System in degraded state (no manageability). BMC uBoot is running but has not transferred control to BMC Linux*. Server remains in this state 6-8 seconds after BMC reset while it pulls the Linux* image into flash. BMC Watchdog has reset the BMC. Power Unit sensor offset for configuration error is asserted. HDD HSC is off-line or degraded.
Amber	~1 Hz blink	Non-critical - System is operating in a degraded state with an impending failure	Non-fatal alarm – system is likely to fail: Critical threshold crossed – Voltage, temperature (including HSBP temp), input power to power supply, output current for main power rail from power supply, and PROCHOT (Therm Ctrl) sensors. VRD Hot asserted. Minimum number of fans to cool the system not present or failed

Color	State	Criticality	Description
		warning, although still functioning	Hard drive fault. Power Unit Redundancy sensor – Insufficient resources offset (indicates not enough power supplies present). In non-sparing and non-mirroring mode if the threshold of correctable errors is crossed within the window.
Amber	Solid on	Critical, non-recoverable – System is halted	Fatal alarm – system has failed or shut down. CPU CATERR signal asserted. MSID mismatch detected (CATERR also asserts for this case). CPU 1 is missing. CPU Thermal Trip. No power good – power fault. DIMM failure when there is only 1 DIMM present and hence no good memory present. Runtime memory uncorrectable error in non-redundant mode. DIMM Thermal Trip or equivalent. SSB Thermal Trip or equivalent. CPU ERR2 signal asserted. BMC/Video memory test failed. (Chassis ID shows blue/solid-on for this condition). Both uBoot BMC FW images are bad. (Chassis ID shows blue/solid-on for this condition). 240VA fault. Fatal Error in processor initialization: Processor family not identical Processor model not identical Processor core/thread counts not identical Processor cache size not identical Unable to synchronize processor frequency Unable to synchronize QPI link frequency Uncorrectable memory error in a non-redundant mode.

Appendix D. *POST Code Diagnostic LED Decoder Table for S2600CW Server Board Family*

As an aid to assist in troubleshooting a system hang that occurs during a system's Power-On Self-Test (POST) process, the server board includes a bank of eight POST Code Diagnostic LEDs on the back edge of the server board.

During the system boot process, Memory Reference Code (MRC) and System BIOS execute a number of memory initialization and platform configuration processes, each of which is assigned a hex POST code number.

As each routine is started, the given POST code number is displayed to the POST Code Diagnostic LEDs on the back edge of the server board.

During a POST system hang, the displayed post code can be used to identify the last POST routine that was run prior to the error occurring, helping to isolate the possible cause of the hang condition.

Each POST code is represented by eight LEDs; four Green and four Amber. The POST codes are divided into two nibbles, an upper nibble and a lower nibble. The upper nibble bits are represented by Amber Diagnostic LEDs #4, #5, #6, #7. The lower nibble bits are represented by Green Diagnostics LEDs #0, #1, #2 and #3. If the bit is set in the upper and lower nibbles, the corresponding LED is lit. If the bit is clear, the corresponding LED is off.

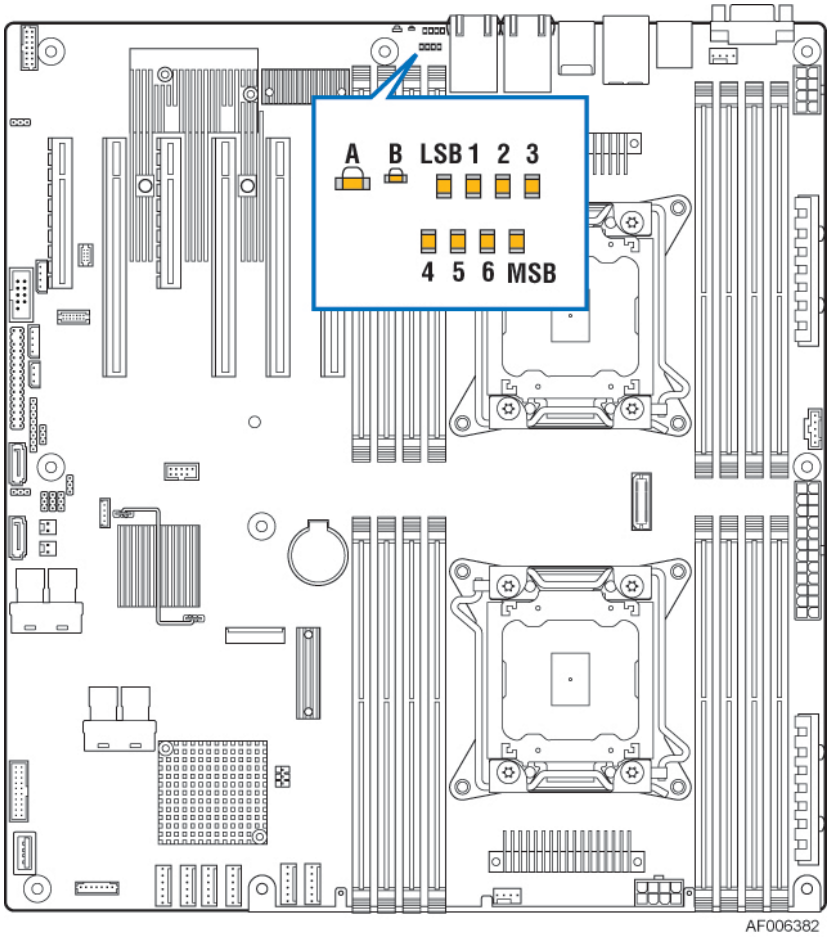


Figure 161. POST Diagnostic LED Location

In the following example, the BIOS sends a value of ACh to the diagnostic LED decoder. The LEDs are decoded as follows:

Note: Diagnostic LEDs are best read and decoded when viewing the LEDs from the back of the system.

Table 5. POST Progress Code LED Example

LEDs	Upper Nibble AMBER LEDs				Lower Nibble GREEN LEDs			
	MSB							LSB
	LED #7	LED #6	LED #5	LED #4	LED #3	LED #2	LED #1	LED #0
	8h	4h	2h	1h	8h	4h	2h	1h
Status	ON	OFF	ON	OFF	ON	ON	OFF	OFF
Results	1	0	1	0	1	1	0	0
	Ah				Ch			

Upper nibble bits = 1010b = Ah; Lower nibble bits = 1100b = Ch; the two are concatenated as ACh

Early POST Memory Initialization MRC Diagnostic Codes

Memory Initialization at the beginning of POST includes multiple functions, such as: discovery, channel training, validation that the DIMM population is acceptable and functional, initialization of the IMC and other hardware settings, and initialization of applicable RAS configurations.

The MRC Progress Codes are displays to the diagnostic LEDs that show the execution point in the MRC operational path at each step.

Table 6. MRC Progress Codes

Checkpoint	Diagnostic LED Decoder 1 = LED On, 0 = LED Off Upper Nibble MSB				Lower Nibble			LSB	Description
	8h	4h	2h	1h	8h	4h	2h	1h	
LED	#7	#6	#5	#4	#3	#2	#1	#0	
MRC Progress Codes									
B0h	1	0	1	1	0	0	0	0	Detect DIMM Population
B1h	1	0	1	1	0	0	0	1	Set DDR3 Frequency
B2h	1	0	1	1	0	0	1	0	Gather Remaining SPD Data
B3h	1	0	1	1	0	0	1	1	Program Registers on the Memory Controller Level
B4h	1	0	1	1	0	1	0	0	Evaluate RAS Modes and Save Rank Information
B5h	1	0	1	1	0	1	0	1	Program Registers on the Channel Level
B6h	1	0	1	1	0	1	1	0	Perform the JEDEC-defined Initialization Sequence
B7h	1	0	1	1	0	1	1	1	Train DDR3 Ranks
B8h	1	0	1	1	1	0	0	0	Initialize CLTT/OLTT
B9h	1	0	1	1	1	0	0	1	Hardware Memory Test and initialization
BAh	1	0	1	1	1	0	1	0	Execute software memory initialization
BBh	1	0	1	1	1	0	1	1	Program Memory Map and Interleaving
BCh	1	0	1	1	1	1	0	0	Program RAS Configuration
BFh	1	0	1	1	1	1	1	1	MRC is Done

Should a major memory initialization error occur, preventing the system from booting with data integrity, a beep code is generated, the MRC displays a fatal error code on the diagnostic LEDs, and a system halt command is executed. Fatal MRC error halts do NOT change the state of the System Status LED, and they do NOT get logged as SEL events. The following table lists all MRC fatal errors that are displayed to the diagnostic LEDs.

Note: Fatal MRC errors will display POST error codes that may be the same as BIOS POST progress codes displayed later in the POST process. You can distinguish the fatal MRC codes from the BIOS POST progress codes by the 3 long beeps accompanying the memory failure beep code of identified in Table 8.

Table 7. MRC Fatal Error Codes

Checkpoint	Diagnostic LED Decoder 1 = LED On, 0 = LED Off Upper Nibble MSB				Lower Nibble			LSB	Description
	8h	4h	2h	1h	8h	4h	2h	1h	
LED	#7	#6	#5	#4	#3	#2	#1	#0	
MRC Fatal Error Codes									
E8h	1	1	1	0	1	0	0	0	No usable memory error 01h = No memory was detected from SPD read, or invalid config that causes no operable memory. 02h = Memory DIMMs on all channels of all sockets are disabled due to hardware memtest error. 3h = No memory installed. All channels are disabled.
E9h	1	1	1	0	1	0	0	1	Memory is locked by Intel Trusted Execution Technology and is inaccessible
EAh	1	1	1	0	1	0	1	0	DDR3 channel training error 01h = Error on read DQ/DQS (Data/Data Strobe) init 02h = Error on Receive Enable 3h = Error on Write Leveling 04h = Error on write DQ/DQS (Data/Data Strobe
EBh	1	1	1	0	1	0	1	1	Memory test failure 01h = Software memtest failure. 02h = Hardware memtest failed. 03h = Hardware Memtest failure in Lockstep Channel mode requiring a channel to be disabled. This is a fatal error which requires a reset and calling MRC with a different RAS mode to retry.
EDh	1	1	1	0	1	1	0	1	DIMM configuration population error 01h = Different DIMM types (UDIMM, RDIMM, LRDIMM) are detected installed in the system. 02h = Violation of DIMM population rules. 03h = The 3rd DIMM slot cannot be populated when QR DIMMs are installed. 04h = UDIMMs are not supported in the 3rd DIMM slot. 05h = Unsupported DIMM Voltage.
EFh	1	1	1	0	1	1	1	1	Indicates a CLTT table structure error

BIOS POST Progress Codes

The following table provides a list of all POST progress codes.

Table 8. POST Progress Codes

Checkpoint	Diagnostic LED Decoder 1 = LED On, 0 = LED Off Upper Nibble / Lower Nibble								Description
	MSB							LSB	
	8h	4h	2h	1h	8h	4h	2h	1h	
LED #	#7	#6	#5	#4	#3	#2	#1	#0	
SEC Phase									
01h	0	0	0	0	0	0	0	1	First POST code after CPU reset.
02h	0	0	0	0	0	0	1	0	Microcode load begin.
03h	0	0	0	0	0	0	1	1	CRAM initialization begin.
04h	0	0	0	0	0	1	0	0	PEI Cache When Disabled.
05h	0	0	0	0	0	1	0	1	SEC Core At Power On Begin.
06h	0	0	0	0	0	1	1	0	Early CPU initialization during Sec Phase.
07h	0	0	0	0	0	1	1	1	Early SB initialization during Sec Phase.
08h	0	0	0	0	1	0	0	0	Early NB initialization during Sec Phase.
09h	0	0	0	0	1	0	0	1	End Of Sec Phase.
0Eh	0	0	0	0	1	1	1	0	Microcode Not Found.
0Fh	0	0	0	0	1	1	1	1	Microcode Not Loaded.
PEI Phase									
10h	0	0	0	1	0	0	0	0	PEI Core
11h	0	0	0	1	0	0	0	1	CPU PEIM
15h	0	0	0	1	0	1	0	1	NB PEIM
19h	0	0	0	1	1	0	0	1	SB PEIM
MRC Process Codes – MRC Progress Code Sequence is executed – See Table 7. MRC Progress Codes									
PEI Phase continued…									
31h	0	0	1	1	0	0	0	1	Memory Installed
32h	0	0	1	1	0	0	1	0	CPU PEIM (CPU Init)
33h	0	0	1	1	0	0	1	1	CPU PEIM (Cache Init)
34h	0	0	1	1	0	1	0	0	CPU PEIM (BSP Select)
35h	0	0	1	1	0	1	0	1	CPU PEIM (AP Init)
36h	0	0	1	1	0	1	1	0	CPU PEIM (CPU SMM Init)
4Fh	0	1	0	0	1	1	1	1	DXE IPL started
DXE Phase									
60h	0	1	1	0	0	0	0	0	DXE Core started

Checkpoint	Diagnostic LED Decoder								Description
	1 = LED On, 0 = LED Off								
	Upper Nibble				Lower Nibble				
	MSB							LSB	
	8h	4h	2h	1h	8h	4h	2h	1h	
LED #	#7	#6	#5	#4	#3	#2	#1	#0	
61h	0	1	1	0	0	0	0	1	DXE NVRAM Init
62h	0	1	1	0	0	0	1	0	SB RUN Init
63h	0	1	1	0	0	0	1	1	DXE CPU Init
68h	0	1	1	0	1	0	0	0	DXE PCI Host Bridge Init
69h	0	1	1	0	1	0	0	1	DXE NB Init
6Ah	0	1	1	0	1	0	1	0	DXE NB SMM Init
70h	0	1	1	1	0	0	0	0	DXE SB Init
71h	0	1	1	1	0	0	0	1	DXE SB SMM Init
72h	0	1	1	1	0	0	1	0	DXE SB devices Init
78h	0	1	1	1	1	0	0	0	DXE ACPI Init
79h	0	1	1	1	1	0	0	1	DXE CSM Init
90h	1	0	0	1	0	0	0	0	DXE BDS Started
91h	1	0	0	1	0	0	0	1	DXE BDS connect drivers
92h	1	0	0	1	0	0	1	0	DXE PCI Bus begin
93h	1	0	0	1	0	0	1	1	DXE PCI Bus HPC Init
94h	1	0	0	1	0	1	0	0	DXE PCI Bus enumeration
95h	1	0	0	1	0	1	0	1	DXE PCI Bus resource requested
96h	1	0	0	1	0	1	1	0	DXE PCI Bus assign resource
97h	1	0	0	1	0	1	1	1	DXE CON_OUT connect
98h	1	0	0	1	1	0	0	0	DXE CON_IN connect
99h	1	0	0	1	1	0	0	1	DXE SIO Init
9Ah	1	0	0	1	1	0	1	0	DXE USB start
9Bh	1	0	0	1	1	0	1	1	DXE USB reset
9Ch	1	0	0	1	1	1	0	0	DXE USB detect
9Dh	1	0	0	1	1	1	0	1	DXE USB enable
A1h	1	0	1	0	0	0	0	1	DXE IDE begin
A2h	1	0	1	0	0	0	1	0	DXE IDE reset
A3h	1	0	1	0	0	0	1	1	DXE IDE detect
A4h	1	0	1	0	0	1	0	0	DXE IDE enable
A5h	1	0	1	0	0	1	0	1	DXE SCSI begin
A6h	1	0	1	0	0	1	1	0	DXE SCSI reset
A7h	1	0	1	0	0	1	1	1	DXE SCSI detect
A8h	1	0	1	0	1	0	0	0	DXE SCSI enable

Checkpoint	Diagnostic LED Decoder 1 = LED On, 0 = LED Off								Description
	Upper Nibble				Lower Nibble				
	MSB							LSB	
	8h	4h	2h	1h	8h	4h	2h	1h	
LED #	#7	#6	#5	#4	#3	#2	#1	#0	
A9h	1	0	1	0	1	0	0	1	DXE verifying SETUP password
ABh	1	0	1	0	1	0	1	1	DXE SETUP start
ACh	1	0	1	0	1	1	0	0	DXE SETUP input wait
ADh	1	0	1	0	1	1	0	1	DXE Ready to Boot
AEh	1	0	1	0	1	1	1	0	DXE Legacy Boot
AFh	1	0	1	0	1	1	1	1	DXE Exit Boot Services
B0h	1	0	1	1	0	0	0	0	RT Set Virtual Address Map Begin
B1h	1	0	1	1	0	0	0	1	RT Set Virtual Address Map End
B2h	1	0	1	1	0	0	1	0	DXE Legacy Option ROM init
B3h	1	0	1	1	0	0	1	1	DXE Reset System
B4h	1	0	1	1	0	1	0	0	DXE USB Hot Plug
B5h	1	0	1	1	0	1	0	1	DXE PCI BUS Hot Plug
B6h	1	0	1	1	0	1	1	0	DXE NVRAM Cleanup
B7h	1	0	1	1	0	1	1	1	DXE Configuration Reset
00h	0	0	0	0	0	0	0	0	INT19
S3 Resume									
E0h	1	1	1	0	0	0	0	0	S3 Resume PEIM (S3 started)
E1h	1	1	1	0	0	0	0	1	S3 Resume PEIM (S3 boot script)
E2h	1	1	1	0	0	0	1	0	S3 Resume PEIM (S3 Video Repost)
E3h	1	1	1	0	0	0	1	1	S3 Resume PEIM (S3 OS wake)
BIOS Recovery									
F0h	1	1	1	1	0	0	0	0	PEIM which detected forced Recovery condition
F1h	1	1	1	1	0	0	0	1	PEIM which detected User Recovery condition
F2h	1	1	1	1	0	0	1	0	Recovery PEIM (Recovery started)
F3h	1	1	1	1	0	0	1	1	Recovery PEIM (Capsule found)
F4h	1	1	1	1	0	1	0	0	Recovery PEIM (Capsule loaded)

Appendix E. *POST Code Diagnostic LED Decoder Table for S2600ST Server Board Family*

As an aid to assist in troubleshooting a system hang occurring during a system's Power-On Self-Test (POST) process, the server board includes a bank of eight (8) POST Code Diagnostic LEDs on the back edge of the server board.

During the system boot process, Memory Reference Code (MRC) and System BIOS execute a number of memory initialization and platform configuration processes, each of which is assigned a hex POST code number.

As each routine is started, the given POST code number is displayed to the POST Code Diagnostic LEDs on the back edge of the server board.

During a POST system hang, the displayed post code can be used to identify the last POST routine that was run prior to the error occurring, helping to isolate the possible cause of the hang condition.

Each POST code is represented by eight (8) LEDs; four (4) Green and four (4) Amber. The POST codes are divided into two (2) nibbles, an upper nibble and a lower nibble. The upper nibble bits are represented by Amber Diagnostic LEDs #4, #5, #6, #7. The lower nibble bits are represented by Green Diagnostics LEDs #0, #1, #2 and #3. If the bit is set in the upper and lower nibbles, the corresponding LED is lit. If the bit is clear, the corresponding LED is off.

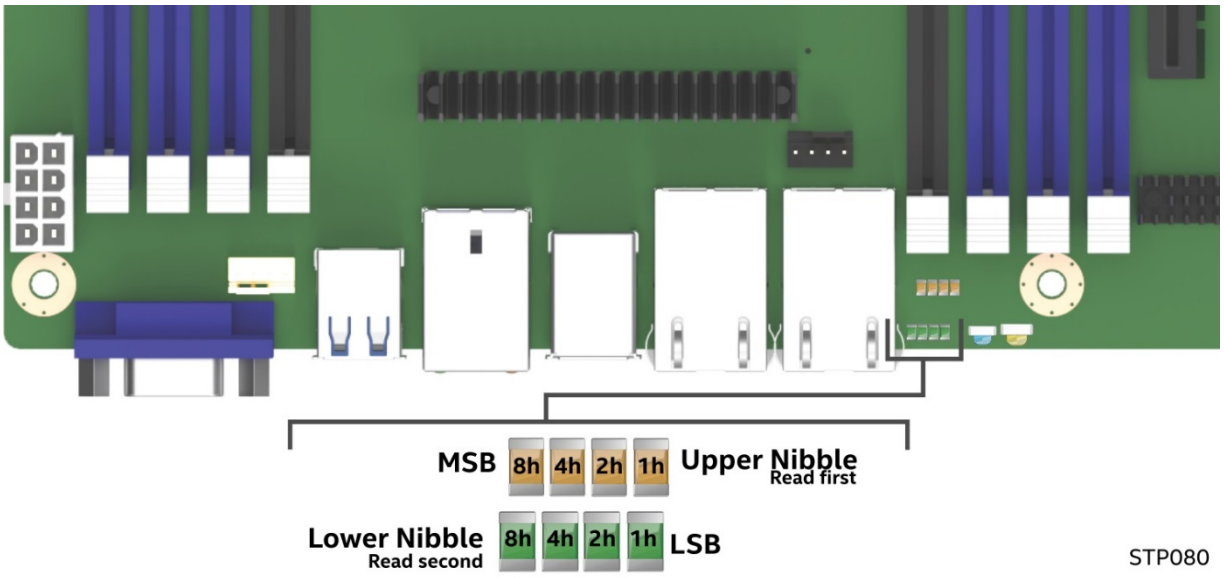


Figure 162. POST Diagnostic LED Location

In the following example, the BIOS sends a value of ACh to the diagnostic LED decoder. The LEDs are decoded as follows:

Note: Diagnostic LEDs are best read and decoded when viewing the LEDs from the back of the system.

Table 9. POST Progress Code LED Example

	LED #3	LED #2	LED #1	LED #0	
	8h (MSB)	4h	2h	1h (LSB)	
LED Status	ON	off	ON	off	Upper Nibble: Ah
	ON	ON	off	off	Lower Nibble: Ch
	8h (MSB) LED #3	4h LED #2	2h LED #1	1h (LSB) LED #0	POST CODE: ACh

Upper nibble bits = 1010b = Ah; Lower nibble bits = 1100b = Ch; the two are concatenated as ACh

Early POST Memory Initialization MRC Diagnostic Codes

Memory Initialization at the beginning of POST includes multiple functions, such as: discovery, channel training, validation that the DIMM population is acceptable and functional, initialization of the IMC and other hardware settings, and initialization of applicable RAS configurations.

The MRC Progress Codes are displayed to the diagnostic LEDs that show the execution point in the MRC operational path at each step.

Table 10. MRC Progress Codes

Diagnostic LED Decoder						
	LED #	**LED 3**	**LED 2**	**LED 1**	**LED 0**	**Description**
Checkpoint	**Upper Nibble**	**8h (MSB)**	**4h**	**2h**	**1h (LSB)**	
	Lower Nibble	**8h (MSB)**	**4h**	**2h**	**1h (LSB)**	
MRC Progress Codes						
B0h	**Upper Nibble**	ON	off	ON	ON	Detect DIMM population.
	Lower Nibble	off	off	off	off	
B1h	**Upper Nibble**	ON	off	ON	ON	Set DDR4 frequency.
	Lower Nibble	off	off	off	ON	

Diagnostic LED Decoder						
	LED #	LED 3	LED 2	LED 1	LED 0	
Checkpoint	**Upper Nibble**	**8h (MSB)**	**4h**	**2h**	**1h (LSB)**	**Description**
	Lower Nibble	**8h (MSB)**	**4h**	**2h**	**1h (LSB)**	
B2h	**Upper Nibble**	ON	off	ON	ON	Gather remaining SPD data.
	Lower Nibble	off	off	ON	off	
B3h	**Upper Nibble**	ON	off	ON	ON	Program registers on the memory controller level.
	Lower Nibble	off	off	ON	ON	
B4h	**Upper Nibble**	ON	off	ON	ON	Evaluate RAS modes and save rank information.
	Lower Nibble	off	ON	off	off	
B5h	**Upper Nibble**	ON	off	ON	ON	Program registers on the channel level.
	Lower Nibble	off	ON	off	ON	
B6h	**Upper Nibble**	ON	off	ON	ON	Perform the JEDEC defined initialization sequence.
	Lower Nibble	off	ON	ON	off	
B7h	**Upper Nibble**	ON	off	ON	ON	Train DDR4 ranks.
	Lower Nibble	off	ON	ON	ON	
B8h	**Upper Nibble**	ON	off	ON	ON	Initialize CLTT/OLTT.
	Lower Nibble	ON	off	off	off	
B9h	**Upper Nibble**	ON	off	ON	ON	Hardware memory test and initialization.
	Lower Nibble	ON	off	off	ON	
BAh	**Upper Nibble**	ON	off	ON	ON	Execute software memory initialization.
	Lower Nibble	ON	off	ON	off	
BBh	**Upper Nibble**	ON	off	ON	ON	Program memory map and interleaving.
	Lower Nibble	ON	off	ON	ON	

Diagnostic LED Decoder						
	LED #	LED 3	LED 2	LED 1	LED 0	Description
Checkpoint	Upper Nibble	8h (MSB)	4h	2h	1h (LSB)	
	Lower Nibble	8h (MSB)	4h	2h	1h (LSB)	
BCh	Upper Nibble	ON	off	ON	ON	Program RAS configuration.
	Lower Nibble	ON	ON	off	off	
BFh	Upper Nibble	ON	off	ON	ON	MRC is done.
	Lower Nibble	ON	ON	ON	ON	

Should a major memory initialization error occur, preventing the system from booting with data integrity, a beep code is generated, the MRC displays a fatal error code on the diagnostic LEDs, and a system halt command is executed. Fatal MRC error halts do NOT change the state of the System Status LED and do NOT get logged as SEL events. The following table lists all MRC fatal errors displayed to the diagnostic LEDs.

Note: Fatal MRC errors will display POST error codes that may be the same as BIOS POST progress codes displayed later in the POST process. The fatal MRC codes can be distinguished from the BIOS POST progress codes by the accompanying memory failure beep code of 3 long beeps as identified in Table 15.

Table 11. MRC Fatal Error Codes

Diagnostic LED Decoder						
	LED #	LED 3	LED 2	LED 1	LED 0	Description
Checkpoint	Upper Nibble	8h (MSB)	4h	2h	1h (LSB)	
	Lower Nibble	8h (MSB)	4h	2h	1h (LSB)	
MRC Fatal Error Codes						
E8h	Upper Nibble	ON	ON	ON	off	**No Usable Memory Error** 01h = No memory was detected from the SPD read or invalid config that causes no operable memory. 02h = Memory DIMMs on all channels of all sockets are disabled due to hardware mem-test error. 3h = No memory installed. All channels are disabled.
	Lower Nibble	ON	off	off	off	

Diagnostic LED Decoder						
	LED #	LED 3	LED 2	LED 1	LED 0	
Checkpoint	Upper Nibble	8h (MSB)	4h	2h	1h (LSB)	Description
	Lower Nibble	8h (MSB)	4h	2h	1h (LSB)	
E9h	Upper Nibble	ON	ON	ON	off	Memory is locked by Intel® Trusted Execution Technology and is inaccessible.
	Lower Nibble	ON	off	off	ON	
EAh	Upper Nibble	ON	ON	ON	off	**DDR4 Channel Training Error** 01h = Error on read DQ/DQS (Data/Data Strobe) initialization 02h = Error on Receive Enable 3h = Error on Write Leveling 04h = Error on write DQ/DQS (Data/Data Strobe
	Lower Nibble	ON	off	ON	off	
EBh	Upper Nibble	ON	ON	ON	off	**Memory Test Failure** 01h = Software mem-test failure. 02h = Hardware mem-test failed.
	Lower Nibble	ON	off	ON	ON	03h = Hardware Mem-test failure in Lockstep Channel mode, requiring a channel to be disabled. This is a fatal error which requires a reset and calling MRC with a different RAS mode to retry.
EDh	Upper Nibble	ON	ON	ON	off	DIMM configuration population error 01h = Different DIMM types (UDIMM, RDIMM, LRDIMM) are detected installed in the system. 02h = Violation of DIMM population rules.
	Lower Nibble	ON	ON	off	ON	03h = The 3rd DIMM slot cannot be populated when QR DIMMs are installed. 04h = UDIMMs are not supported in the 3rd DIMM slot. 05h = Unsupported DIMM Voltage.
EFh	Upper Nibble	ON	ON	ON	off	Indicates a CLTT table structure error

Diagnostic LED Decoder						
	LED #	LED 3	LED 2	LED 1	LED 0	Description
Checkpoint	Upper Nibble	8h (MSB)	4h	2h	1h (LSB)	
	Lower Nibble	8h (MSB)	4h	2h	1h (LSB)	
	Lower Nibble	ON	ON	ON	ON	

BIOS POST Progress Codes

The following table provides a list of all POST progress codes.

Table 12. POST Progress Codes

Diagnostic LED Decoder						
	LED #	LED 3	LED 2	LED 1	LED 0	Description
Checkpoint	Upper Nibble	8h (MSB)	4h	2h	1h (LSB)	
	Lower Nibble	8h (MSB)	4h	2h	1h (LSB)	
SEC Phase						
01h	Upper Nibble	0	0	0	0	First POST code after CPU reset
	Lower Nibble	0	0	0	1	
02h	Upper Nibble	0	0	0	0	Microcode load begin
	Lower Nibble	0	0	1	0	
03h	Upper Nibble	0	0	0	0	CRAM initialization begin
	Lower Nibble	0	0	1	1	
04h	Upper Nibble	0	0	0	0	EI Cache When Disabled
	Lower Nibble	0	1	0	0	
05h	Upper Nibble	0	0	0	0	SEC Core at Power on Begin
	Lower Nibble	0	1	0	1	
06h	Upper Nibble	0	0	0	0	Early CPU Initialization during Sec Phase
	Lower Nibble	0	1	1	0	
UPI RC (Fully leverage without platform change)						
A1h	Upper Nibble	1	0	1	0	Collect Info such as SBSP, Boot Mode, Reset Type Etc.
	Lower Nibble	0	0	0	1	
A3h	Upper Nibble	1	0	1	0	

Diagnostic LED Decoder						
	LED #	LED 3	LED 2	LED 1	LED 0	
Checkpoint	Upper Nibble	8h (MSB)	4h	2h	1h (LSB)	Description
	Lower Nibble	8h (MSB)	4h	2h	1h (LSB)	
	Lower Nibble	0	0	1	1	Set Up Minimum Path Between SBSP & Other Sockets
A7h	Upper Nibble	1	0	1	0	Topology Discovery and Route Calculation
	Lower Nibble	0	1	1	1	
A8h	Upper Nibble	1	0	1	0	Program Final Route
	Lower Nibble	1	0	0	0	
A9h	Upper Nibble	1	0	1	0	Program Final IO SAD Setting
	Lower Nibble	1	0	0	1	
AAh	Upper Nibble	1	0	1	0	Protocol Layer and Other Uncore Settings
	Lower Nibble	1	0	1	0	
ABh	Upper Nibble	1	0	1	0	Transition Links to Full Speed Operation
	Lower Nibble	1	0	1	1	
Ach	Upper Nibble	1	0	1	0	PHY Layer Setting
	Lower Nibble	1	1	0	0	
ADh	Upper Nibble	1	0	1	0	Link Layer Settings
	Lower Nibble	1	1	0	1	
AEh	Upper Nibble	1	0	1	0	Coherency settings
	Lower Nibble	1	1	1	0	
AFh	Upper Nibble	1	0	1	0	UPI initialization done
	Lower Nibble	1	1	1	1	
07h	Upper Nibble	0	0	0	0	Early SB Initialization during Sec Phase
	Lower Nibble	0	1	1	1	
08h	Upper Nibble	0	0	0	0	Early NB Initialization during Sec Phase
	Lower Nibble	1	0	0	0	
09h	Upper Nibble	0	0	0	0	End of Sec Phase
	Lower Nibble	1	0	0	1	
0Eh	Upper Nibble	0	0	0	0	Microcode Not Found
	Lower Nibble	1	1	1	0	
0Fh	Upper Nibble	0	0	0	0	Microcode Not Loaded
	Lower Nibble	1	1	1	1	
PEI Phase						
10h	Upper Nibble	0	0	0	1	PEI Core
	Lower Nibble	0	0	0	0	

Diagnostic LED Decoder						
	LED #	LED 3	LED 2	LED 1	LED 0	
Checkpoint	Upper Nibble	8h (MSB)	4h	2h	1h (LSB)	Description
	Lower Nibble	8h (MSB)	4h	2h	1h (LSB)	
11h	Upper Nibble	0	0	0	1	CPU PEIM
	Lower Nibble	0	0	0	1	
15h	Upper Nibble	0	0	0	1	NB PEIM
	Lower Nibble	0	1	0	1	
19h	Upper Nibble	0	0	0	1	SB PEIM
	Lower Nibble	1	0	0	1	
MRC Progress Codes						
31h	Upper Nibble	0	0	1	1	Memory Installed
	Lower Nibble	0	0	0	1	
32h	Upper Nibble	0	0	1	1	CPU PEIM (CPU Init)
	Lower Nibble	0	0	1	0	
33h	Upper Nibble	0	1	0	0	CPU PEIM (Cache Init)
	Lower Nibble	1	1	1	1	
4Fh	Upper Nibble	0	1	0	0	DXE IPL started
	Lower Nibble	1	1	1	1	
DXE Phase						
60h	Upper Nibble	0	1	1	0	DXE Core started
	Lower Nibble	0	0	0	0	
61h	Upper Nibble	0	1	1	0	DXE NVRAM Initialization
	Lower Nibble	0	0	0	1	
62h	Upper Nibble	0	1	1	0	DXE Set up Initialization
	Lower Nibble	0	0	1	0	
63h	Upper Nibble	0	1	1	0	DXE CPU Initialization
	Lower Nibble	0	1	0	1	
65h	Upper Nibble	0	1	1	0	DXE CPU BSP Select
	Lower Nibble	0	1	0	1	
66h	Upper Nibble	0	1	1	0	DXE CPU AP Initialization
	Lower Nibble	0	1	1	0	
68h	Upper Nibble	0	1	1	0	DXE PCI Host Bridge Initialization
	Lower Nibble	1	0	0	0	
69h	Upper Nibble	0	1	1	0	DXE NB Initialization
	Lower Nibble	1	0	0	1	

Diagnostic LED Decoder						
	LED #	LED 3	LED 2	LED 1	LED 0	
Checkpoint	Upper Nibble	8h (MSB)	4h	2h	1h (LSB)	Description
	Lower Nibble	8h (MSB)	4h	2h	1h (LSB)	
6Ah	Upper Nibble	0	1	1	0	DXE NB SMM Initialization
	Lower Nibble	1	0	1	0	
70h	Upper Nibble	0	1	1	1	DXE SB Initialization
	Lower Nibble	0	0	0	0	
71h	Upper Nibble	0	1	1	1	DXE SB SMM Initialization
	Lower Nibble	0	0	0	1	
72h	Upper Nibble	0	1	1	1	DXE SB Devices Initialization
	Lower Nibble	0	0	1	0	
78h	Upper Nibble	0	1	1	1	DXE ACPI Initialization
	Lower Nibble	1	0	0	1	
79h	Upper Nibble	0	1	1	1	DXE CSM Initialization
	Lower Nibble	1	0	0	1	
80h	Upper Nibble	1	0	0	0	DXE BDS Started
	Lower Nibble	0	0	0	0	
81h	Upper Nibble	1	0	0	0	DXE BDS Connect Drivers
	Lower Nibble	0	0	0	1	
82h	Upper Nibble	1	0	0	0	DXE PCI Bus Begin
	Lower Nibble	0	0	1	0	
83h	Upper Nibble	1	0	0	0	DXE PCI Bus HPC Initialization
	Lower Nibble	0	0	1	1	
84h	Upper Nibble	1	0	0	0	DXE PCI Bus Enumeration
	Lower Nibble	0	1	0	0	
85h	Upper Nibble	1	0	0	0	DXE PCI Bus Resource Requested
	Lower Nibble	0	1	0	1	
86h	Upper Nibble	1	0	0	0	DXE PCI Bus Assign Resource
	Lower Nibble	0	1	1	0	
87h	Upper Nibble	1	0	0	0	DXE CON_OUT Connect
	Lower Nibble	0	1	1	1	
88h	Upper Nibble	1	0	0	0	DXE CON_IN Connect
	Lower Nibble	1	0	0	0	
89h	Upper Nibble	1	0	0	0	DXE SIO Initialization
	Lower Nibble	1	0	0	1	

Diagnostic LED Decoder						
	LED #	LED 3	LED 2	LED 1	LED 0	
Checkpoint	Upper Nibble	8h (MSB)	4h	2h	1h (LSB)	Description
	Lower Nibble	8h (MSB)	4h	2h	1h (LSB)	
8Ah	Upper Nibble	1	0	0	0	DXE USB Start
	Lower Nibble	1	0	1	0	
8Bh	Upper Nibble	1	0	0	0	DXE USB Reset
	Lower Nibble	1	0	1	1	
8Ch	Upper Nibble	1	0	0	0	DXE USB Detect
	Lower Nibble	1	1	0	0	
8Dh	Upper Nibble	1	0	0	0	DXE USB Enable
	Lower Nibble	1	1	0	1	
91h	Upper Nibble	1	0	0	1	DXE IDE Begin
	Lower Nibble	0	0	0	1	
92h	Upper Nibble	1	0	0	1	DXE IDE Reset
	Lower Nibble	0	0	1	0	
93h	Upper Nibble	1	0	0	1	DXE IDE Detect
	Lower Nibble	0	0	1	1	
94h	Upper Nibble	1	0	0	1	DXE IDE Enable
	Lower Nibble	0	1	0	0	
95h	Upper Nibble	1	0	0	1	DXE SCSI Begin
	Lower Nibble	0	1	0	1	
96h	Upper Nibble	1	0	0	1	DXE SCSI Reset
	Lower Nibble	0	1	1	0	
97h	Upper Nibble	1	0	0	1	DXE SCSI Detect
	Lower Nibble	0	1	1	1	
98h	Upper Nibble	1	0	0	1	DXE SCSI Enable
	Lower Nibble	1	0	0	0	
99h	Upper Nibble	1	0	0	1	DXE Verifying SETUP Password
	Lower Nibble	1	0	0	1	
9Bh	Upper Nibble	1	0	0	1	DXE SETUP Start
	Lower Nibble	1	0	1	1	
9Ch	Upper Nibble	1	0	0	1	DXE SETUP Input Wait
	Lower Nibble	1	1	0	0	
9Dh	Upper Nibble	1	0	0	1	DXE Ready to Boot
	Lower Nibble	1	1	0	1	

Diagnostic LED Decoder						
	LED #	LED 3	LED 2	LED 1	LED 0	
Checkpoint	Upper Nibble	8h (MSB)	4h	2h	1h (LSB)	Description
	Lower Nibble	8h (MSB)	4h	2h	1h (LSB)	
9Eh	Upper Nibble	1	0	0	1	DXE Legacy Boot
	Lower Nibble	1	1	1	0	
9Fh	Upper Nibble	1	0	0	1	DXE Exit Boot Services
	Lower Nibble	1	1	1	1	
C0h	Upper Nibble	1	1	0	0	RT Set Virtual Address Map Begin
	Lower Nibble	0	0	0	0	
C2h	Upper Nibble	1	1	0	0	DXE Legacy Option ROM Initialization
	Lower Nibble	0	0	1	0	
C3h	Upper Nibble	1	1	0	0	DXE Reset System
	Lower Nibble	0	0	1	1	
C4h	Upper Nibble	1	1	0	0	DXE USB Hot Plug
	Lower Nibble	0	1	0	0	
C5h	Upper Nibble	1	1	0	0	DXE PCI BUS Hot Plug
	Lower Nibble	0	1	0	1	
C6h	Upper Nibble	1	1	0	0	DXE NVRAM Cleanup
	Lower Nibble	0	1	1	0	
C7h	Upper Nibble	1	1	0	0	DXE ACPI Enable
	Lower Nibble	0	1	1	1	
0h	Upper Nibble	0	0	0	0	Clear POST Code
	Lower Nibble	0	0	0	0	
S3 Resume						
40h	Upper Nibble	0	1	0	0	S3 Resume PEIM (S3 Started)
	Lower Nibble	0	0	0	0	
41h	Upper Nibble	0	1	0	0	S3 Resume PEIM (S3 Boot Script)
	Lower Nibble	0	0	0	1	
42h	Upper Nibble	0	1	0	0	S3 Resume PEIM (S3 Video Repost)
	Lower Nibble	0	0	1	0	
43h	Upper Nibble	0	1	0	0	S3 Resume PEIM (S3 OS wake)
	Lower Nibble	0	0	1	1	
BIOS Recovery						
46h	Upper Nibble	0	1	0	0	

Diagnostic LED Decoder						
	LED #	LED 3	LED 2	LED 1	LED 0	
Checkpoint	Upper Nibble	8h (MSB)	4h	2h	1h (LSB)	Description
	Lower Nibble	8h (MSB)	4h	2h	1h (LSB)	
	Lower Nibble	0	1	1	0	PEIM which Detected Forced Recovery Condition
47h	Upper Nibble	0	1	0	0	PEIM which Detected User Recovery Condition
	Lower Nibble	0	1	1	1	
48h	Upper Nibble	0	1	0	0	Recovery PEIM (Recovery Started)
	Lower Nibble	1	0	0	0	
49h	Upper Nibble	0	1	0	0	Recovery PEIM (Capsule Found)
	Lower Nibble	1	0	0	1	
4Ah	Upper Nibble	0	1	0	0	Recovery PEIM (Capsule Loaded)
	Lower Nibble	1	0	1	0	
E8h	Upper Nibble	1	1	1	0	No Usable Memory Error
	Lower Nibble	1	0	0	0	
E9h	Upper Nibble	1	1	1	0	Memory is locked by Intel® Trusted Execution Technology and is inaccessible.
	Lower Nibble	1	0	0	1	
EAh	Upper Nibble	1	1	1	0	DDR4 Channel Training Error
	Lower Nibble	1	0	1	0	
EBh	Upper Nibble	1	1	1	0	Memory Test Failure
	Lower Nibble	1	0	1	1	
Edh	Upper Nibble	1	1	1	0	DIMM Configuration/Population Error:
	Lower Nibble	1	1	0	1	
EFh	Upper Nibble	1	1	1	0	Indicates a CLTT Table Structure Error.
	Lower Nibble	1	1	1	1	
B0h	Upper Nibble	1	0	1	1	Detect DIMM Population
	Lower Nibble	0	0	0	0	
B1h	Upper Nibble	1	0	1	1	Set DDR4 Frequency
	Lower Nibble	0	0	0	1	
B2h	Upper Nibble	1	0	1	1	Gather Remaining SPD Data
	Lower Nibble	0	0	1	0	
B3h	Upper Nibble	1	0	1	1	Program registers on the memory controller level
	Lower Nibble	0	0	1	1	
B4h	Upper Nibble	1	0	1	1	Evaluate RAS modes and save rank information
	Lower Nibble	0	1	0	0	
B5h	Upper Nibble	1	0	1	1	

Diagnostic LED Decoder						
	LED #	LED 3	LED 2	LED 1	LED 0	
Checkpoint	Upper Nibble	8h (MSB)	4h	2h	1h (LSB)	Description
	Lower Nibble	8h (MSB)	4h	2h	1h (LSB)	
	Lower Nibble	0	1	0	1	Program registers on the channel level
B6h	Upper Nibble	1	0	1	1	Perform the JEDEC defined initialization sequence
	Lower Nibble	0	1	1	0	
B7h	Upper Nibble	1	0	1	1	Train DDR4 ranks
	Lower Nibble	0	1	1	1	
B8h	Upper Nibble	1	0	1	1	Initialize CLTT/OLTT
	Lower Nibble	1	0	0	0	
B9h	Upper Nibble	1	0	1	1	Hardware Memory Test and Initialization
	Lower Nibble	1	0	0	1	
Bah	Upper Nibble	1	0	1	1	Execute Software Memory Initialization
	Lower Nibble	1	0	1	0	
BBh	Upper Nibble	1	0	1	1	Program Memory Map and Interleaving
	Lower Nibble	1	0	1	1	
BCh	Upper Nibble	1	0	1	1	Program RAS Configuration
	Lower Nibble	1	1	0	0	
BFh	Upper Nibble	1	0	1	1	MRC is done
	Lower Nibble	1	1	1	1	

Appendix F. *POST Code Errors*

Most error conditions encountered during POST are reported using POST Error Codes. These codes represent specific failures, warnings, or are informational. POST Error Codes may be displayed in the **Error Manager Display Screen** and are always logged to the System Event Log (SEL). Logged events are available to System Management applications, including Remote and Out of Band (OOB) management.

There are exception cases in early initialization where system resources are not adequately initialized for handling POST Error Code reporting. These cases are primarily Fatal Error conditions resulting from initialization of processors and memory, and they are handed by a Diagnostic LED display with a system halt.

The following table lists the supported POST Error Codes. Each error code is assigned an error type which determines the action the BIOS will take when the error is encountered. Error types include Minor, Major, and Fatal. The BIOS action for each is defined as follows:

Minor: The error message is displayed on the screen or on the **Error Manager Display Screen**, and an error is logged to the SEL. The system continues booting in a degraded state. You may want to replace the erroneous unit. The POST Error Pause option setting in the BIOS setup does not have any effect on this error.

Major: The error message is displayed on the Error Manager screen, and an error is logged to the SEL. The POST Error Pause option setting in the BIOS setup determines whether the system pauses to the Error Manager for this type of error so the user can take immediate corrective action or the system continues booting.

> **Note** that for 0048 “Password check failed”, the system halts, and, then, after the next reset/reboot, displays the error code on the **Error Manager Display Screen**.

Fatal: The system halts during post at a blank screen with the text **“Unrecoverable fatal error found. System will not boot until the error is resolved” and “Press <F2> to enter setup”** The POST Error Pause option setting in the BIOS setup does not have any effect with this class of error.

When the operator presses the **F2** key on the keyboard, the error message is displayed on the Error Manager screen, and an error is logged to the SEL with the error code. The system cannot boot unless the error is resolved. The user needs to replace the faulty part and restart the system.

Note: The POST error codes in the following table are common to all current generation Intel server platforms. Features present on a given server board/system will determine which of the listed error codes are supported.

Table 13. POST Error Codes and Messages

Error Code	Error Message	Response
0012	System RTC date/time not set	Major
0048	Password check failed	Major
0140	PCI component encountered a PERR error	Major
0141	PCI resource conflict	Major
0146	PCI out of resources error	Major
0191	Processor core/thread count mismatch detected	Fatal
0192	Processor cache size mismatch detected	Fatal
0194	Processor family mismatch detected	Fatal
0195	Processor Intel(R) QPI link frequencies unable to synchronize	Fatal
0196	Processor model mismatch detected	Fatal
0197	Processor frequencies unable to synchronize	Fatal
5220	BIOS Settings reset to default settings	Major
5221	Passwords cleared by jumper	Major
5224	Password clear jumper is Set	Major
8130	Processor 01 disabled	Major
8131	Processor 02 disabled	Major
8160	Processor 01 unable to apply microcode update	Major
8161	Processor 02 unable to apply microcode update	Major
8170	Processor 01 failed self-test (BIST)	Major
8171	Processor 02 failed self-test (BIST)	Major
8180	Processor 01 microcode update not found	Minor
8181	Processor 02 microcode update not found	Minor
8190	Watchdog timer failed on last boot	Major
8198	OS boot watchdog timer failure	Major
8300	Baseboard management controller failed Self-Test	Major
8305	Hot-Swap Controller failure	Major
83A0	Management Engine (ME) failed self-test	Major
83A1	Management Engine (ME) failed to respond.	Major
84F2	Baseboard management controller failed to respond	Major
84F3	Baseboard management controller in update mode	Major
84F4	Sensor data record empty	Major
84FF	System event log full	Minor
8500	Memory component could not be configured in the selected RAS mode	Major
8501	DIMM Population Error	Major
8520	DIMM_A1 failed test/initialization	Major
8521	DIMM_A2 failed test/initialization	Major

Error Code	Error Message	Response
8522	DIMM_A3 failed test/initialization	Major
8523	DIMM_B1 failed test/initialization	Major
8524	DIMM_B2 failed test/initialization	Major
8525	DIMM_B3 failed test/initialization	Major
8526	DIMM_C1 failed test/initialization	Major
8527	DIMM_C2 failed test/initialization	Major
8528	DIMM_C3 failed test/initialization	Major
8529	DIMM_D1 failed test/initialization	Major
852A	DIMM_D2 failed test/initialization	Major
852B	DIMM_D3 failed test/initialization	Major
852C	DIMM_E1 failed test/initialization	Major
852D	DIMM_E2 failed test/initialization	Major
852E	DIMM_E3 failed test/initialization	Major
852F	DIMM_F1 failed test/initialization	Major
8530	DIMM_F2 failed test/initialization	Major
8531	DIMM_F3 failed test/initialization	Major
8532	DIMM_G1 failed test/initialization	Major
8533	DIMM_G2 failed test/initialization	Major
8534	DIMM_G3 failed test/initialization	Major
8535	DIMM_H1 failed test/initialization	Major
8536	DIMM_H2 failed test/initialization	Major
8537	DIMM_H3 failed test/initialization	Major
8538	DIMM_J1 failed test/initialization	Major
8539	DIMM_J2 failed test/initialization	Major
853A	DIMM_J3 failed test/initialization	Major
853B	DIMM_K1 failed test/initialization	Major
853C	DIMM_K2 failed test/initialization	Major
853D	DIMM_K3 failed test/initialization	Major
853E	DIMM_L1 failed test/initialization	Major
853F (Go to 85C0)	DIMM_L2 failed test/initialization	Major
8540	DIMM_A1 disabled	Major
8541	DIMM_A2 disabled	Major
8542	DIMM_A3 disabled	Major
8543	DIMM_B1 disabled	Major
8544	DIMM_B2 disabled	Major
8545	DIMM_B3 disabled	Major

Error Code	Error Message	Response
8546	DIMM_C1 disabled	Major
8547	DIMM_C2 disabled	Major
8548	DIMM_C3 disabled	Major
8549	DIMM_D1 disabled	Major
854A	DIMM_D2 disabled	Major
854B	DIMM_D3 disabled	Major
854C	DIMM_E1 disabled	Major
854D	DIMM_E2 disabled	Major
854E	DIMM_E3 disabled	Major
854F	DIMM_F1 disabled	Major
8550	DIMM_F2 disabled	Major
8551	DIMM_F3 disabled	Major
8552	DIMM_G1 disabled	Major
8553	DIMM_G2 disabled	Major
8554	DIMM_G3 disabled	Major
8555	DIMM_H1 disabled	Major
8556	DIMM_H2 disabled	Major
8557	DIMM_H3 disabled	Major
8558	DIMM_J1 disabled	Major
8559	DIMM_J2 disabled	Major
855A	DIMM_J3 disabled	Major
855B	DIMM_K1 disabled	Major
855C	DIMM_K2 disabled	Major
855D	DIMM_K3 disabled	Major
855E	DIMM_L1 disabled	Major
855F (Go to 85D0)	DIMM_L2 disabled	Major
8560	DIMM_A1 encountered a Serial Presence Detection (SPD) failure	Major
8561	DIMM_A2 encountered a Serial Presence Detection (SPD) failure	Major
8562	DIMM_A3 encountered a Serial Presence Detection (SPD) failure	Major
8563	DIMM_B1 encountered a Serial Presence Detection (SPD) failure	Major
8564	DIMM_B2 encountered a Serial Presence Detection (SPD) failure	Major
8565	DIMM_B3 encountered a Serial Presence Detection (SPD) failure	Major
8566	DIMM_C1 encountered a Serial Presence Detection (SPD) failure	Major
8567	DIMM_C2 encountered a Serial Presence Detection (SPD) failure	Major
8568	DIMM_C3 encountered a Serial Presence Detection (SPD) failure	Major
8569	DIMM_D1 encountered a Serial Presence Detection (SPD) failure	Major

Error Code	Error Message	Response
856A	DIMM_D2 encountered a Serial Presence Detection (SPD) failure	Major
856B	DIMM_D3 encountered a Serial Presence Detection (SPD) failure	Major
856C	DIMM_E1 encountered a Serial Presence Detection (SPD) failure	Major
856D	DIMM_E2 encountered a Serial Presence Detection (SPD) failure	Major
856E	DIMM_E3 encountered a Serial Presence Detection (SPD) failure	Major
856F	DIMM_F1 encountered a Serial Presence Detection (SPD) failure	Major
8570	DIMM_F2 encountered a Serial Presence Detection (SPD) failure	Major
8571	DIMM_F3 encountered a Serial Presence Detection (SPD) failure	Major
8572	DIMM_G1 encountered a Serial Presence Detection (SPD) failure	Major
8573	DIMM_G2 encountered a Serial Presence Detection (SPD) failure	Major
8574	DIMM_G3 encountered a Serial Presence Detection (SPD) failure	Major
8575	DIMM_H1 encountered a Serial Presence Detection (SPD) failure	Major
8576	DIMM_H2 encountered a Serial Presence Detection (SPD) failure	Major
8577	DIMM_H3 encountered a Serial Presence Detection (SPD) failure	Major
8578	DIMM_J1 encountered a Serial Presence Detection (SPD) failure	Major
8579	DIMM_J2 encountered a Serial Presence Detection (SPD) failure	Major
857A	DIMM_J3 encountered a Serial Presence Detection (SPD) failure	Major
857B	DIMM_K1 encountered a Serial Presence Detection (SPD) failure	Major
857C	DIMM_K2 encountered a Serial Presence Detection (SPD) failure	Major
857D	DIMM_K3 encountered a Serial Presence Detection (SPD) failure	Major
857E	DIMM_L1 encountered a Serial Presence Detection (SPD) failure	Major
857F (Go to 85E0)	DIMM_L2 encountered a Serial Presence Detection (SPD) failure	Major
85C0	DIMM_L3 failed test/initialization	Major
85C1	DIMM_M1 failed test/initialization	Major
85C2	DIMM_M2 failed test/initialization	Major
85C3	DIMM_M3 failed test/initialization	Major
85C4	DIMM_N1 failed test/initialization	Major
85C5	DIMM_N2 failed test/initialization	Major
85C6	DIMM_N3 failed test/initialization	Major
85C7	DIMM_P1 failed test/initialization	Major
85C8	DIMM_P2 failed test/initialization	Major
85C9	DIMM_P3 failed test/initialization	Major
85CA	DIMM_R1 failed test/initialization	Major
85CB	DIMM_R2 failed test/initialization	Major
85CC	DIMM_R3 failed test/initialization	Major
85CD	DIMM_T1 failed test/initialization	Major
85CE	DIMM_T2 failed test/initialization	Major

Error Code	Error Message	Response
85CF	DIMM_T3 failed test/initialization	Major
85D0	DIMM_L3 disabled	Major
85D1	DIMM_M1 disabled	Major
85D2	DIMM_M2 disabled	Major
85D3	DIMM_M3 disabled	Major
85D4	DIMM_N1 disabled	Major
85D5	DIMM_N2 disabled	Major
85D6	DIMM_N3 disabled	Major
85D7	DIMM_P1 disabled	Major
85D8	DIMM_P2 disabled	Major
85D9	DIMM_P3 disabled	Major
85DA	DIMM_R1 disabled	Major
85DB	DIMM_R2 disabled	Major
85DC	DIMM_R3 disabled	Major
85DD	DIMM_T1 disabled	Major
85DE	DIMM_T2 disabled	Major
85DF	DIMM_T3 disabled	Major
85E0	DIMM_L3 encountered a Serial Presence Detection (SPD) failure	Major
85E1	DIMM_M1 encountered a Serial Presence Detection (SPD) failure	Major
85E2	DIMM_M2 encountered a Serial Presence Detection (SPD) failure	Major
85E3	DIMM_M3 encountered a Serial Presence Detection (SPD) failure	Major
85E4	DIMM_N1 encountered a Serial Presence Detection (SPD) failure	Major
85E5	DIMM_N2 encountered a Serial Presence Detection (SPD) failure	Major
85E6	DIMM_N3 encountered a Serial Presence Detection (SPD) failure	Major
85E7	DIMM_P1 encountered a Serial Presence Detection (SPD) failure	Major
85E8	DIMM_P2 encountered a Serial Presence Detection (SPD) failure	Major
85E9	DIMM_P3 encountered a Serial Presence Detection (SPD) failure	Major
85EA	DIMM_R1 encountered a Serial Presence Detection (SPD) failure	Major
85EB	DIMM_R2 encountered a Serial Presence Detection (SPD) failure	Major
85EC	DIMM_R3 encountered a Serial Presence Detection (SPD) failure	Major
85ED	DIMM_T1 encountered a Serial Presence Detection (SPD) failure	Major
85EE	DIMM_T2 encountered a Serial Presence Detection (SPD) failure	Major
85EF	DIMM_T3 encountered a Serial Presence Detection (SPD) failure	Major
8604	POST Reclaim of non-critical NVRAM variables	Minor
8605	BIOS Settings are corrupted	Major
8606	NVRAM variable space was corrupted and has been reinitialized	Major

Error Code	Error Message	Response
8607	Recovery boot has been initiated. **Note**: The Primary BIOS image may be corrupted or the system may hang during POST. A BIOS update is required.	Fatal
92A3	Serial port component was not detected	Major
92A9	Serial port component encountered a resource conflict error	Major
A000	TPM device not detected.	Minor
A001	TPM device missing or not responding.	Minor
A002	TPM device failure.	Minor
A003	TPM device failed self-test.	Minor
A100	BIOS ACM Error	Major
A421	PCI component encountered a SERR error	Fatal
A5A0	PCI Express component encountered a PERR error	Minor
A5A1	PCI Express component encountered an SERR error	Fatal
A6A0	DXE Boot Services driver: Not enough memory available to shadow a Legacy Option ROM.	Minor

POST Error Beep Codes

The following table lists the POST error beep codes. Prior to system video initialization, the BIOS uses these beep codes to inform users on error conditions. The beep code is followed by a user-visible code on the POST Progress LEDs.

Table 14. Post Error Beep Codes

Beeps	Error Message	POST Progress Code	Description
1	USB device action	N/A	Short beep sounded whenever USB device is discovered in POST, or inserted or removed during runtime.
1 long	Intel® TXT security violation	0xAE, 0xAF	System halted because Intel® Trusted Execution Technology detected a potential violation of system security.
3	Memory error	Multiple	System halted because a fatal error related to the memory was detected.
3 long and 1	CPU mismatch error	0xE5, 0xE6	System halted because a fatal error related to the CPU family/core/cache mismatch was detected.
The following Beep Codes are sounded during BIOS Recovery.			
2	Recovery started	N/A	Recovery boot has been initiated.
4	Recovery failed	N/A	Recovery has failed. This typically happens so quickly after recovery is initiated that it sounds like a 2-4 beep code.

The Integrated BMC may generate beep codes upon detection of failure conditions. Beep codes are sounded each time the problem is discovered, such as on each power-up attempt, but are not sounded continuously. Codes that are common across all Intel server boards and systems that use same generation chipset are listed in the following table. Each digit in the code is represented by a sequence of beeps whose count is equal to the digit.

Table 15. Integrated BMC Beep Codes

Code	Associated Sensors	Reason for Beep
1-5-2-1	No CPUs installed or first CPU socket is empty.	CPU1 socket is empty or sockets are populated incorrectly. CPU1 must be populated before CPU2.
1-5-2-4	MSID Mismatch	MSID mismatch occurs if a processor is installed into a system board that has incompatible power capabilities.
1-5-4-2	Power fault	DC power unexpectedly lost (power good dropout) – power unit sensors report power unit failure offset.
1-5-4-4	Power control fault (power good assertion timeout).	Power good assertion timeout – power unit sensors report soft power control failure offset.
1-5-1-2	VR Watchdog Timer sensor assertion	VR controller DC power on sequence was not completed in time...
1-5-1-4	Power Supply Status	The system does not power on or unexpectedly powers off and a Power Supply Unit (PSU) is present that is incompatible with one or more other PSUs in the system.

Appendix G. *Glossary*

Term	Definition
AHCI	Advanced Host Controller Interface
BIOS	Basic Input Output System
BMC	Baseboard Management Controller
BSP	Bootstrap Processor
DIMM	Dual In-line Memory Module
ESD	Electro-Static Discharge
FRU	Field-Replaceable Unit
GPGPU	General Purpose/ Graphics Processing Unit
I^2C	Inter-Integrated Circuit
iPC	Intel Product Code
LAN	Local Area Network
Intel® ME	Intel® Management Engine
NDA	Non-Disclosure Agreement
NVDIMM	Non-Volatile Dual Inline Memory Module
OS	Operating System
PCIe*	PCI Express*
PHM	Processor Heat Sink Module
PMBus*	Power Management Bus
POST	Power-On Self-Test
PSU	Power Supply Unit
RDIMM	Registered DIMM
SAS	Serial Attached SCSI
SATA	Serial ATA
SEL	System Event Log
SMM	Server Management Mode
SMS	System Management Software
SUP	System Update Package
SR	Single Rank
SSD	Solid State Drive
Intel® SSE	Intel® Streaming SIMD Extensions
SSH	Secure Shell
SSL	Secure Sockets Layer
SUP	System Update Package
TCG	Trusted Computing Group
TIM	Thermal Interface Material
TPM	Trusted Platform Module
TPS	Technical Product Specification

Term	Definition
Intel® TXT	Intel® Trusted Execution Technology for servers
UEFI	Unified Extensible Firmware Interface
Intel® UPI	Intel® Ultra Path Interconnect
USB	Universal Serial Bus