Intel® Server Board S7200AP/APR
Intel® Compute Module HNS7200AP/APR
Product Family

System Integration and Service Guide

A document providing instruction on installation and removal of subassemblies.

Revision 1.1
April 2018

Datacenter Systems Group

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Revision History

Date	Revision Number	Modifications
Oct 2017	0.8	Update with Adams Pass Refresh information
Jan 2018	1.0	Update Processor Information; image modifications; warnings updated.
April 2018	1.1	Updated Intel® Xeon™ Phi™ x205 Product Family CPUs to official marketing name of Intel® Xeon™ Phi™ 72x5 Product Family CPUs

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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 http://www.intel.com/support/motherboards/server/sb/cs-010770.htm.

重要安全指导

在执行任何指令之前，请阅读本文档中的所有注意事项及安全声明。和/或 http://www.intel.com/support/motherboards/server/sb/cs-010770.htm 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》）。

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: Risk of electric shock or fire exist. Do not service the systems if energized by any source of power. The power button **DOES NOT** turn off the system AC power. To remove power from the system, you must unplug the AC power cords fully from the systems and from the wall outlet. Make sure the AC power cord is unplugged before you open the chassis, add, or remove any components. Hazardous conditions, devices and cables: Hazardous electrical conditions may be present on power, telephone, and communication cables. Turn off the server and disconnect the power cord, telecommunications systems, networks, and modems attached to the server before opening it. Otherwise, personal injury or equipment damage can result.

Liquid Cooling Solutions: Follow the power off guidance. Prior to powering up any compute modules, check the liquid cooling system for leaks and/or damaged parts (e.g. tubing, fittings, and disconnects). Ensure that all power is off prior to disconnecting any cooling quick disconnects. Do not to energize or power up any server node if the liquid cooling system is compromised in any way. To reduce risk of damage to the cooling system, use care when installing or removing server nodes. Avoid excessive force when connecting & disconnecting quick disconnects. Keep cooling tubing clear of pinch points when sliding server nodes.

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 attached to the server 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.

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 divided into two major sections. The first half of the document provides detailed instructions on how to install critical components to the system like memory, processor and others. It will guide 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

Chapter 1 Product Features - provides a high level overview of the Intel® Compute Module HNS7200AP. In this chapter, you will find a list of the compute module features and illustrations identifying the major compute module components.

Chapter 2 Hardware Installations and Upgrades - provides instructions on adding and replacing the components. Use this chapter for step-by-step instructions and diagrams for installing or replacing the components such as the processors, memory, and add-in cards, among other components.

Chapter 3 System Software Updates and Configuration - provides instructions on using the utilities that are shipped with the board or that may be required to update the compute module. This includes information for navigating through the BIOS Setup screens, performing a BIOS update, and resetting the password or BIOS defaults.

Chapter 4 Server Utilities - provides instructions for server utilities.

Nomenclature

Throughout this manual “compute module” is the abbreviation of the Intel® Compute Module HNS7200AP or HNS7200APR. It is also referred to as “compute node” or “node”.

Additional Information and Software

For additional information about this family of products or any of their supported accessories, refer to the following resources available at http://www.intel.com/support.

Table 1. Server System References

For this information or software	Use this Document or Software
For in-depth technical information about this product	Intel® Server Board S7200AP *Product Family and Intel® Compute Module HNS7200AP Product Family Technical Product Specification*
For product list and supported Intel spares and accessories	*Spares and Accessories List and Configuration Guide*
For server configuration guidance and compatibility	Intel® Server Configurator tool *http://serverconfigurator.intel.com*
For system power budget guidance	Power Budget Tool *http://www.intel.com/support*
Product Safety and Regulatory document	*Intel Server Products – Product Safety and Regulatory Compliance Document*

The server system has support for several software utilities which can be used to configure system parameters and aid in troubleshooting system issues. All available utilities can be downloaded from the following Intel web site: http://downloadcenter.intel.com/

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1 Product Features

This chapter briefly describes the main features of the Intel® Server Board S7200AP/APR and the Intel® Compute Module HNS7200AP/APR. This includes illustrations of the products, a list of features, and diagrams showing the location of important components and connections. The two main boards are described in this document to include support for several chassis. The document includes updates for Intel® Server Board S7200APR refresh product that is supported in the Intel® Server Chassis H2204XXLRE.

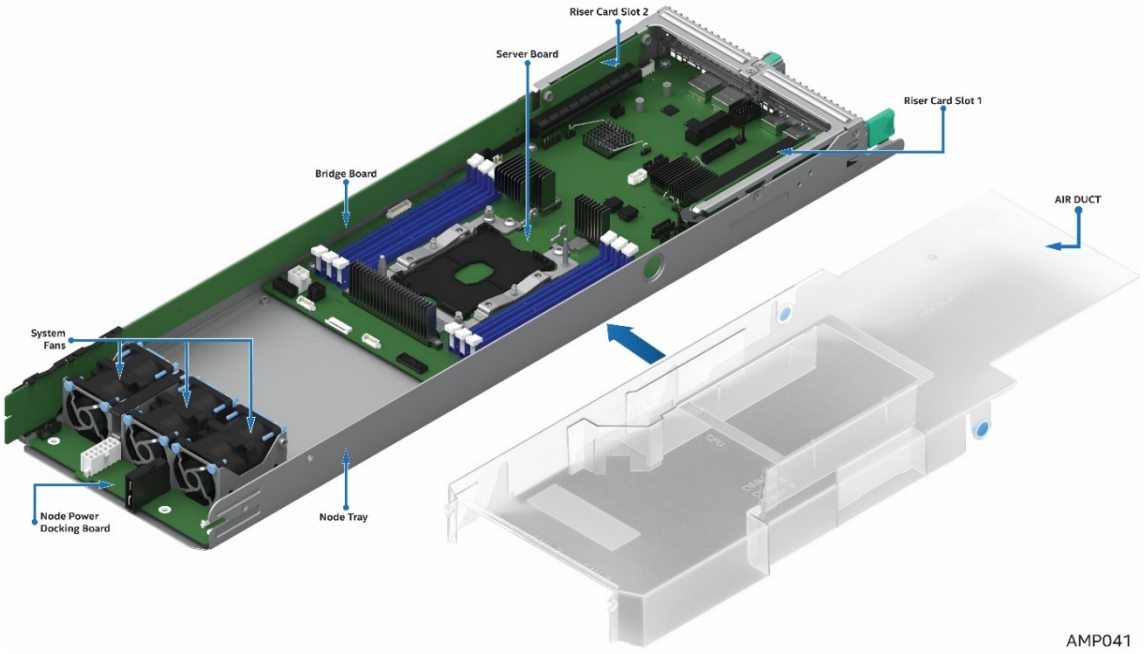


Figure 1. Intel® Compute Module HNS7200AP Product Family

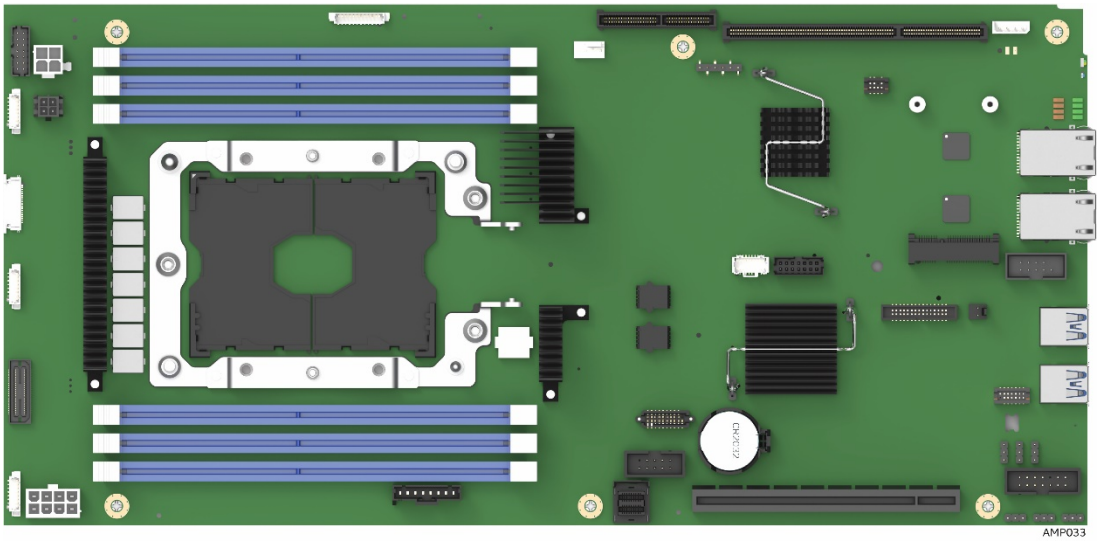


Figure 2. Intel® Server Board S7200AP Product Family

1.1 Product Feature Overview

1.1.1 Server Board Feature Set

Intel® Server Board S7200AP Product Family contains two server board options. Intel® Server Board S7200AP supports Intel® Xeon™ Phi™ x200 CPUs (up to 230w TDP) in Intel® Server Chassis H2312XXLR2 and H2216XXLR2.

Intel® Server Board S7200APR supports both Intel® Xeon™ Phi™ x200 and Intel® Xeon™ Phi™ 72x5 Product Family CPUs (up to 320w TDP) in Intel® Server Chassis H2204XXLRE.

This document describes the servicing of both compute modules. Although, these boards are independent and stand-alone products, there are many features and service steps that are common to each board. These common steps will be identified in its respective section.

The following tables list the common feature set, however, a board will be identified by its product code when a described feature or function is unique to it.

Table 1. Intel® Server Board S7200AP Product Family Feature Set

Feature	Description
Processor Support	**Intel® Xeon™ Phi™ x200 Product Family** ▪ Single processor socket P (3647 pins) ▪ Thermal Design Power (TDP) up to **230W** ▪ 36 lanes of Integrated PCI Express® 3.0 low-latency I/O
Memory Support	▪ Six DIMM slots in total across six memory channels ▪ Registered DDR4 (RDIMM), Load Reduced DDR4 (LRDIMM) ▪ Memory DDR4 data transfer rates of 2400/2666 MT/s ▪ 1 DIMM per channel ▪ Max memory 384GB
Chipset	Intel C610 “Wellsburg” Platform Controller Hub (PCH)
External I/O Connections	▪ Two USB 3.0 connectors ▪ Two RJ-45 10/100/1000 Mbit Network Interface Controller (NIC) ports
Internal I/O connectors/headers	▪ One USB 2.0 Header ▪ One TPM Header ▪ One Intel® Omni-Path Fabric Signal Connector ▪ One mSATA Connector ▪ One Bridge Board Connector ▪ One 2x7 pin header for system fan module ▪ One Aux Front Panel Connector ▪ Three 8-pin fan headers for non-Intel chassis support ▪ One 4 pin CPU fan or liquid cooling pump support header ▪ One PSU Control Header ▪ One RMII header for Intel® RMM4 Lite ▪ One internal RGB Video Header ▪ One Serial Port A Header
PCIe Support	PCIe* 3.0 (2.5, 5, 8 GT/s)
Power Connections	• One 2x4 pin main power connector • One 2x2 pin aux. power connector • One 4 pin power connector for disk drive power
System Fan Support	▪ Three 40x56mm double rotor fans ▪ One 4 pin CPU fan or liquid cooling pump support header
Video	▪ Integrated 2D video graphics controller ▪ 128MB DDR3 memory

Feature	Description
Riser Support	▪ One PCIe Gen3 x16 standard riser connector o Supports a low-profile adapter in Riser Slot 1 ▪ One PCIe Gen3 x20 HSEC-8 fine-pitch riser connector o Supports a x16 low-profile adapter in Riser Slot 2 o Supports a x4 low-profile adapter in Riser Slot 2 when CPUs with integrated Intel® Omni-Path Fabric are used
On-board storage controllers and options	▪ Integrated 10-port SATA o 5 ports to bridge board, o 1 port to mSATA o 4 ports to MiniSAS HD connector
Fabric	▪ Dual port Intel® Omni-Path Fabric via Xeon™ Phi™ x200 Product Family or ▪ Single Port Intel® Omni-Path Fabric via x16 Gen 3 PCIe Adapter
Network (LAN)	▪ Dual i210 Springvilles ▪ Dual 10/100/1000Gbe RJ45 connectors ▪ NC_SI sideband to BMC. Option to host share or dedicate a Network port to management traffic.
Server Management	▪ Onboard Emulex* Pilot III* Controller ▪ Support for Intel® Remote Management Module 4 Lite solutions ▪ Support for Intel® System Management Software ▪ Support for Intel® Intelligent Power Node Manager

NOTE: The Riser Slot 1 on the server board is designed for plugging in ONLY the riser adapter. Plugging in a PCIe* adapter directly into the riser slot may cause permanent server board and/or PCIe* card damage.

1.1.2 HNS7200AP Compute Module Feature Set

Table 2. Intel® Compute Module HNS7200AP Product Family Feature Set

Feature[1]	Description
Server Board	**Intel® Xeon™ Phi™ x200 Product Family** ▪ Single processor socket P (3647 pins) ▪ Thermal Design Power (TDP) up to **230W** ▪ 36 lanes of Integrated PCI Express® 3.0 low-latency I/O ▪ CPUs with Integrated Intel® Omni-Path Fabric supported
Processor TDP Support	Maximum supported Thermal Design Power (TDP) of up to **230W**
Heatsink	▪ One 80x107mm 1U Heatsink
Fan	Three 40x56mm dual rotor system fans
Riser Support	▪ One PCIe Gen3 x16 standard riser connector o Supports a low-profile adapter in Riser Slot 1 ▪ One PCIe Gen3 x20 HSEC-8 fine-pitch riser connector o Supports a x16 low-profile adapter in Riser Slot 2 o Supports a x4 low-profile adapter in Riser Slot 2 when CPUs with integrated Intel® Omni-Path Fabric are used
Compute Module Board	▪ Bridge boards: o 6G SATA Bridge Board (Default) ▪ One compute module power docking board
Air Duct	One transparent air duct

Feature[1]	Description
Form Factor	Length 14.17” (360m), width 6.81” (173mm)

NOTE: The table only lists features that are unique to the compute module or different with the server board.

1. ONLY standard low profile PCIe* cards can be installed in the riser card slots.

1.1.3 Chassis Feature Set for Intel® Compute Module HNS7200AP

The following table lists a brief description of the 2U H2000G Chassis Product Family features,

Feature	Description
Dimensions (2U)	438mm x 86.9mm x 771/733mm 17.24” width x 3.42 length x 30.35/28.86” height
Node Support	Intel® Compute Module options: HNS7200AP (up to four)
Power Supply	2 x 2130W AC CRPS
System Cooling	3 dual rotor 40 x 56 mm fixed fans per node
PCIe support	Two low profile PCIe cards on riser 1 and 2
Storage	8 x 2.5” SATA drive **Note**: 2.5” SATA HDD installed in the 3.5” Drive Carrier 16 x 2.5” SATA drives Bridge Board Options: (1) 6G SATA only RAID 0, 1, 10 SW RAID ESRT2
System SKUs	Support for **H2312XXLR2** and **H2216XXLR2** chassis only

Note: Intel® Compute Module HNS7200AP is not supported in Intel® Server Chassis H2204XXLRE

For additional details on chassis features, refer to the Intel® Server Chassis H2000G and H2000P Product Family TPS and Service Guide.

Table 3. Intel® Server Board S7200APR (Refresh) Product Family Feature Set

Feature	Description
Processor Support	**Intel® Xeon™ Phi™ 72x5 Product Family** ▪ Single processor socket P ▪ Thermal Design Power (TDP) up to **320W** with the **1U LACC** thermal solution ▪ 36 lanes of Integrated PCI Express® 3.0 low-latency I/O **Intel® Xeon™ Phi™ x200 Product Family** ▪ Single processor socket P (3647 pins) ▪ Thermal Design Power (TDP) up to **230W (Air Cooled Heatsink)** ▪ 36 lanes of Integrated PCI Express® 3.0 low-latency I/O ▪ CPUs with Integrated Intel® Omni-Path Fabric supported
Memory Support	▪ Six DIMM slots in total across six memory channels ▪ Registered DDR4 (RDIMM), Load Reduced DDR4 (LRDIMM) ▪ Memory DDR4 data transfer rates of 2400/2666 MT/s ▪ 1 DIMM per channel ▪ Max memory 384GB
Chipset	Intel C610 "Wellsburg" Platform Controller Hub (PCH)
External I/O Connections	▪ Two USB 3.0 connectors ▪ Two RJ-45 10/100/1000 Mbit Network Interface Controller (NIC) ports
Internal I/O connectors/headers	▪ One USB 2.0 Header ▪ One TPM Header ▪ One Intel® Omni-Path Fabric Signal Connector ▪ One mSATA Connector ▪ One Bridge Board Connector ▪ One 2x7 pin header for system fan module ▪ One Aux Front Panel Connector ▪ Three 8 pin fan headers for third-party chassis support ▪ One 4 pin CPU fan or liquid cooling pump support header ▪ One PSU Control Header ▪ One RMII header for Intel® RMM4 Lite ▪ One internal RGB Video Header ▪ One Serial Port A Header
PCIe Support	PCIe* 3.0 (2.5, 5, 8 GT/s)
Power Connections	• One 2x4 pin main power connector • One 2x2 pin aux. power connector • One 4 pin power connector for disk drive power
System Fan Support	▪ Three 40x56mm double rotor fans ▪ One 4 pin CPU fan or liquid cooling pump support header
Video	▪ Integrated 2D video graphics controller ▪ 128MB DDR3 memory
Riser Support	▪ One PCIe Gen3 x16 standard riser connector o Supports a low-profile adapter in Riser Slot 1 ▪ One PCIe Gen3 x20 HSEC-8 fine-pitch riser connector o Supports a x16 low-profile adapter in Riser Slot 2 o Supports a x4 low-profile adapter in Riser Slot 2 when CPUs with integrated Intel® Omni-Path Fabric are used
On-board storage controllers and options	▪ Integrated 10-port SATA o 5 ports to bridge board, o 1 port to mSATA o 4 ports to MiniSAS HD connector
Fabric	▪ Single Port Intel® Omni-Path Fabric via x16 Gen 3 PCIe Adapter

Feature	Description
Network (LAN)	▪ Dual i210 Springvilles ▪ Dual 10/100/1000Gbe RJ45 connectors ▪ NC_SI sideband to BMC. Option to host share or dedicate a Network port to management traffic.
RAID Support	▪ Intel® Embedded Server RAID Technology 2 (ESRT2)
Server Management	▪ Onboard Emulex* Pilot III* Controller ▪ Support for Intel® Remote Management Module 4 Lite solutions ▪ Support for Intel® System Management Software ▪ Support for Intel® Intelligent Power Node Manager

NOTE: The Riser Slot 1 on the server board is designed for plugging in ONLY the riser adapter. Plugging in a PCIe* adapter directly into the riser slot may cause permanent server board and/or PCIe* card damage.

1.1.4 HNS7200APR Compute Module Feature Set

Table 4. Intel® Compute Module HNS7200APR Product Family Feature Set

Feature[1]	Description
Server Board	**Intel® Xeon™ Phi™ 72x5 Product Family** ▪ Single processor socket P ▪ Thermal Design Power (TDP) up to **320W** with the **1U LACC** thermal solution ▪ 36 lanes of Integrated PCI Express® 3.0 low-latency I/O **Intel® Xeon™ Phi™ x200 Product Family** ▪ Single processor socket P (3647 pins) ▪ Thermal Design Power (TDP) up to **230W (Air Cooled Heatsink)** ▪ 36 lanes of Integrated PCI Express® 3.0 low-latency I/O ▪ CPUs with Integrated Intel® Omni-Path Fabric supported
Processor TDP Support	Maximum supported Thermal Design Power (TDP) of up to 320W
Heatsink	▪ One 80x107mm 1U Heatsink-CPUs < 245W TDP
Liquid Assisted Air Cooling (LAAC)	▪ 1U Liquid Assisted Air Cooling (LAAC) -CPUs > 245W TDP
Fan	Three 40x56mm dual rotor system fans
Riser Support	▪ One PCIe Gen3 x16 standard riser connector o Supports a low-profile adapter in Riser Slot 1 ▪ One PCIe Gen3 x20 HSEC-8 fine-pitch riser connector o Supports a x16 low-profile adapter in Riser Slot 2 o Supports a x4 low-profile adapter in Riser Slot 2 when CPUs with integrated Intel® Omni-Path Fabric are used
Compute Module Board	▪ Bridge boards: o 6G SATA Bridge Board (Default) ▪ One compute module power docking board
Air Duct	One transparent air duct
Form Factor	Length 14.17” (360m), width 6.81” (173mm)

NOTE: The table only lists features that are unique to the compute module or different with the server board.

1. ONLY standard low profile PCIe* cards can be installed in the riser card slots.

1.1.5 Chassis Feature Set for Intel® Compute Module HNS7200APR

The following table lists a brief description of the 2U H2000-G Chassis Product Family features

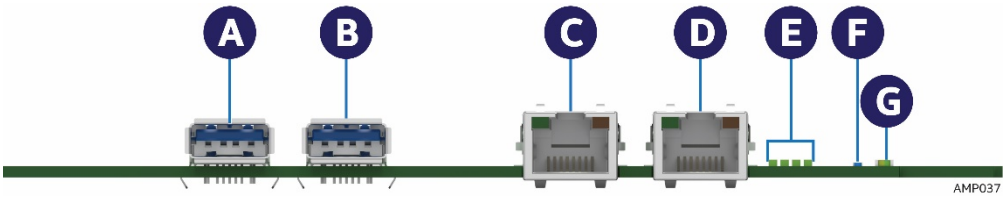
Feature	Description
Dimensions (2U)	438mm x 86.9mm x 771/733mm 17.24" width x 3.42 length x 30.35/28.86" height
Node Support	Intel® Compute Module options: HNS7200APR (up to four)
Power Supply	2 x 2130W AC CRPS
System Cooling	3 dual rotor 40 x 56 mm fixed fans per node
PCIe support	Two low profile PCIe cards on riser 1 and 2
Storage	4 x 2.5" SATA drive **Note**: 2.5" SATA HDD installed in the 3.5" Drive Carrier Bridge Board Options: (1) 6G SATA only RAID 0, 1, 10 SW RAID ESRT2
System SKUs	Supported for **H2204XXLRE** chassis only

Note: Intel® Compute Module HNS7200APR is not supported in Intel® Server Chassis H2312XXLR2 and H2216XXLR2

For additional details on chassis features, refer to the Intel® Server Chassis H2000G Product Family TPS.

1.2 Back Panel Feature Identification

The Intel® Compute Module HNS7200AP product family has the following board rear connector placement and features.



Label	Description	Label	Description
A	USB 3.0 Port 1	B	USB 3.0 Port 2
C	NIC port 1 (RJ45)	D	NIC port 2 (RJ45)
E	POST Code LEDs (8 LEDs)	F	ID LED
G	Status LED		

Figure 3. Intel® Server Board S7200AP Rear Connectors

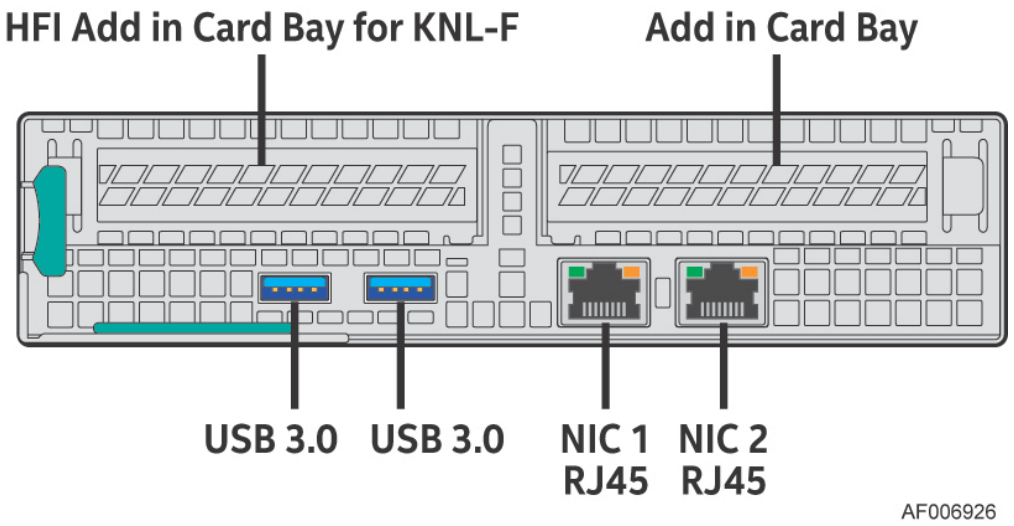
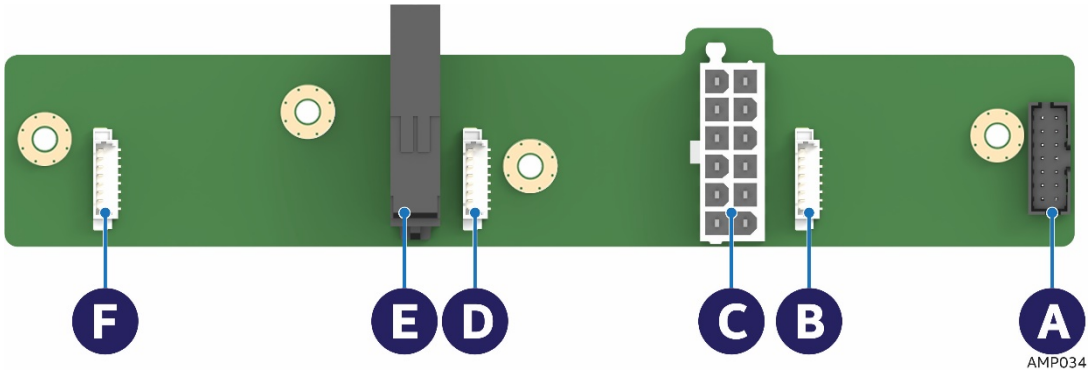


Figure 4. Intel® Compute Module HNS7200AP Rear Connectors

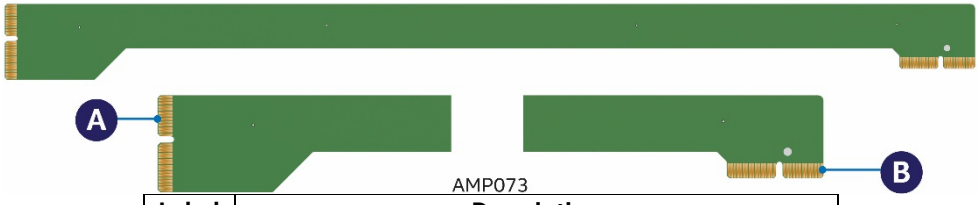
1.3 Power Docking Board Features



Label	Description
A	2x7 pin fan control connector
B	8 pin connector for fan 1
C	2x6 pin Minifit Jr. main power output connector
D	8 pin connector for fan 2
E	12 pin connector for main power input
F	8 pin connector for fan 3

Figure 5. Power Docking Board Features

1.4 Bridge Board Feature Features



Label	Description
A	2x40 pin card edge connector (to the backplane)
B	2x40 pin card edge connector (to the baseboard slot)

Figure 6. 6G SATA Bridge Board Features

1.5 Server Board Features

This section helps you identify the components and connectors on the server board. Intel® Server Board S7200AP features shown. All major features that are called out are common to both boards.

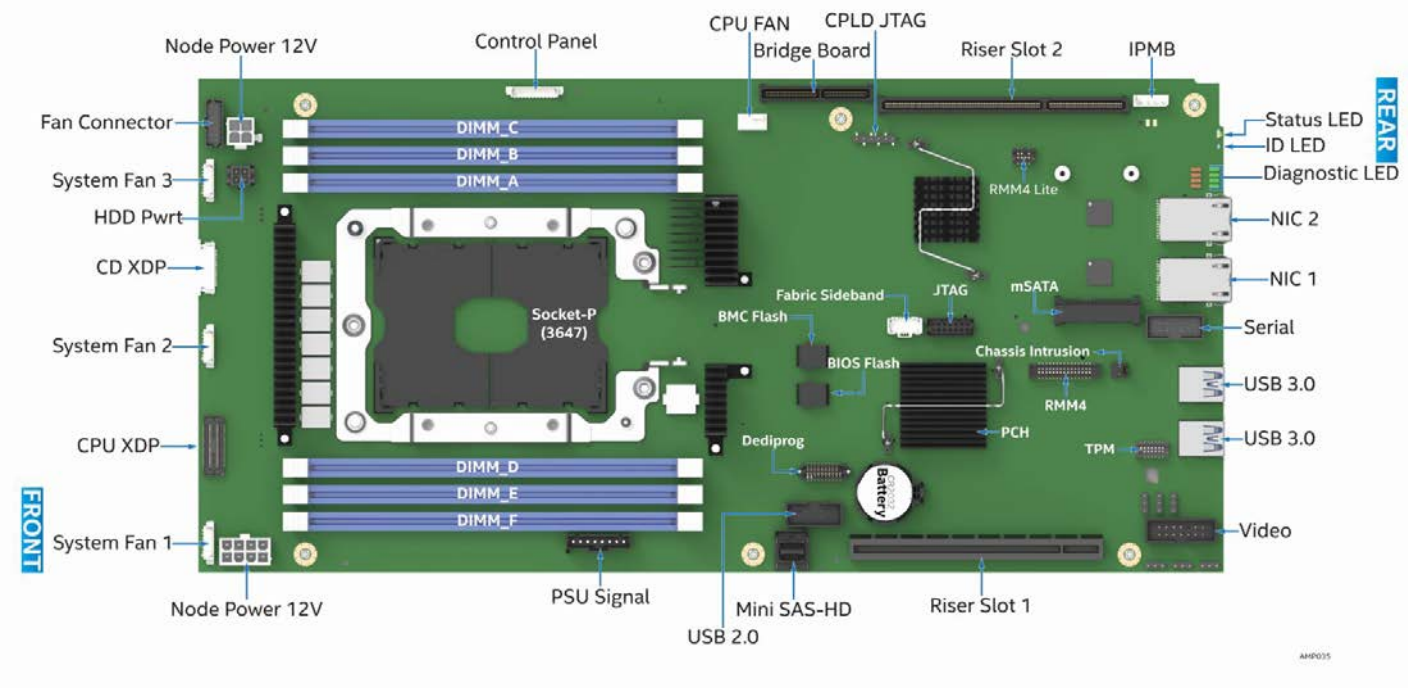


Figure 7. Intel® Server Board S7200AP Features

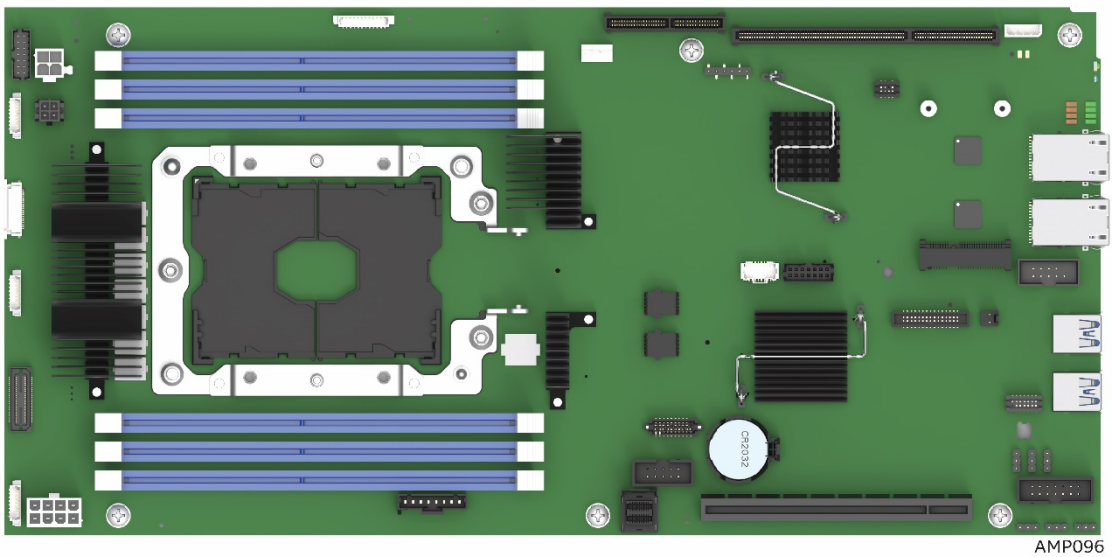


Figure 8. Intel® Server Board S7200APR

1.6 Intel® Light-Guided Diagnostics

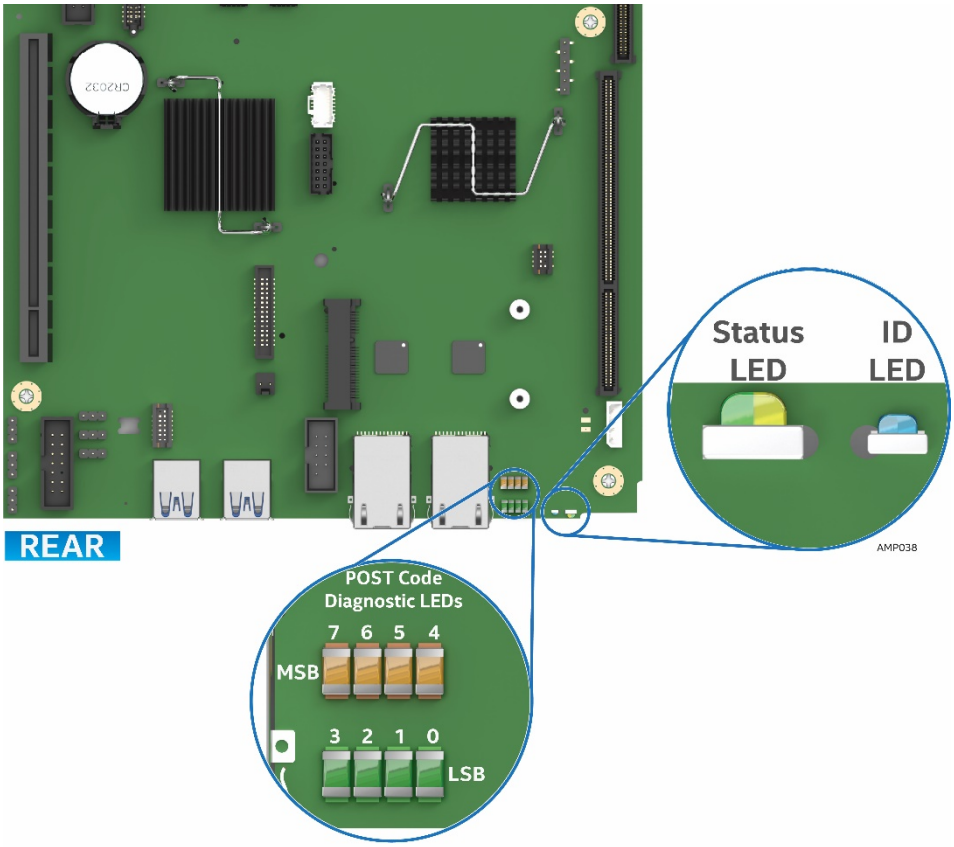


Figure 9. Intel® Light-Guided Diagnostic LEDs – Server Board

The POST Code Diagnostic LEDs on the server board change color or state (off, green, red, and amber) according to the POST sequence.

The Status LED on the rear of the board shows the overall health of the system (green, blinking green, blinking amber, amber, and off).

The Identification LED on the rear of the board helps identify the server from among several servers. The ID LED is off by default, and blue when activated by button or software.

1.7 Configuration and Recovery Jumpers

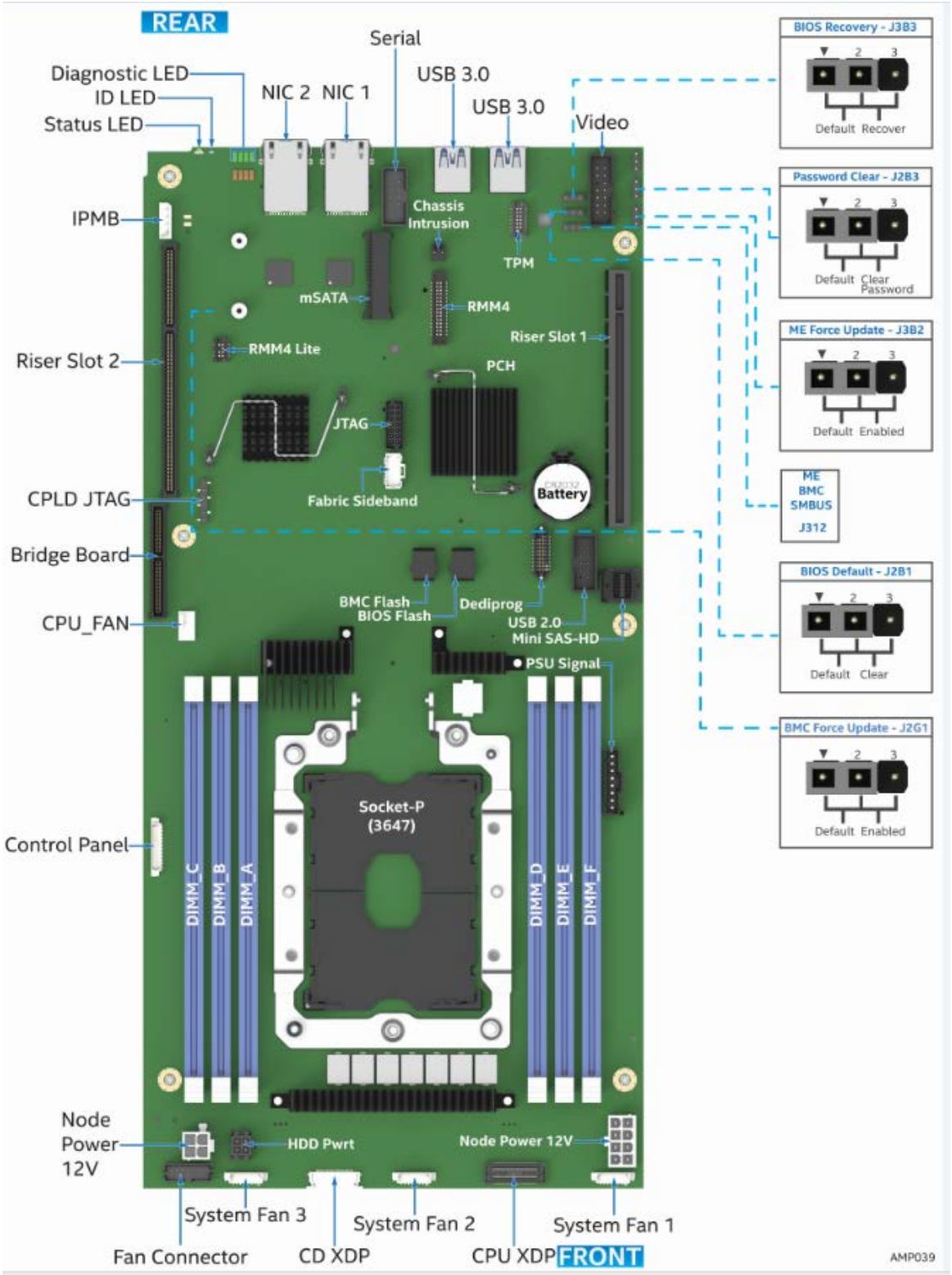


Figure 10. Configuration and Recovery Jumpers

Jumper Name	Description
BMC Force Update (J2G1)	If pins 2-3 are selected, the Integrated BMC Force Update Mode is enabled. These pins should be selected on 1-2 for normal system operation.
BIOS Default (J2B1)	If pins 2-3 are selected, the BIOS settings are restored to the factory defaults on the next reset. These pins should be selected on 1-2 for normal system operation.
BIOS Recovery	If the system BIOS is corrupted, an onboard backup copy of the BIOS can be loaded using the BIOS

(J3B3)	Recovery Jumper. To load the backup BIOS image, move the jumper from pins 1-2 (default) to pins 2-3, and power on the system. The system will boot to the backup BIOS image. These pins should be selected on 1-2 for normal system operation.
Password Clear(J2B3)	If pins 2-3 are selected, administrator and user passwords are cleared within five to ten seconds after the system is powered on. These pins should be selected on 1-2 for normal system operation.
ME Force Update (J3B2)	If pins 2-3 are selected, the ME Force Update Mode is enabled. These pins should be selected on 1-2 for normal system operation.

1.8 Advanced Management Options

1.8.1 Intel® Remote Management Module 4 Lite

The Intel® Remote Management Module 4 Lite plugs into a dedicated connector on the server board and provides additional server management functionality to the compute module.
The Intel® Remote Management Module 4 Lite, together with the dedicated management port provides a dedicated web server for viewing server information and remote control of the compute module. It also provides Remote KVM Redirection and USB Media Redirection allowing USB devices attached to the remote system to be used on the managed server.

For instructions on installing the Intel® Remote Management Module 4 Lite, see section 2.10.

2 Hardware Installations and Upgrades

2.1 Before You Begin

Before working with your server product, closely review the Safety Information at the beginning of this document.

NOTE: Prior to servicing the compute module or chassis, power down the server, unplug all peripheral devices and the AC power cords.

2.1.1 Tools and Supplies Needed

- Phillips* (cross head) screwdriver (#1 bit and #2 bit)
- T30 Torx bit screwdriver
- Flat head screwdriver
- Needle nosed pliers
- Anti-static wrist strap and conductive foam pad (recommended)

2.1.2 System Reference

All references to left, right, front, top, and bottom assume that the reader is facing the front of the chassis as it would be positioned for normal operation.

2.2 Cable Routing

Each compute module is self-contained and can be hot swapped without any impact to other compute modules. When you add or remove components from the compute module enclosure, ensure that cables are routed correctly before plugging in the compute module back into the chassis. Use caution to ensure that cables or wires are not pinched and that the airflow from the fans is not blocked. Use the figures below to determine the correct cable routing. ***Section 2.2 applies to both server boards.***

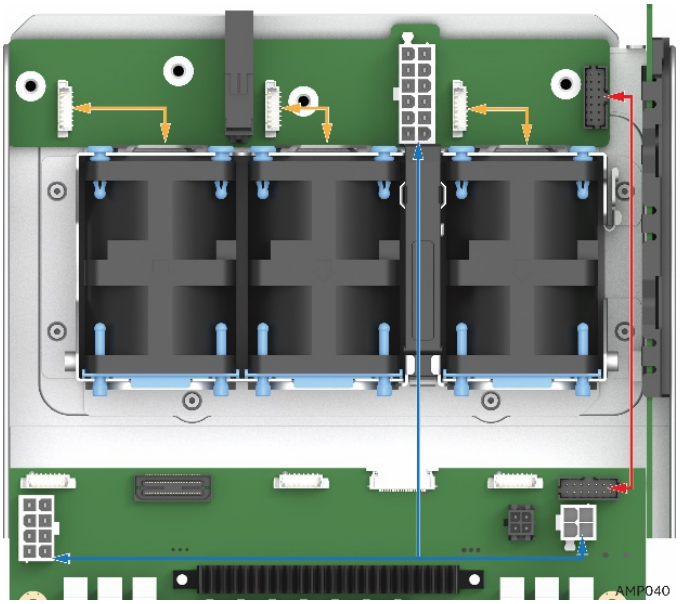


Figure 11. Cable Routing

NOTES:

- Orange line: Fan cable connection
- Blue line: Server board power cable connection
- Red line: Fan control signal cable connection

2.3 Removing and Installing the Air Duct

Always operate your compute module with the air duct in place. The air duct is required for proper airflow within the compute module. Intel® Server Board S7200AP. ***Section 2.3 applies to both server compute module.***

2.3.1 Removing the Air Duct

1. Press and hold both the left and right side buttons of the air duct (See letter **A**).
2. Rotate the air duct more than 45 degrees and pull it out. (See letter **B**).

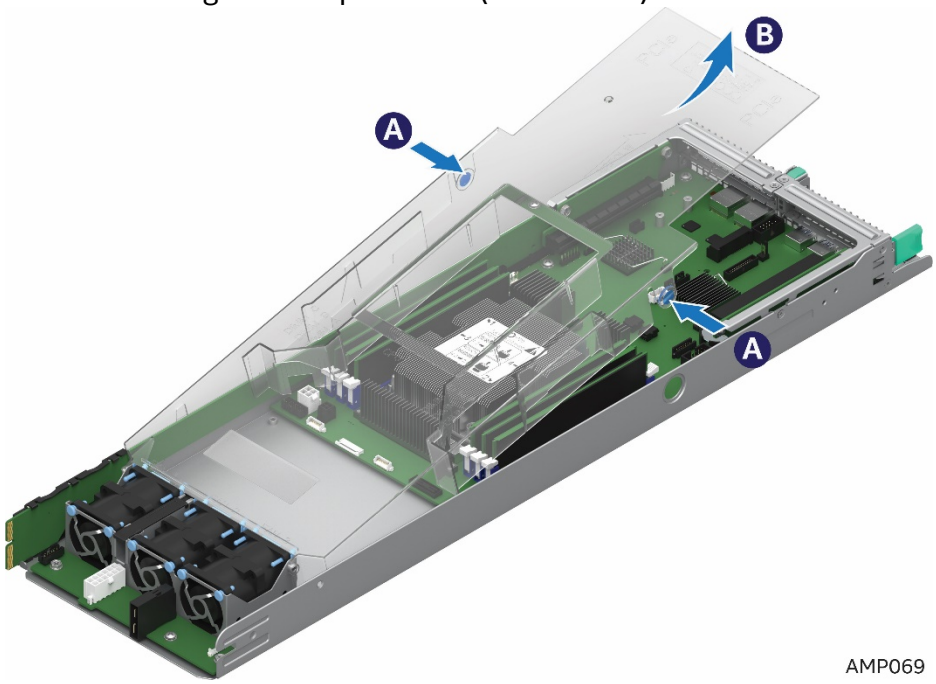


Figure 12. Removing the Air Duct

2.3.2 Installing the Air Duct

NOTES: Ensure that all DIMM latches are closed before installing the air duct.

1. Align the front end of the air duct with the hinges on both sides of the fan bracket (See letter **A**).
2. Rotate the air duct (See letter **B**) and lower it down until the left and right side buttons snaps into place.

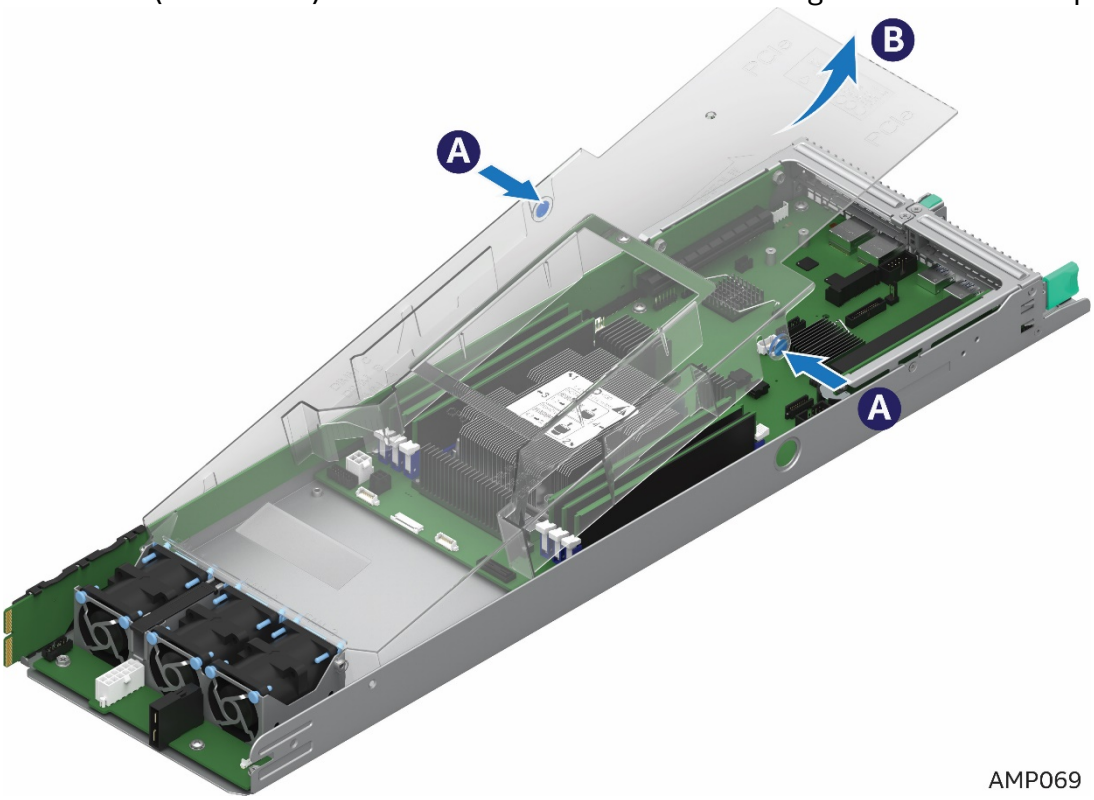


Figure 13. Installing the Air Duct

2.4 Processor Assembly Installation and Removal

2.4.1 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 attached together prior to installation onto the server board.

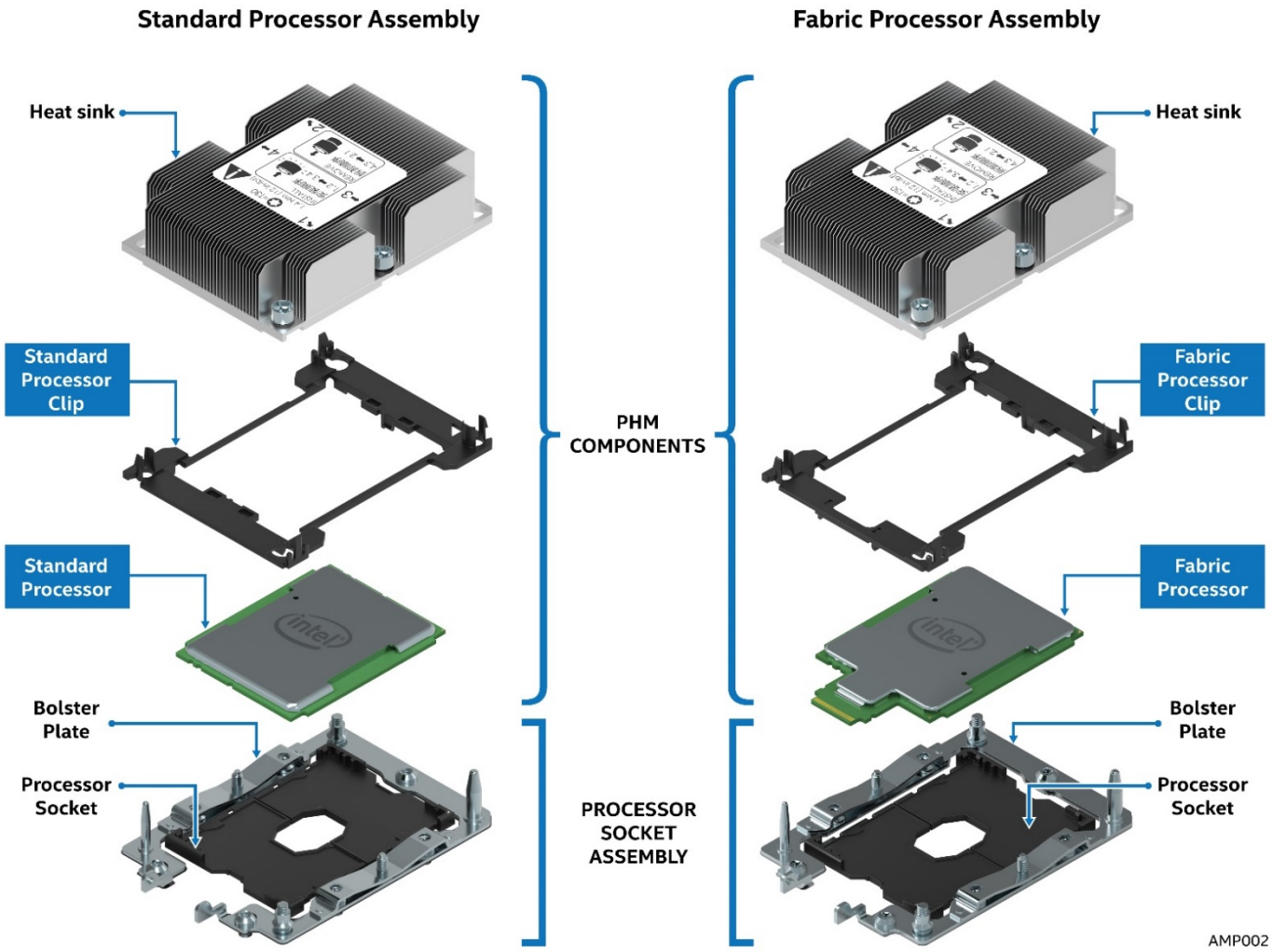


Figure 14. Processor Heatsink Module (PHM) and Processor Socket Reference Diagram

Procedures described in the following sections must be followed in the order specified to properly assemble the PHM, install it to, or remove it from the server board. These instructions assume that all the PHM components are new and the thermal interface material (TIM) is already applied to the bottom of the heat sink.

Required Tools:

- T-30 Torx screwdriver
- Flat head screwdriver
- Adequate ESD protective gear (wrist strap, ESD mat)

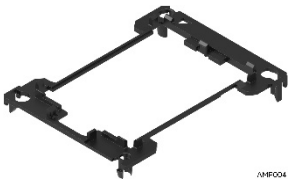
CAUTION: Refer to the "**Warning**" section at the beginning of this document for detailed ESD precautions.

NOTE: Fabric supported processor models require the use of a Fabric Carrier assembly. Fabric Carrier assemblies are sold separately and can be obtained by ordering the following Intel Accessory Kit - iPC

AXX2PFABKIT. Refer to the Product Configuration Guide for this Intel Server product family for additional ordering details.

WARNING: Attempting to use a standard processor carrier clip assembly with a fabric supported processor may result in component damage and/or induce improper assembly of the PHM. See the following table and figures for an overview of the different processor carrier and processors.

Table 5. Processor Carriers

Carrier Clip Model	iPN*	Carrier Clip Assembly
Standard Processor Carrier (Default) Included with Systems	H53249-00x	
Fabric Processor Carrier (Accessory)	H53248-00x	

NOTE: * For reference only. Intel part numbers (iPN) are not used for ordering purposes.
Intel parts that are available as a Spare or Accessory are orderable via Intel Product Codes (iPC).

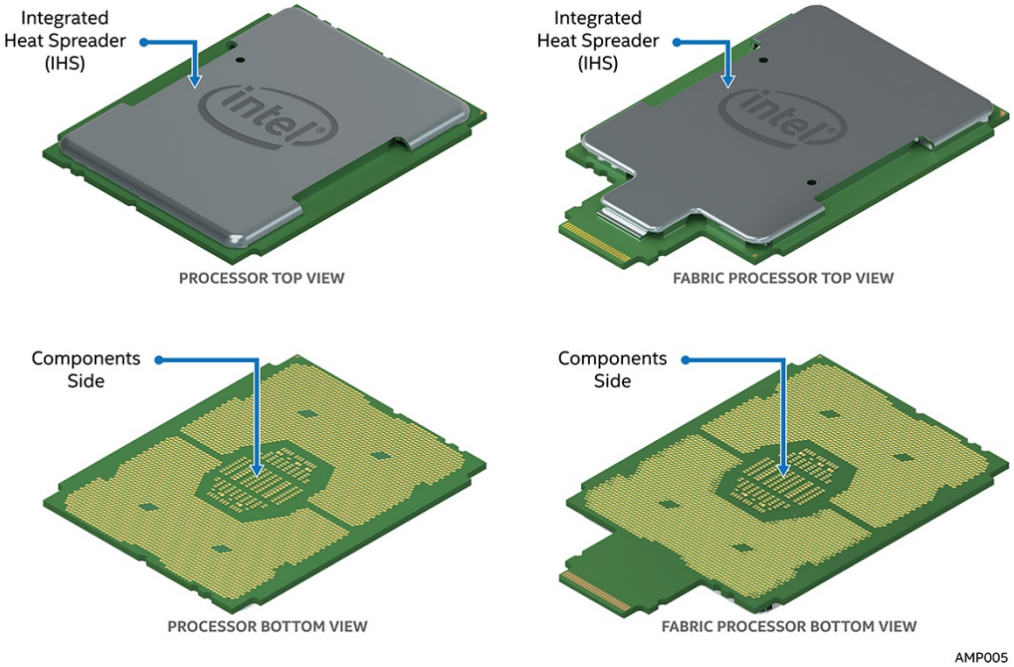


Figure 15. Processor Reference Diagram - Top and Bottom Views of Processor

WARNING: Damage to the processor heat sink may occur when grasping the heat sink by the longer sides and squeezing fins together. Processor heat sinks should only be grasped using the shorter edges of the heat sink as shown in the following illustration.

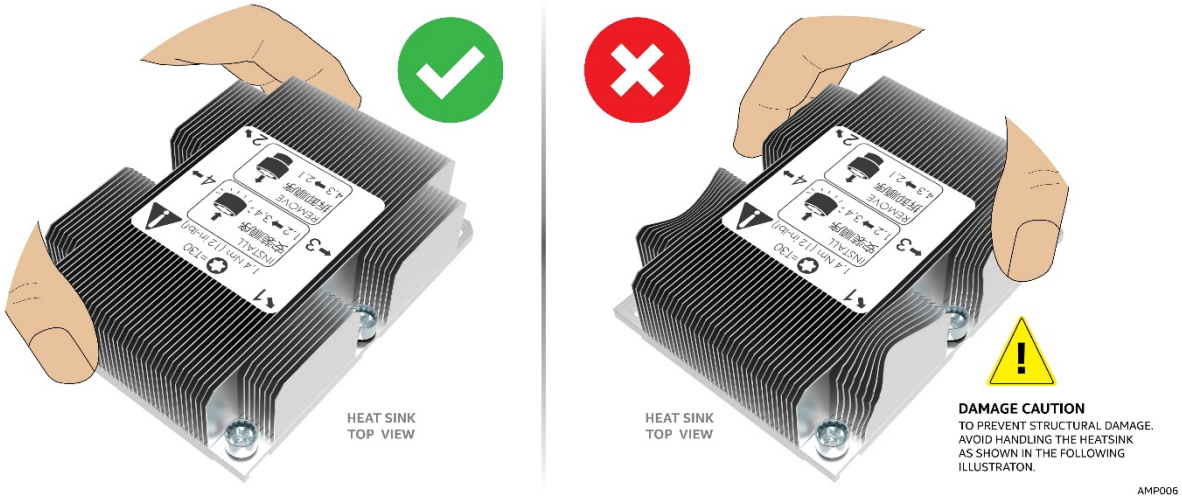


Figure 16. Grasping the Heatsink Correctly

1. Remove the heat sink from its packaging. With the thermal interface material (TIM) facing up, place the heat sink on to a flat surface as shown in the following illustration.

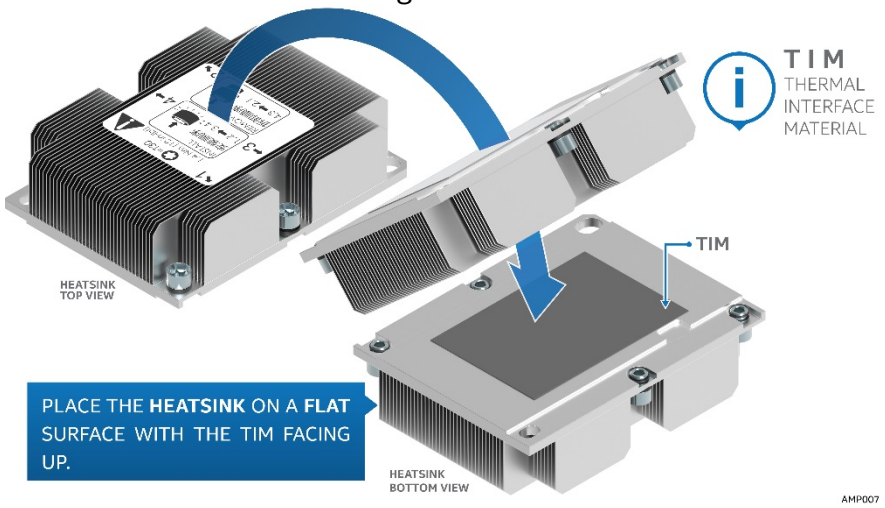


Figure 17. Placing the Processor Heat Sink on to a Flat Surface

CAUTION: Do not touch the sensitive contacts on the bottom side of the processor at any time during PHM assembly or installation. In addition, the pins inside the processor socket are extremely sensitive. A damaged processor socket may produce unpredictable system errors

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

NOTE: The PHM and processor socket include several alignment features as shown in the following illustration to ensure proper assembly and installation. Care should be taken to ensure components are accurately assembled and the PHM is oriented correctly to the processor socket prior to installation.

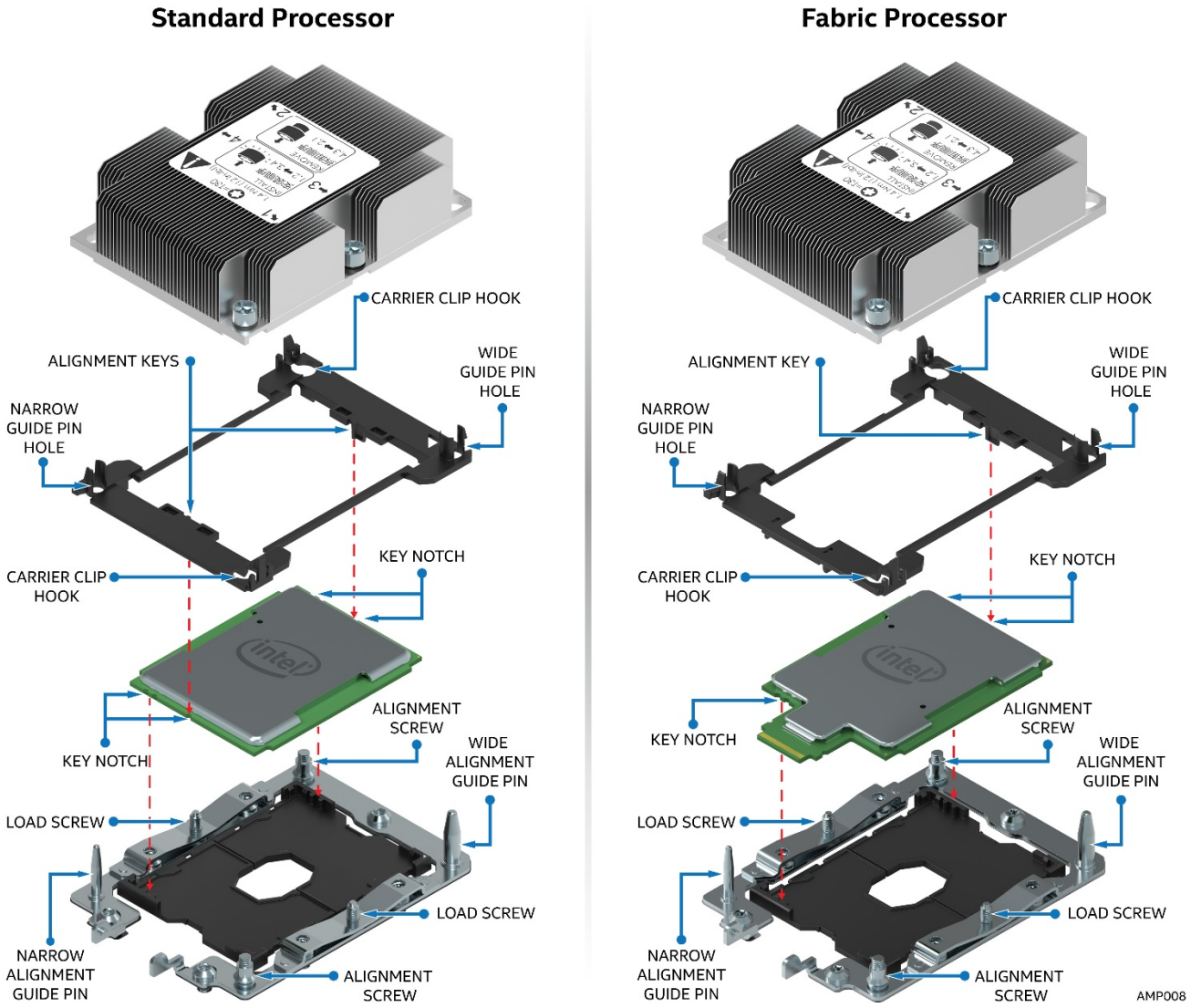


Figure 18. Alignment Features

CAUTION: Handle the processor carefully. Do not touch the bottom-side 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.

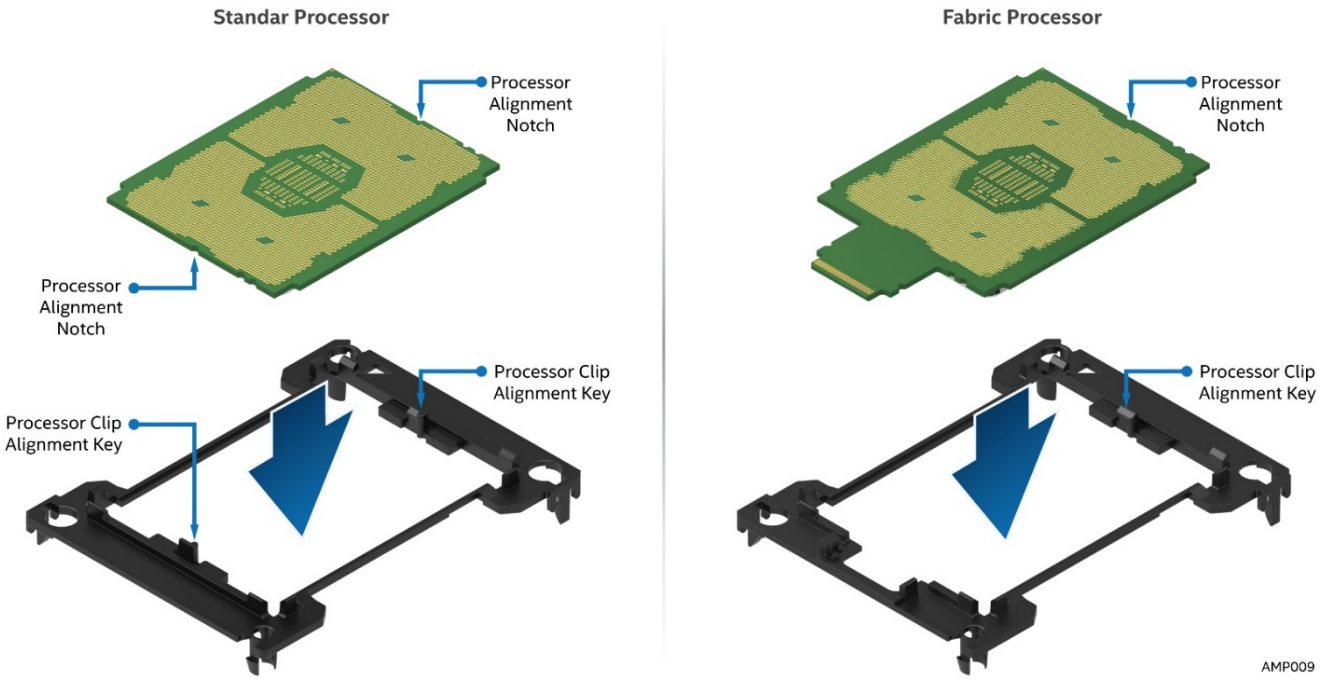


Figure 19. Processor Carrier Assembly

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

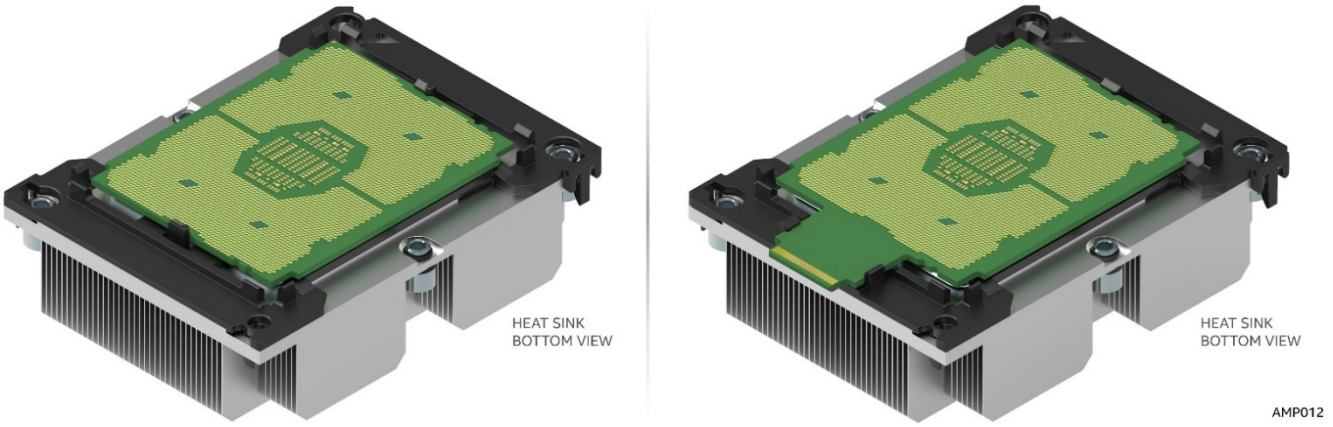


Figure 20. Processor Carrier Clip Sub-Assembly

CAUTION: A processor can dislodge from the processor carrier clip if the assembly is grasped by the long narrow edges of the processor clip. The processor carrier assembly should only be grasped 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 carrier clip sub-assembly over the processor heat sink so that all corner features are in alignment.

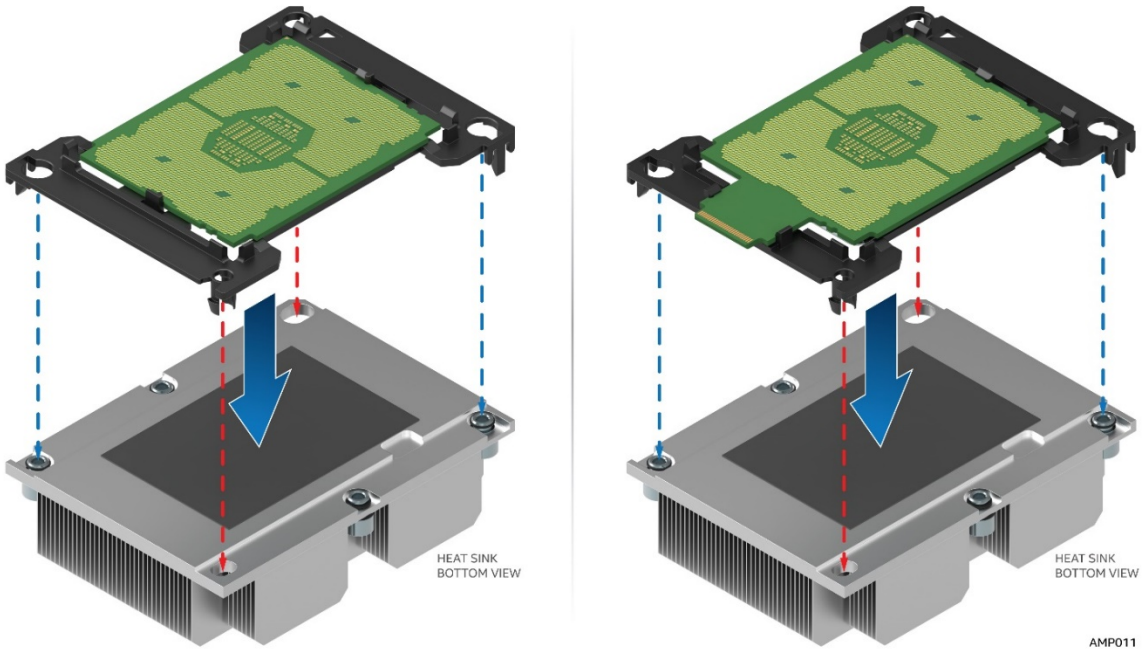


Figure 21. Orienting Processor Carrier Clip Sub-assembly to Heat Sink

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

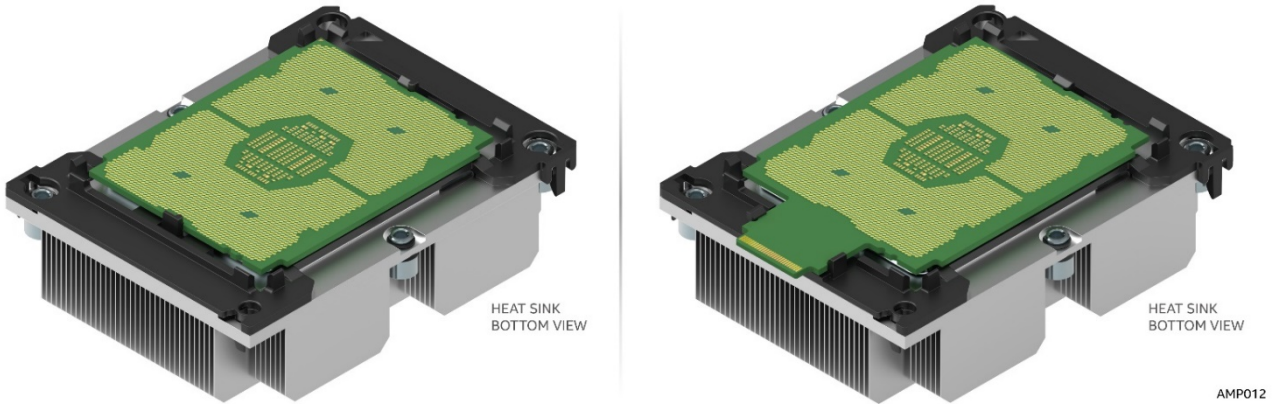
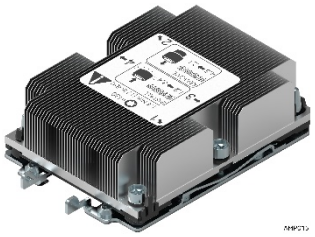


Figure 22. Processor Heat Sink Module (PHM)

2.4.2 Processor Installation

Table 6. Processor Heat Sinks

Intel Product Code (iPC)	MM#	Description
iPC - **AXXAPHS** 	**MM# - 942344**	1U Standard Ex-Al 80mm x 107mm Heat Sink

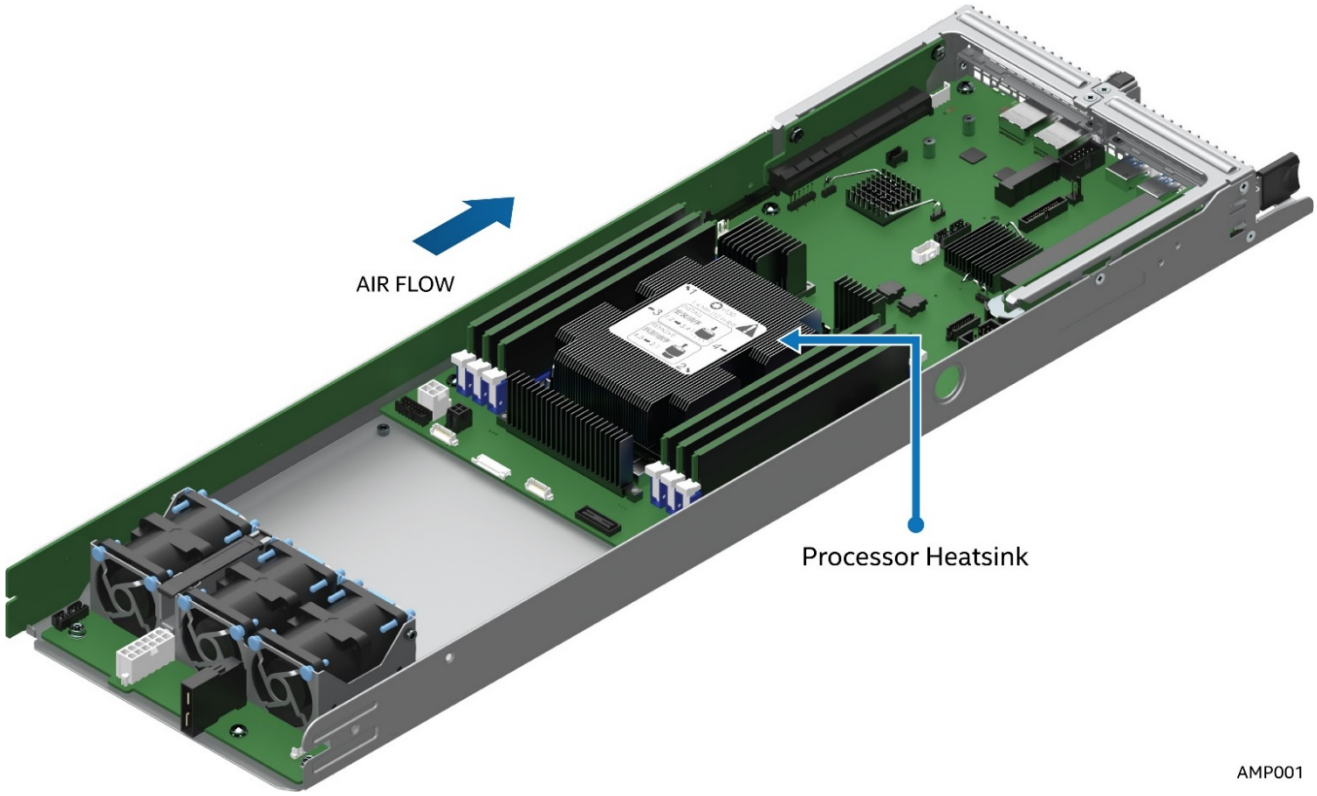


Figure 23. Processor Heat Sink Location

1. Remove the plastic processor socket cover. 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**).

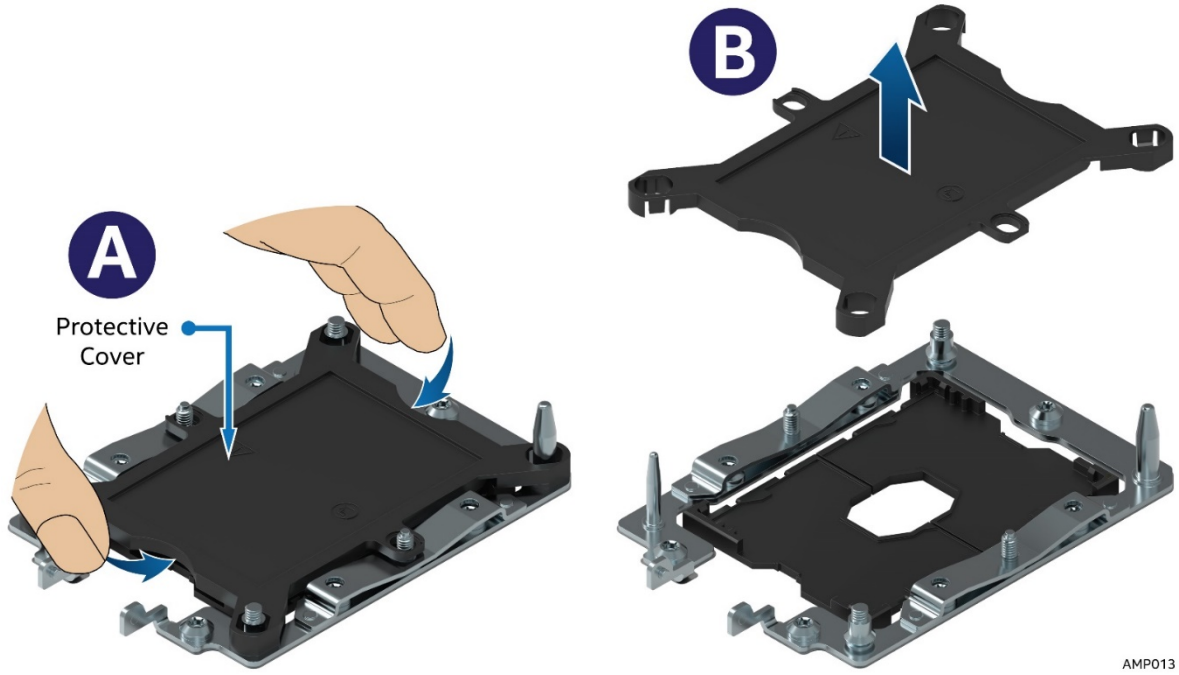


Figure 24. Plastic processor socket cover removal

NOTE: The processor socket cover should be saved 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 PHM to Processor socket.

    a. 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 will have a matching PHM mounting hole which allows for only one orientation when installed as shown in the following figure. Look for the wide and narrow holes for proper and accurate alignment.

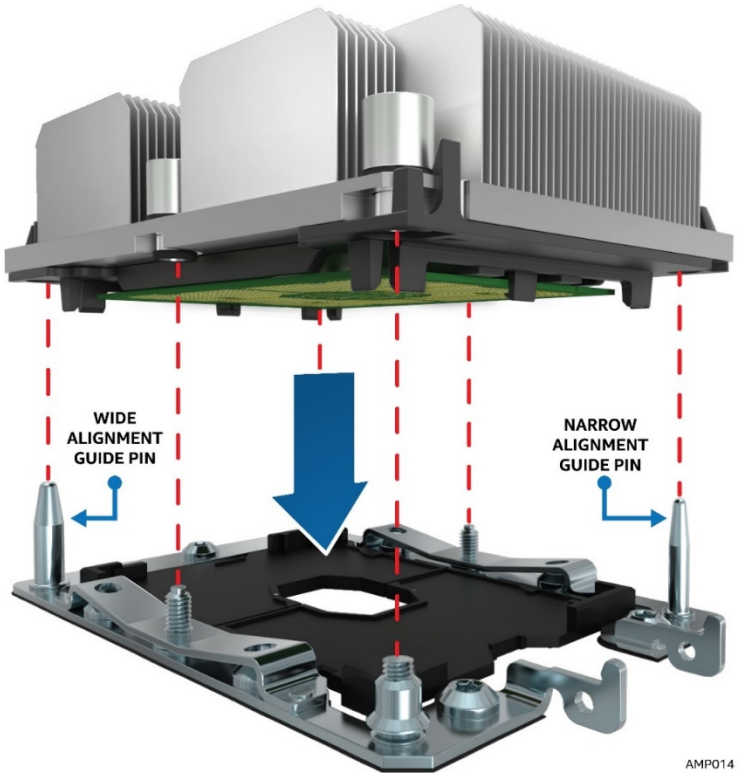


Figure 25. PHM Alignment to Bolster Plate

b. 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: See the illustration below and confirm proper PHM installation by visually checking whether or not the PHM sits level with the processor socket assembly. The PHM is NOT installed properly if it does not sit level with the processor socket assembly. Improperly installed PHMs cannot be fastened down. PHMs can only be fastened down if correctly installed.

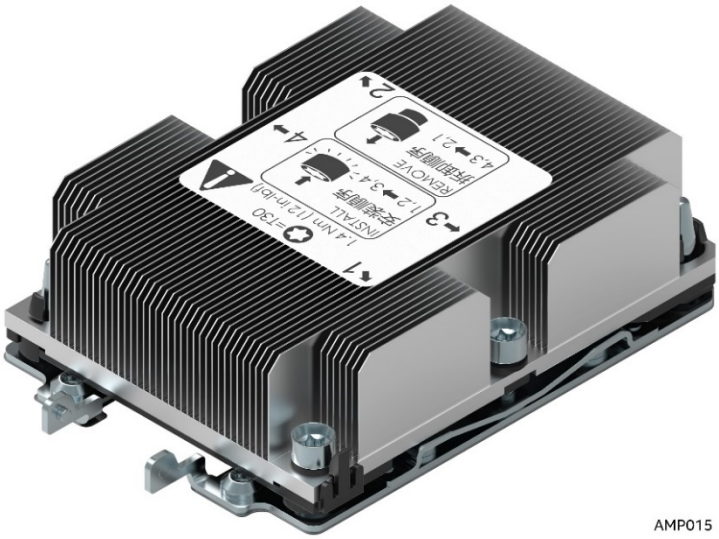


Figure 26. Correct Placement

3. Secure PHM to the processor socket assembly.

   a) Using a T30 Torx bit screwdriver, securely tighten (12 in-lb.) each nut in the sequence shown on the label located on the top of the heat sink. Follow the (#1→ #2 → #3→ #4) sequence when tightening. Tighten each screw prior to moving to the next.

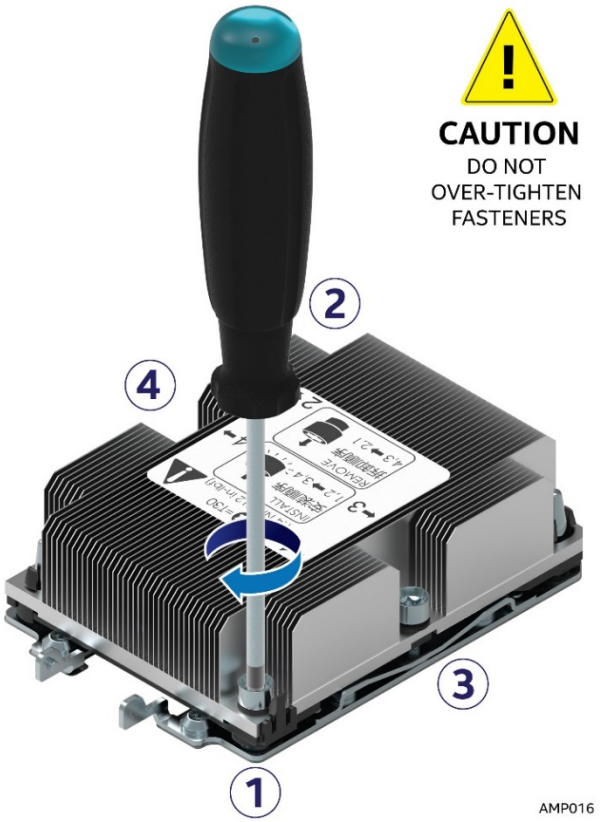


Figure 27. Installing the PHM

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.

2.5 Processor Removal

WARNING: Processor heat sinks can become extremely hot during normal system operation. Before attempting to remove the processor from the server board, ensure 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 nut in the sequence shown on the label affixed to the top side of the heat sink (#4→ #3 → #2→ #1) (See letter **A**). Loosen each screw all the way prior to moving to the next.

2. Lift the PHM straight up from the server board until free from the bolster plate guide pins (See letter **B**).

3.

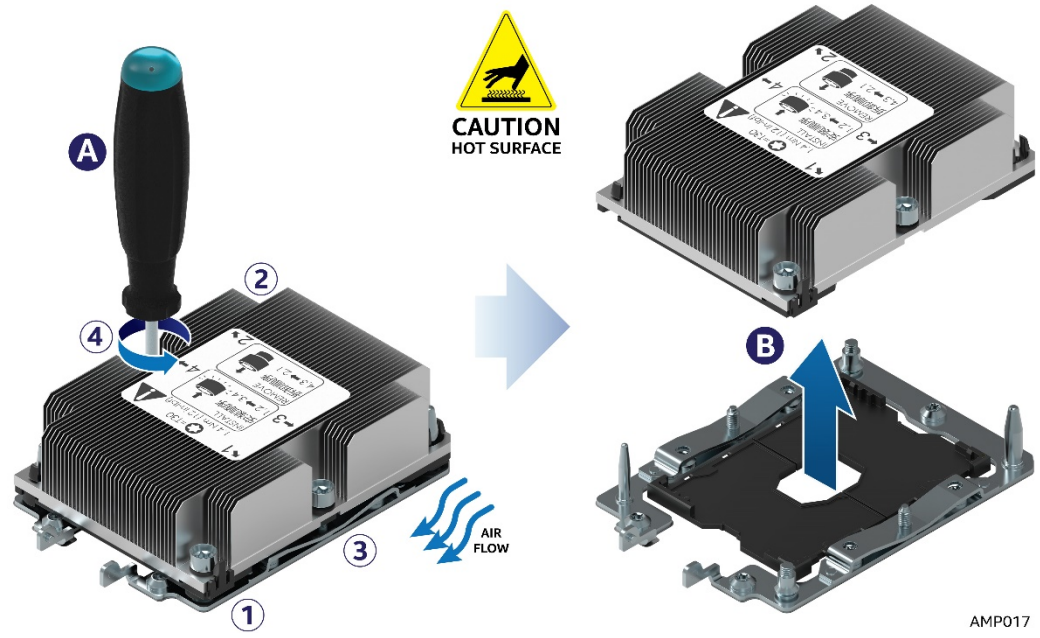


Figure 28. Uninstalling the PHM

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

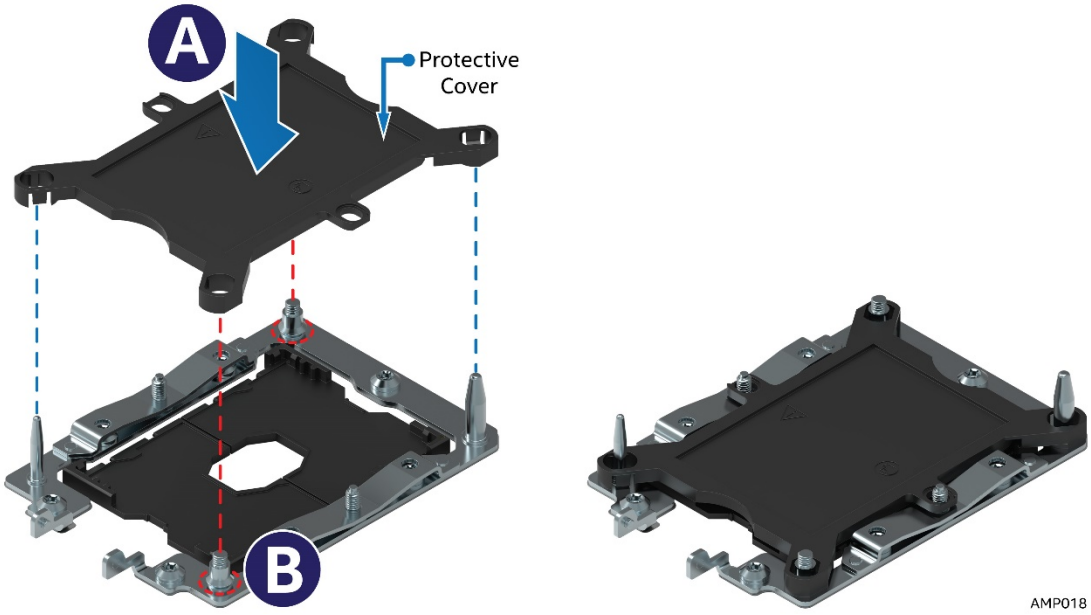


Figure 29. Plastic processor socket cover Installation

2.5.1 PHM 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, using a flat head screw driver, carefully release the bond between processor and heat sink as shown in the following illustration.

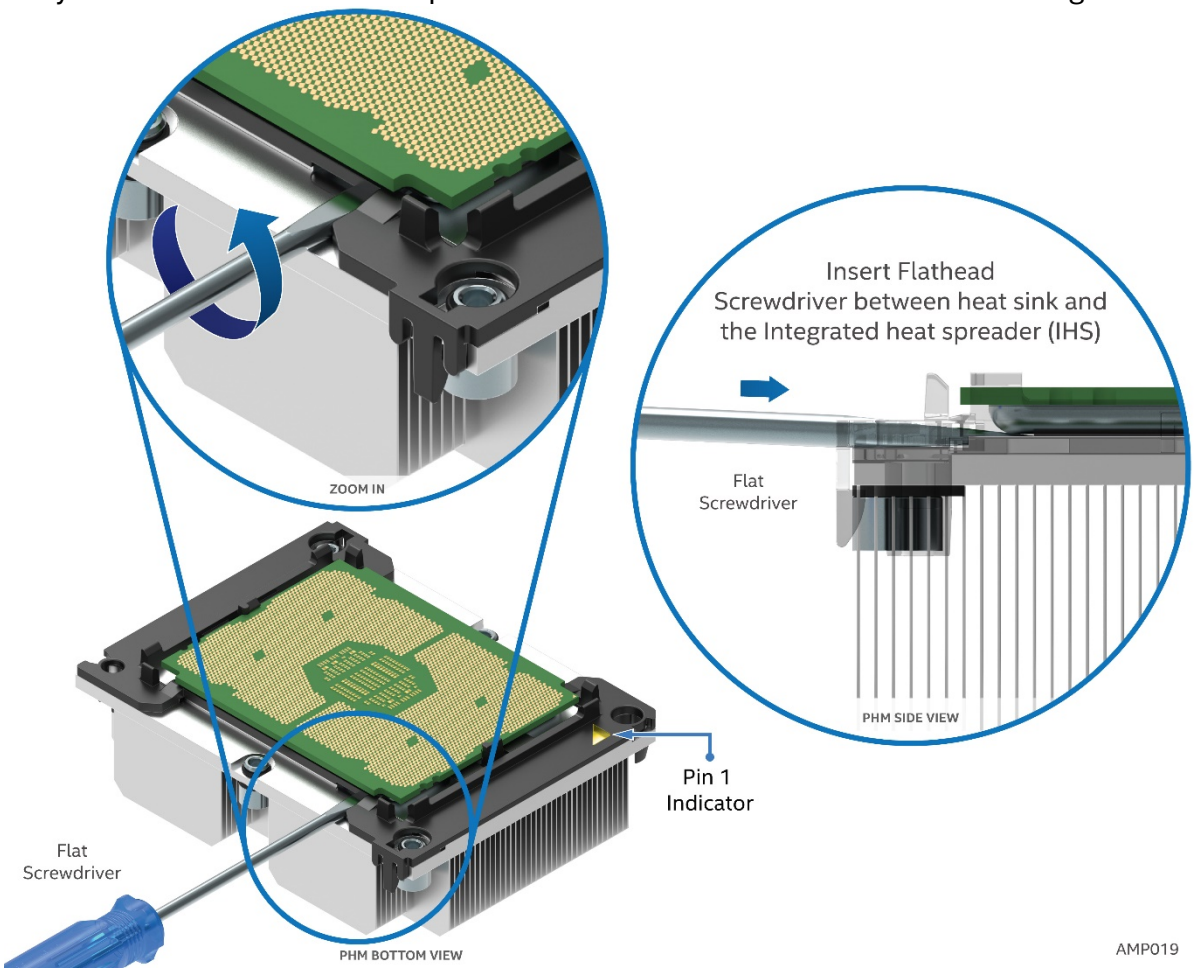


Figure 30. PHM Disassembly

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

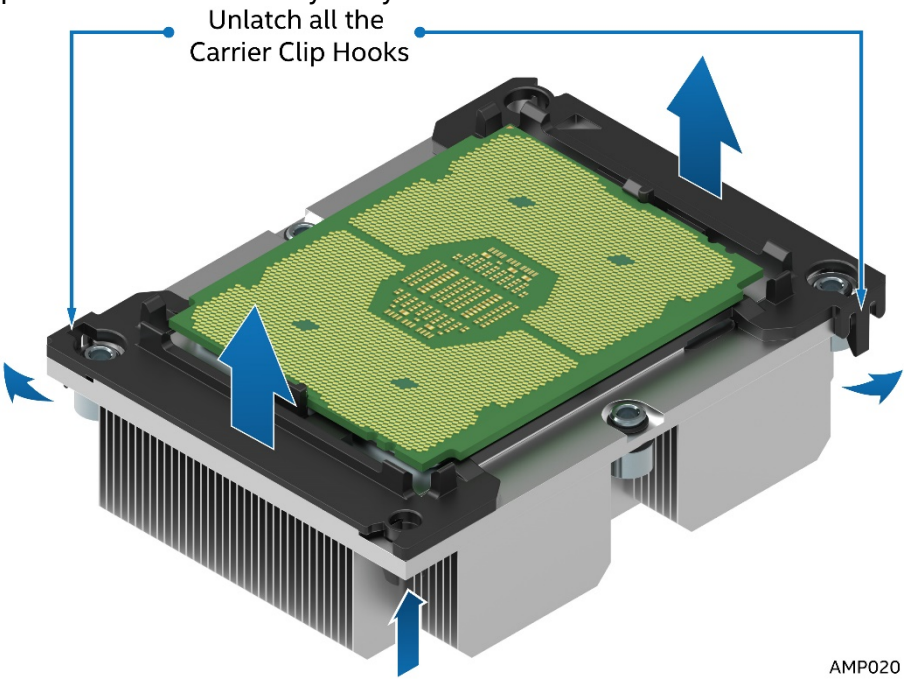


Figure 31. Releasing the Processor Carrier Clip from the Heat Sink

5. Remove the processor from the processor carrier 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.

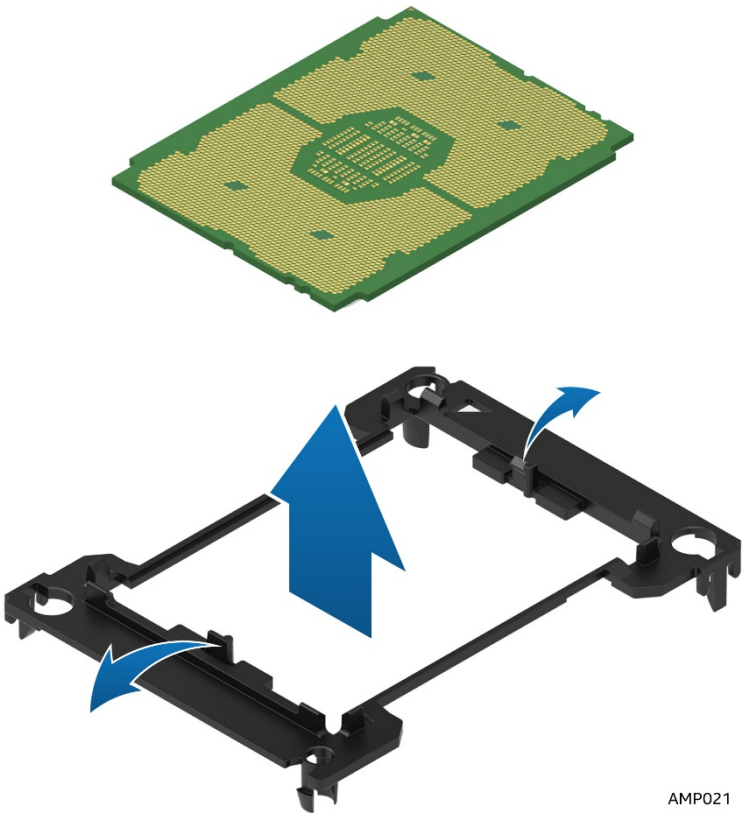


Figure 32. Releasing Processor from Carrier

2.6 Installation and Removal of the 1U LACC

Intel® Server Board S7200APR and Intel® Server Compute Module HNS7200APRL product family support the Intel® Xeon™ Phi™ processors Bootable CPUs (up to 320W TDP) in Intel® Server Chassis H2204XXLRE. All Intel® Xeon™ Phi™ Processors x200 or 72x5 CPU SKUs at 245W or greater TDP require use of the Intel® 1U Liquid Assisted Air Cooling (LACC) solution for optimal thermal support. The Intel® Server Board S7200APR product family Technical Product Specfication (TPS) decribes the 1U LAAC in detail. This section of the Service Guide describes the installation and removal of the 1U LACC coolling solution.

Note: Passive Air Cooled Heatsinks are not supported on CPUs with TDPs equal to or higher than 245w regardless of the supported CPU generation.

2.6.1 Removal of the 1U LACC Assembly

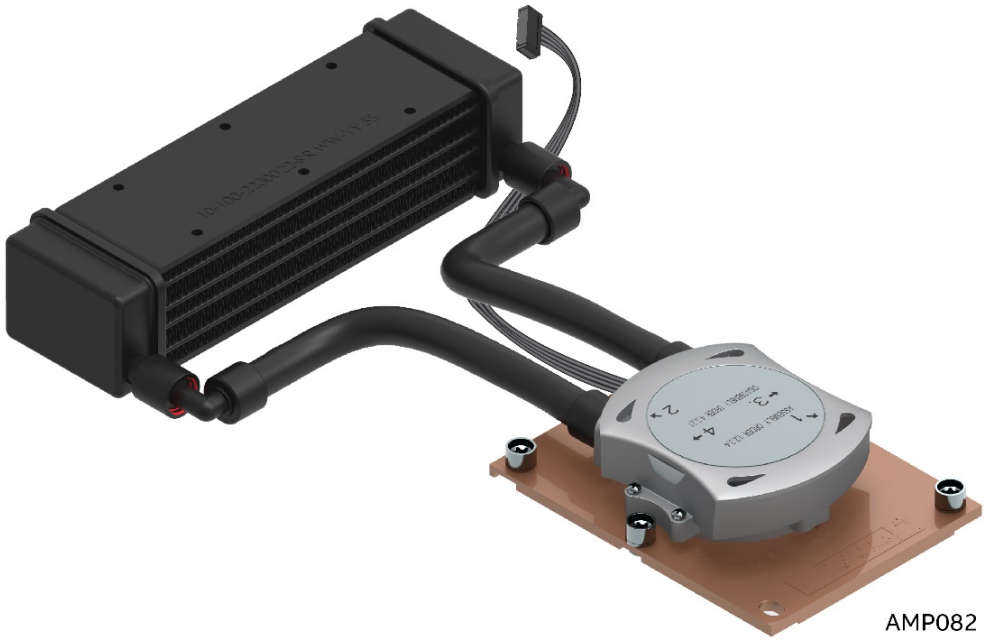


Figure 33. 1U LACC Assembly

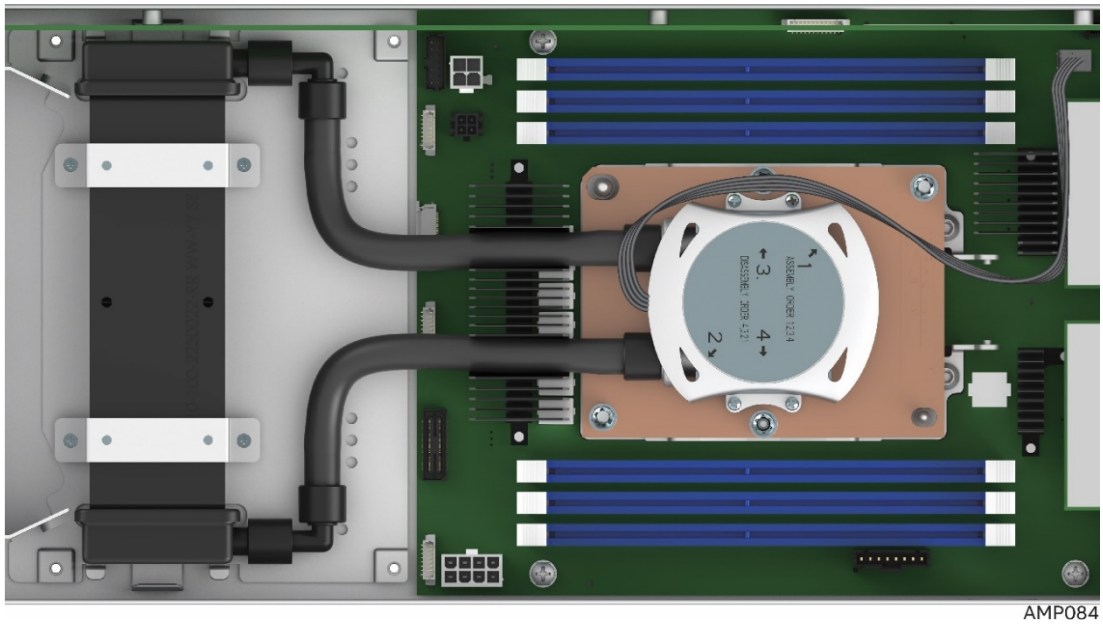


Figure 34. 1U LACC Assembly installed in the system

1. Power off the compute module and disconnect the power cable(s).
2. Remove the air duct. See section 2.3.1.
3. Disconnect the pump cable that is connected to the 4-pin CPU Fan Header (**J6J2**)

Figure 35. Disconnect the Pump Cable (Fan Header J6J2)

4. Next, remove the LACC Heat Exchanger retaining brackets by removing the 4 screws.

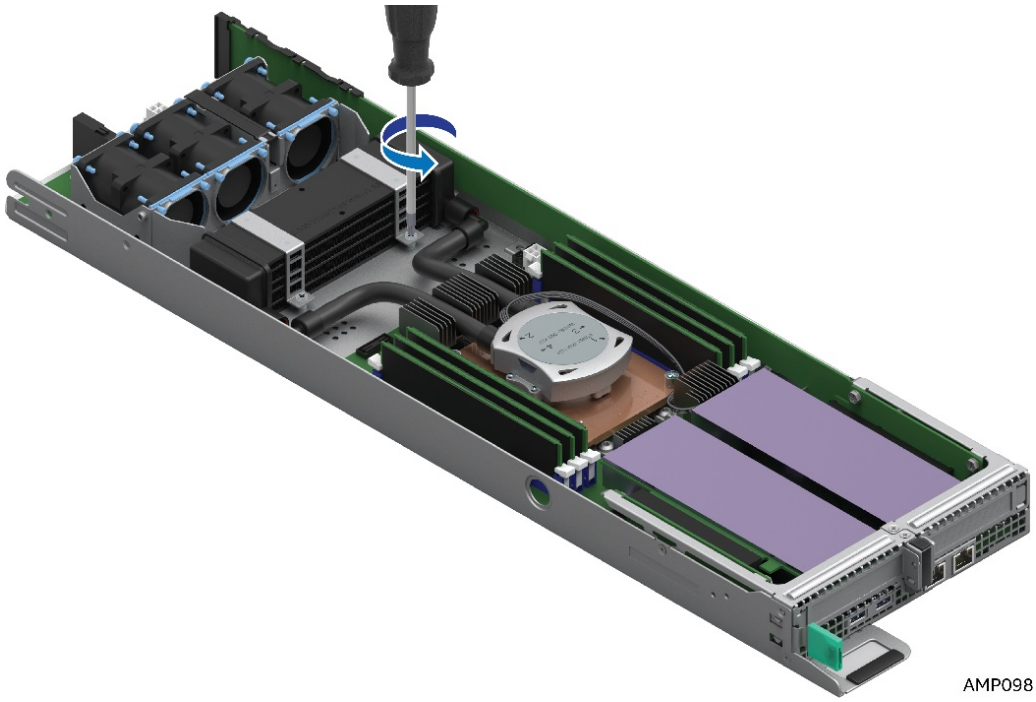


Figure 36. Remove LACC brackets #1

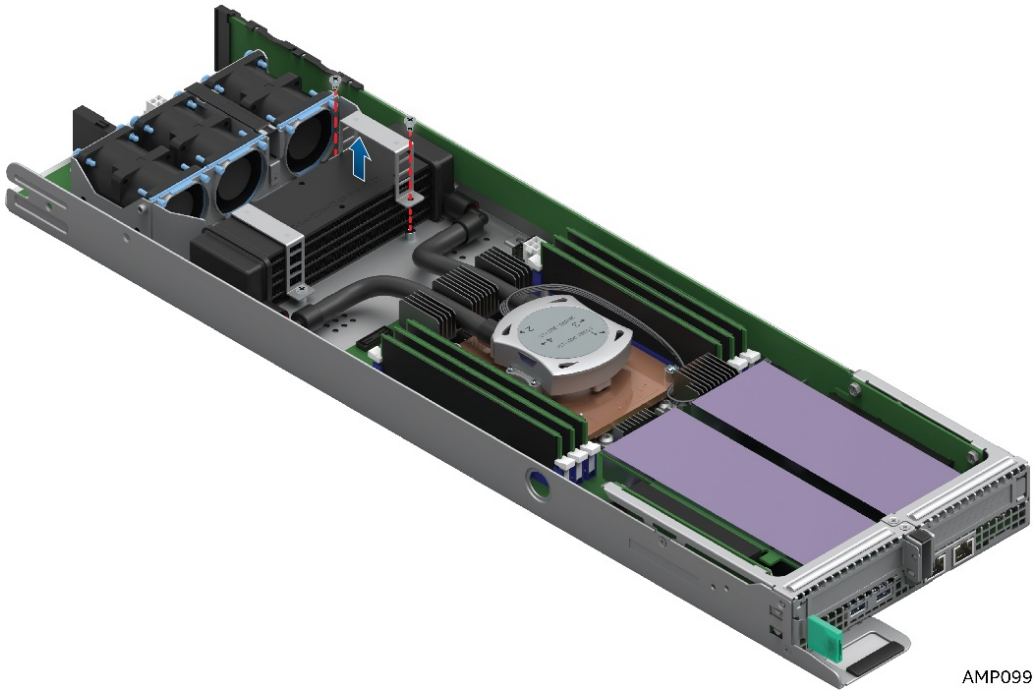


Figure 37. Remove LACC brackets #2

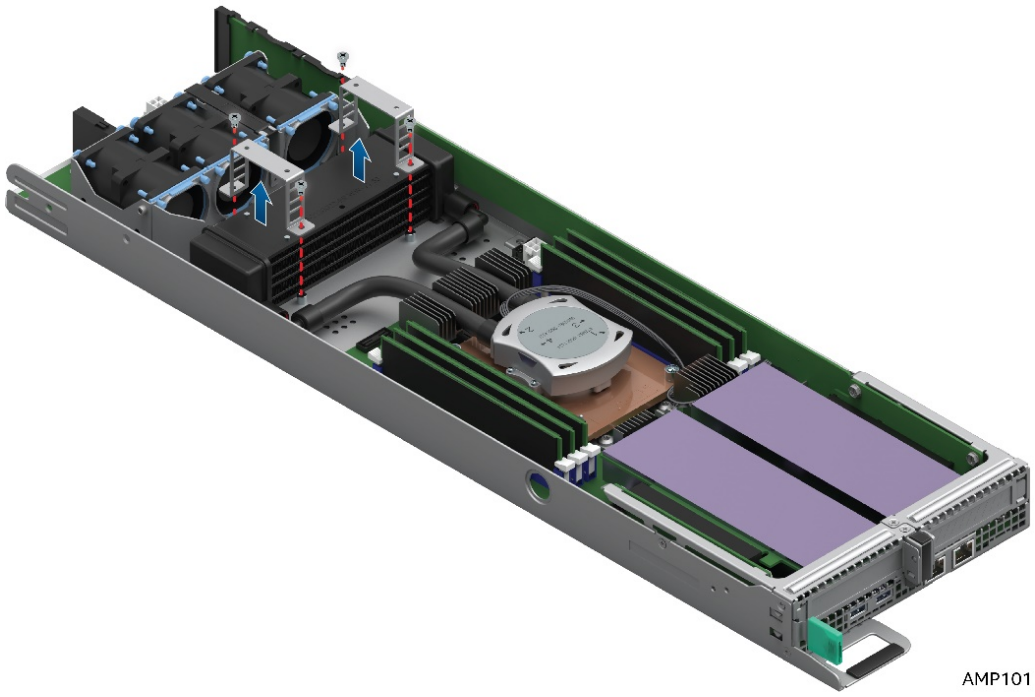


Figure 38. Remove LACC brackets #3

5. Finally, remove the LACC Cold Plate assembly. The LACC cold plate assembly is modeled after the passive air heatsink assembly. The sequence and method of removing the cold plate is exactly the same as the passive air heatsink. Follow carefully the screw loosening sequence. Refer to the passive air heatsink removal instructions in Section 2.5 for detail.

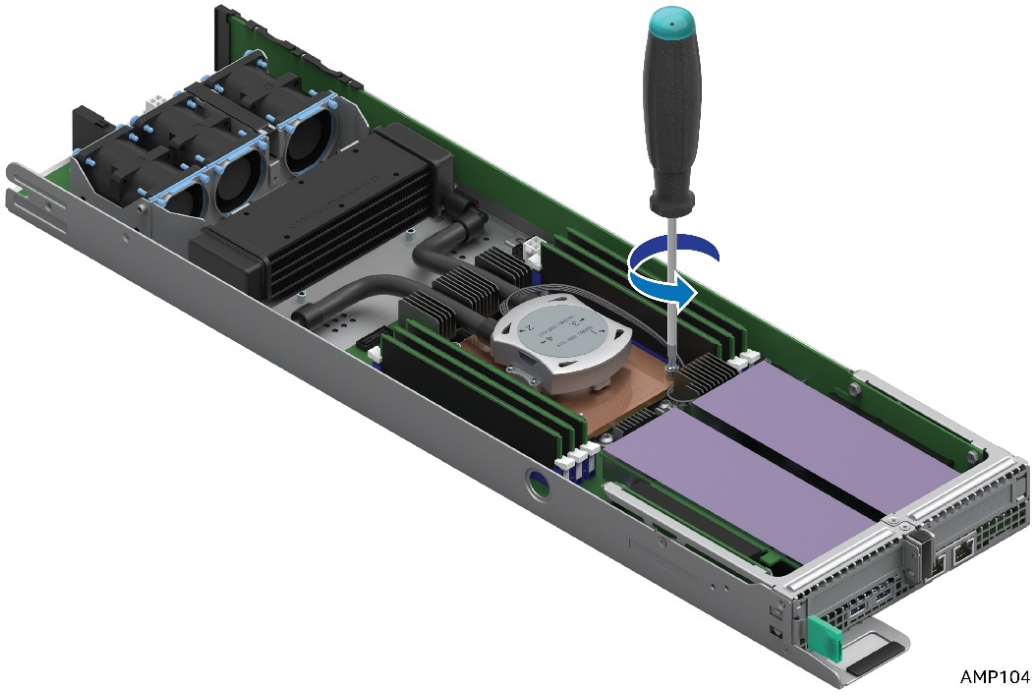


Figure 39. Remove Cold Plate Assembly

6. Carefully lift the LACC Assembly away from the node. Use two hands to grasp the heat exchanger and cold plate to safely remove the LACC assembly.

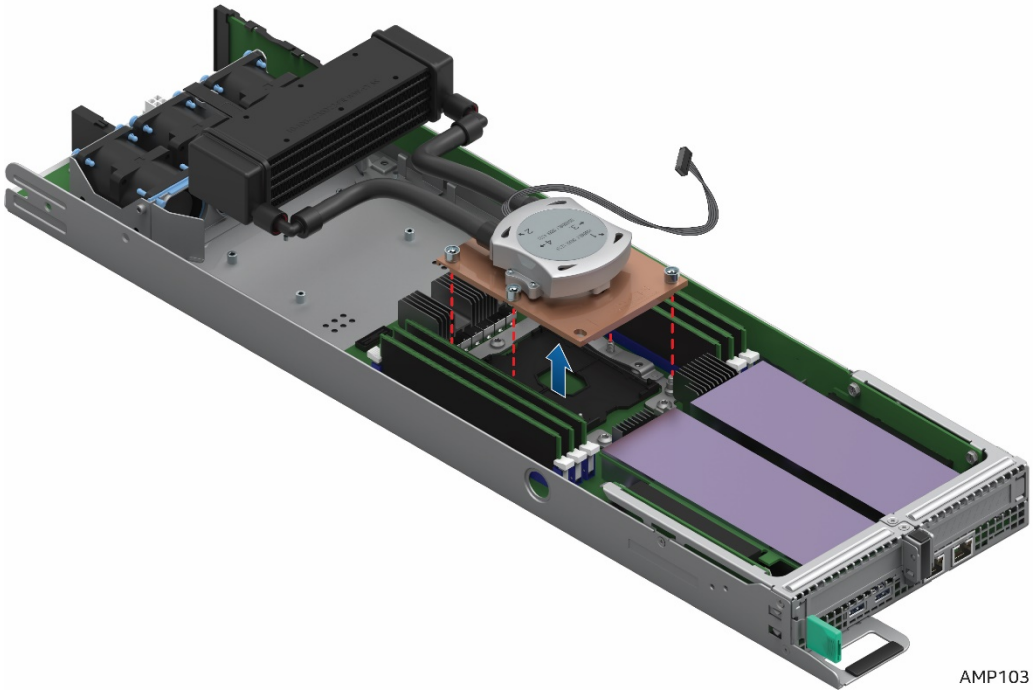


Figure 40. Lift out LACC Assembly

2.6.2 Remove the CPU and Carrier Assembly

1. Power off the compute module and disconnect the power cable(s).
2. Remove the air duct. See section 2.3.1.
3. Follow the procedures in Section 2.6.1 for LACC assembly removal
4. Turn the LACC and cold plate assembly over as shown in Figure 41
5. The LACC cold plate assembly is modeled after the passive air heatsink assembly. The sequence and method of removing the CPU and Carrier is exactly the same as the passive air heatsink. This step is only required if the CPU requires replacement. For simplification, refer to the CPU and Carrier removal instructions in Section 2.5 for detail.

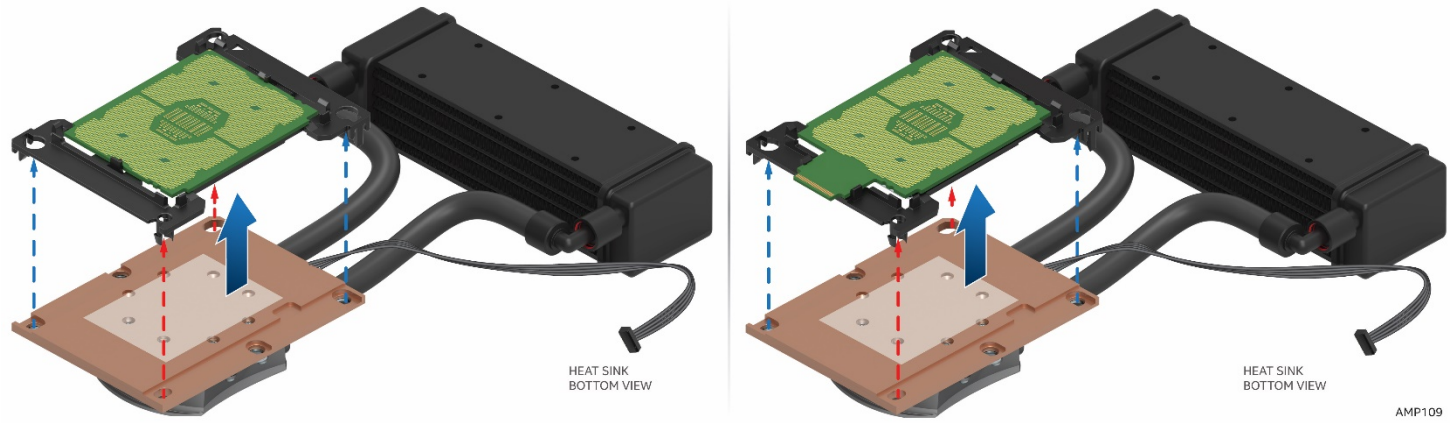


Figure 41. Releasing CPU and Carrier from Cold Plate

2.6.3 Install the 1U LACC Assembly

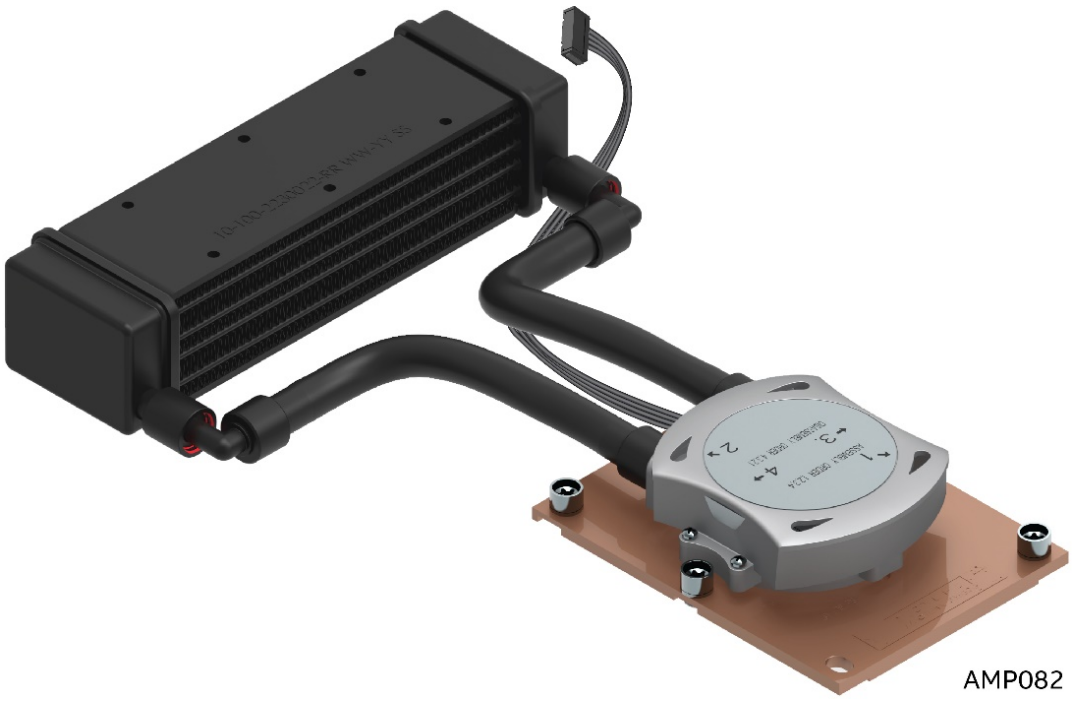


Figure 42. 1U LACC Assembly

1. Power off the compute module and disconnect the power cable(s).
2. Remove the air duct. See section 2.3.1.
3. The LACC cold plate assembly is modeled after the passive air heatsink assembly. The sequence and method of installing the CPU and Carrier is exactly the same as the passive air heatsink. This step is only required if the CPU requires replacement or installation. For simplification, refer to the CPU and Carrier installation instructions in Section 2.4 for detail.

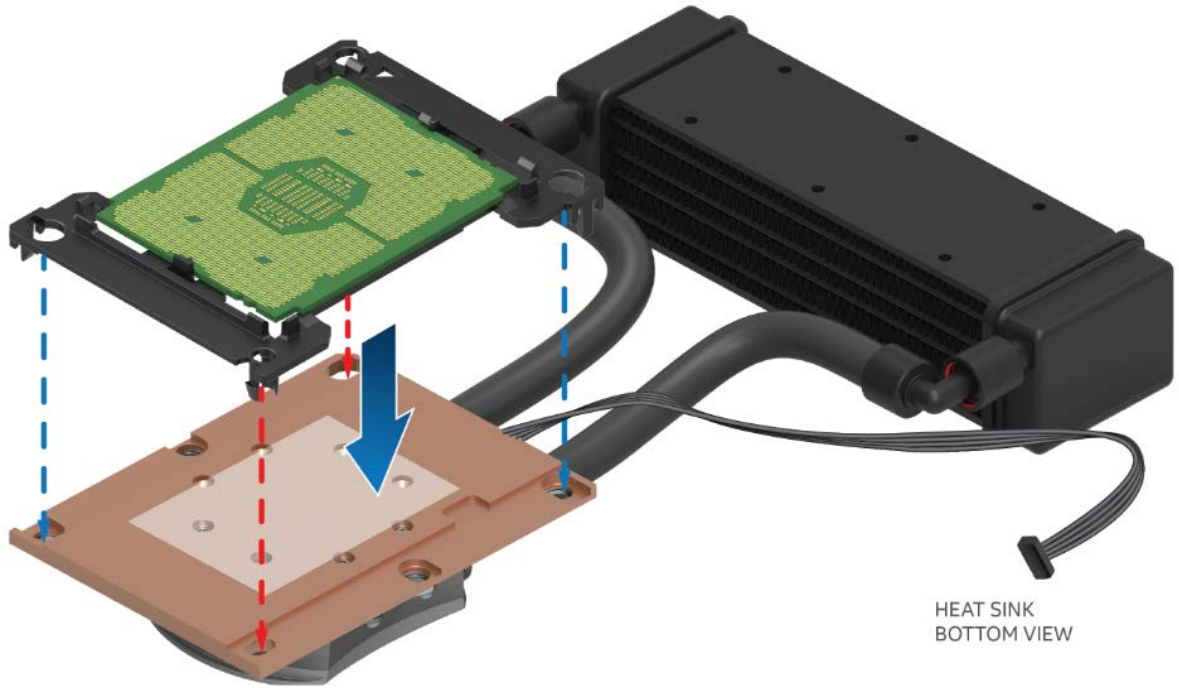


Figure 43. Install CPU and Carrier to Cold LACC Cold Plate

4. Carefully place and position the LACC assembly back into the system by using two hands. Ensure that it is properly aligned and that the cold plate aligns correctly with the CPU socket assembly and guide pins.

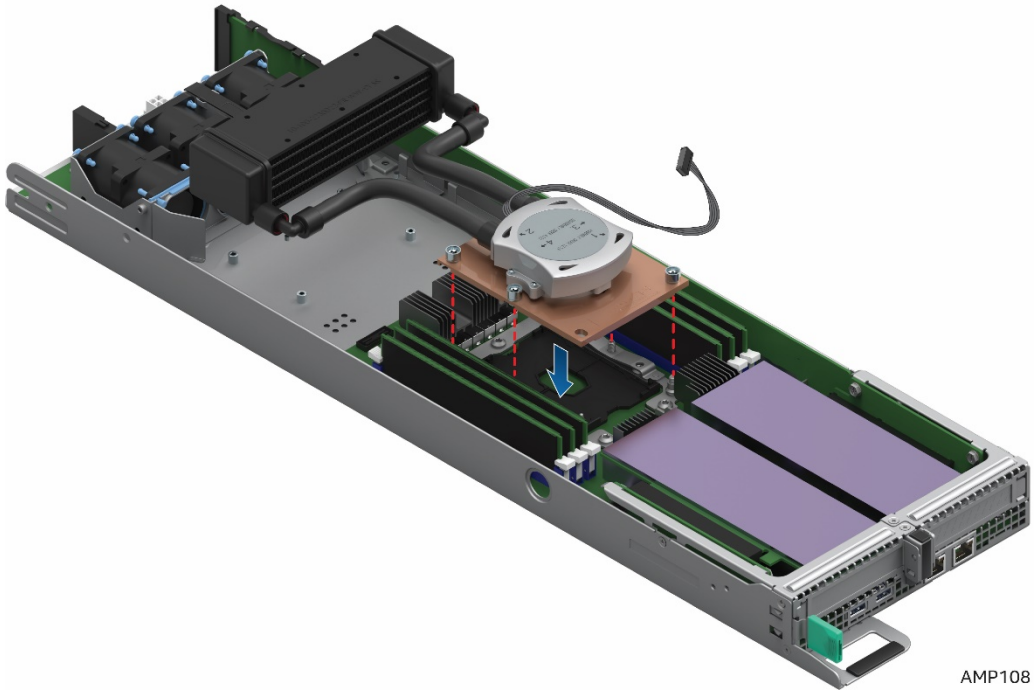


Figure 44. Install the LACC assembly into the system

5. Next, align and install the LACC cold plate assembly. Tighten the LACC Cold Plate assembly nuts. The LACC cold plate assembly is modeled after the passive air heatsink assembly. The sequence and method of tightening the cold plate screws is exactly the same as the passive air heatsink. Follow the tightening sequence carefully. Refer to the passive air cooled heatsink installation instructions in Section 2.4 for detail.

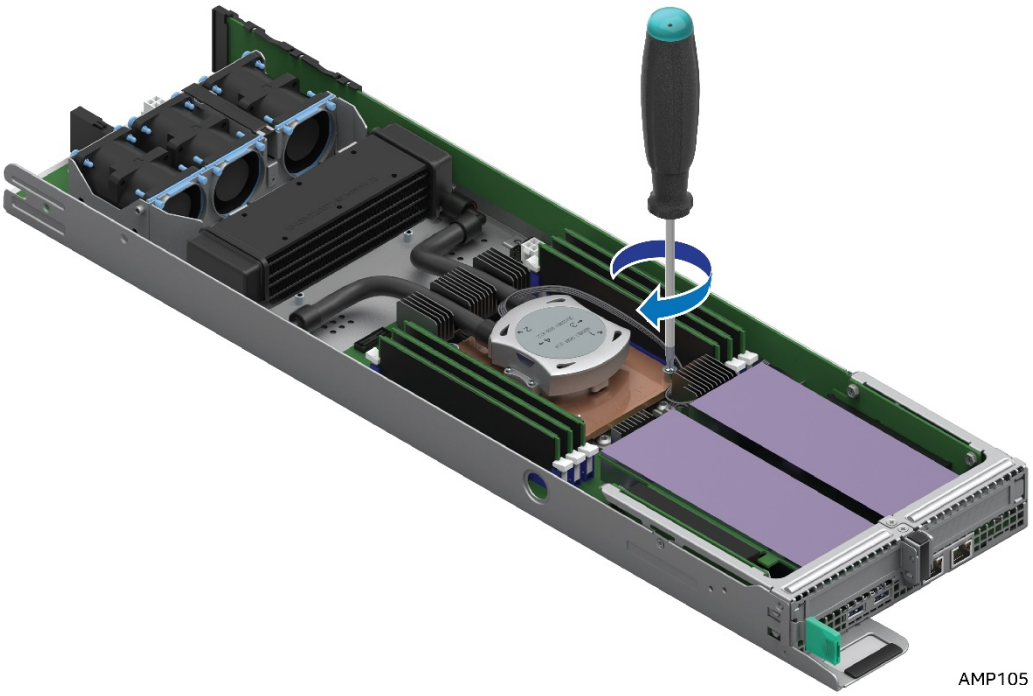


Figure 45. Install the LACC assembly into the system

6. Install the LACC Heat Exchanger retaining brackets by installing the 4 screws.

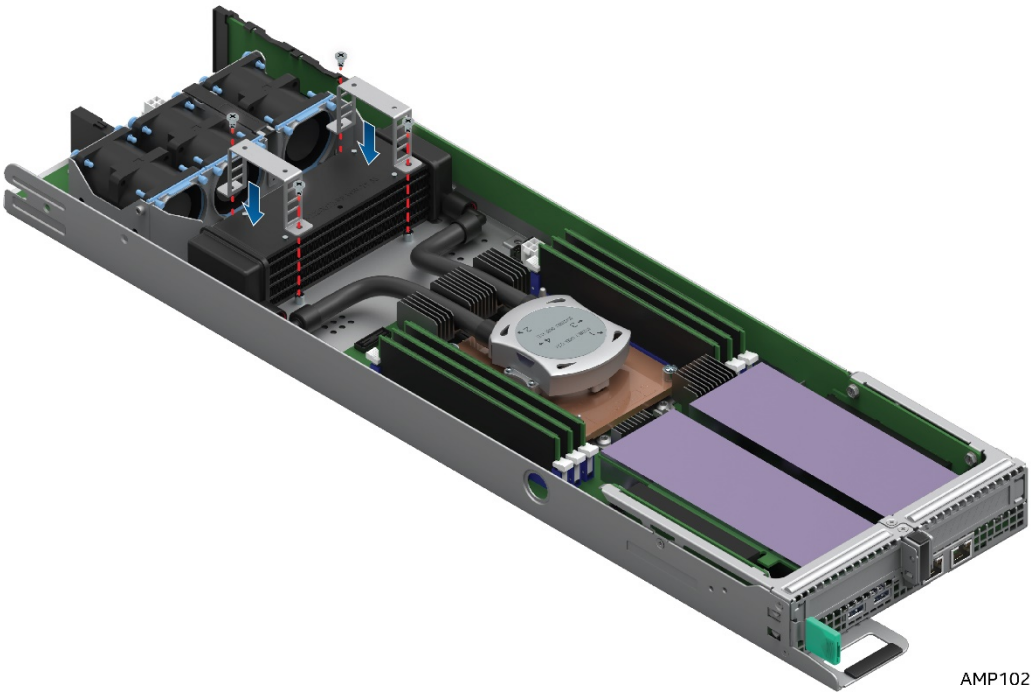


Figure 46. Install brackets #1

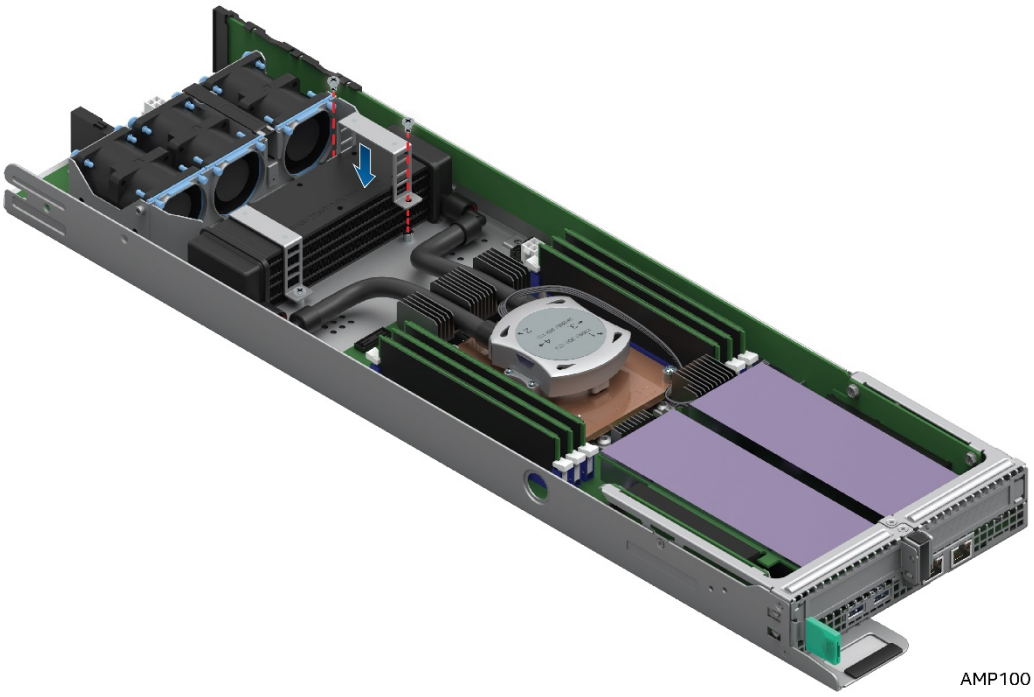


Figure 47. Install LACC brackets #2

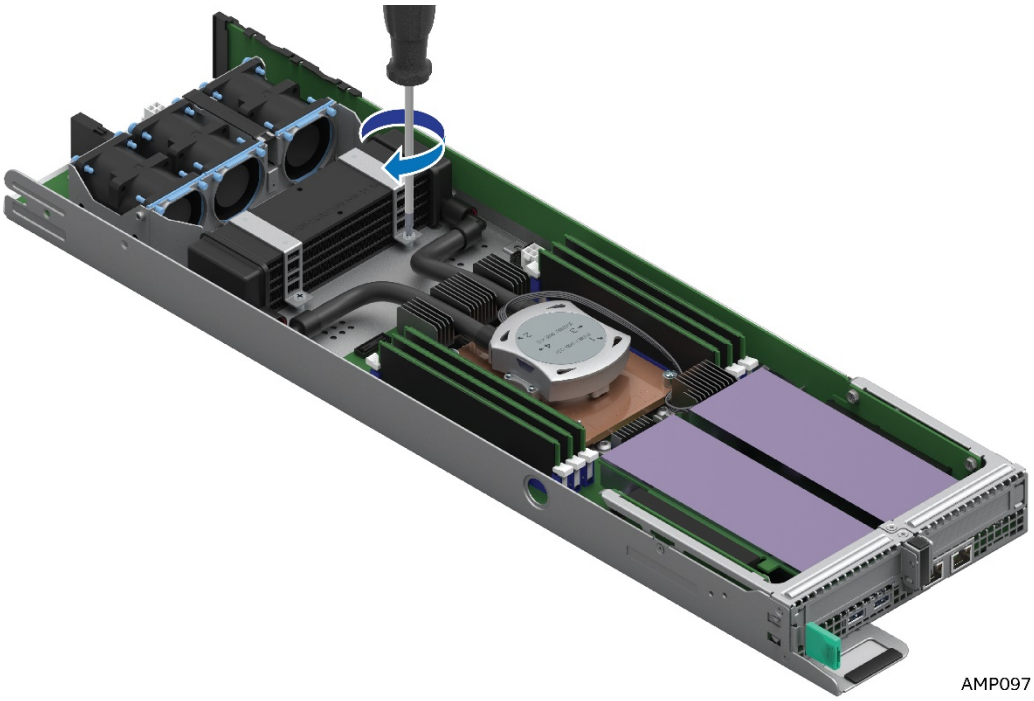


Figure 48. Install LACC brackets #3

7. Connect the pump cable to the 4-pin CPU Fan Header (**J6J2**)

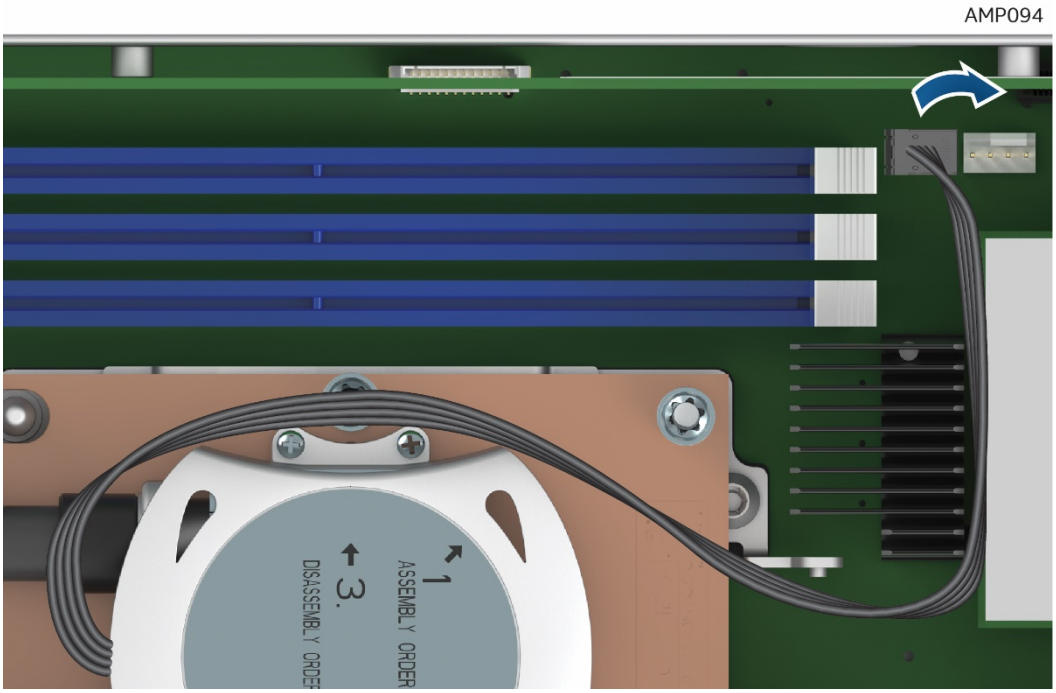


Figure 49. Connect the Pump Cable (fan header J6J2)

2.7 Removing and Installing Riser 1 and Riser 2

2.7.1 Remove Riser 1

1. Power off the compute module and disconnect the power cable(s).
2. Remove the air duct. See section 2.3.1.
3. Loosen the 3 screws (See **A**)
4. Pull the riser straight up and out of the system (See **B** and **C**)

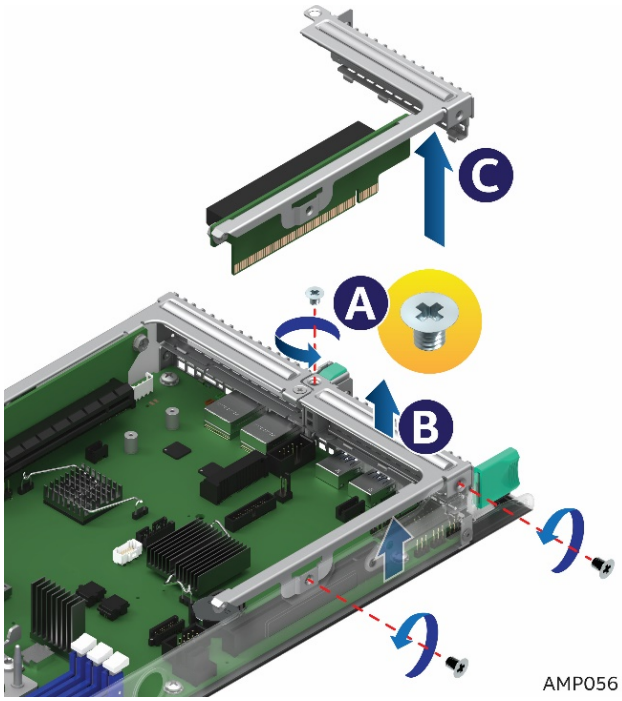


Figure 50. Removing Riser 1

2.7.2 Install Riser 1

1. Power off the compute module and disconnect the power cable(s).
2. Remove the air duct. See section 2.3.1.
3. Align and insert Riser 1 into Riser Slot 1 (See **A)**
4. Ensure that the Riser is all the way down and fully seated (See **B**)
5. Tighten the 3 screws (See **C**)

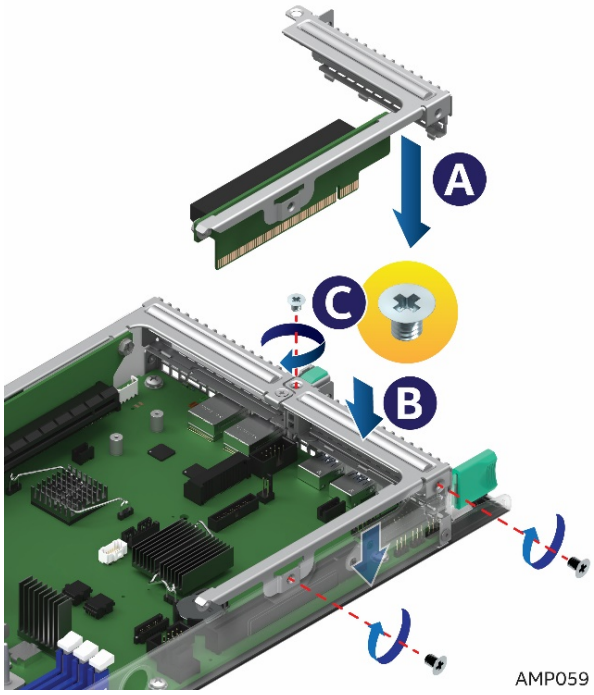


Figure 51. Installing Riser 1

2.7.3 Remove Riser 2

1. Power off the compute module and disconnect the power cable(s).
2. Remove the air duct. See section 2.3.1.
3. Loosen the 3 screws (See **A**)
4. Pull and lift the riser straight up and out of the system (See **B** and **C**)

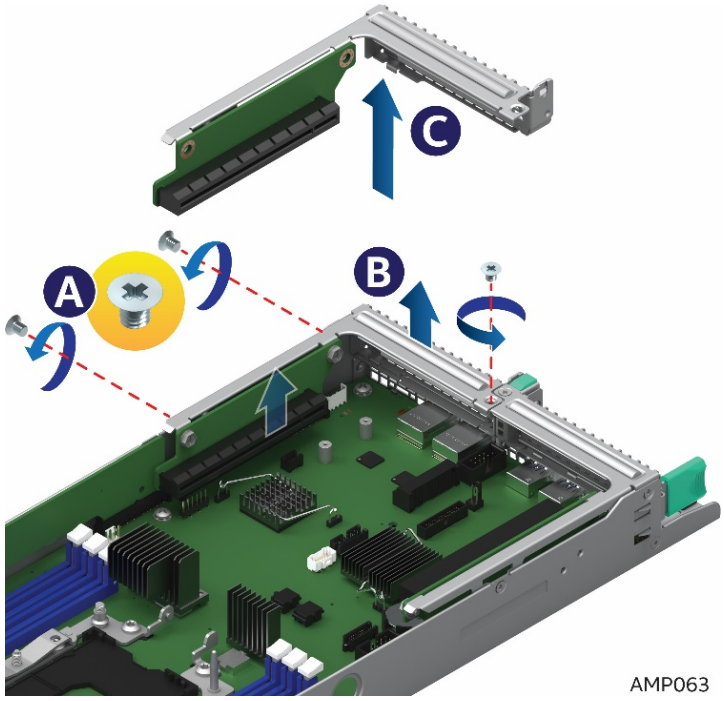


Figure 52. Removing Riser 2

2.7.4 Install Riser 2

1. Power off the compute module and disconnect the power cable(s).
2. Remove the air duct. See section 2.3.1.
3. Align and insert Riser 2 into Riser Slot 2 (See **A)**
4. Ensure that the Riser is all the way down and fully seated (See **B**)

5. Tighten the 3 screws (See **C**)

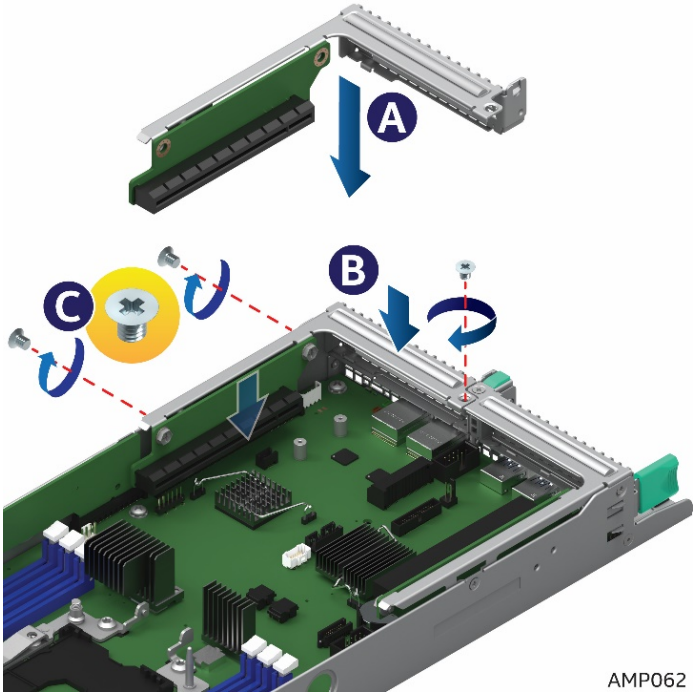


Figure 53. Installing Riser 2

2.8 Installing and Removing an Add-In Card - Riser Slot 1

2.8.1 Installing a PCIe* Add-In Card Riser 1

1. Power off the compute module and disconnect the power cable(s).
2. Remove the air duct. See section 2.3.1.
3. Remove Riser 1 See section 2.7.1
4. Remove the filler panel and attach the Add-In Card to the riser card assembly.
5. Insert the PCIe* Add-In Card into the riser slot (See letter **A**).

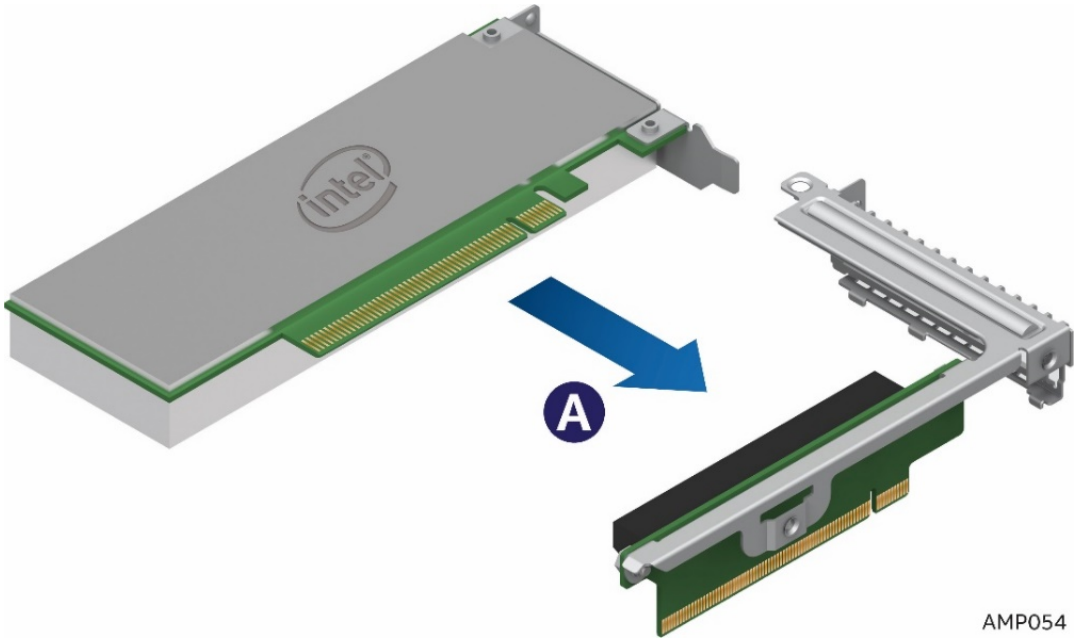


Figure 54. Installing the PCIe* Add-In Card– Step 1

6. Align and insert the PCIe* riser assembly into the Riser Slot 1 on the server board (See letter **B**).

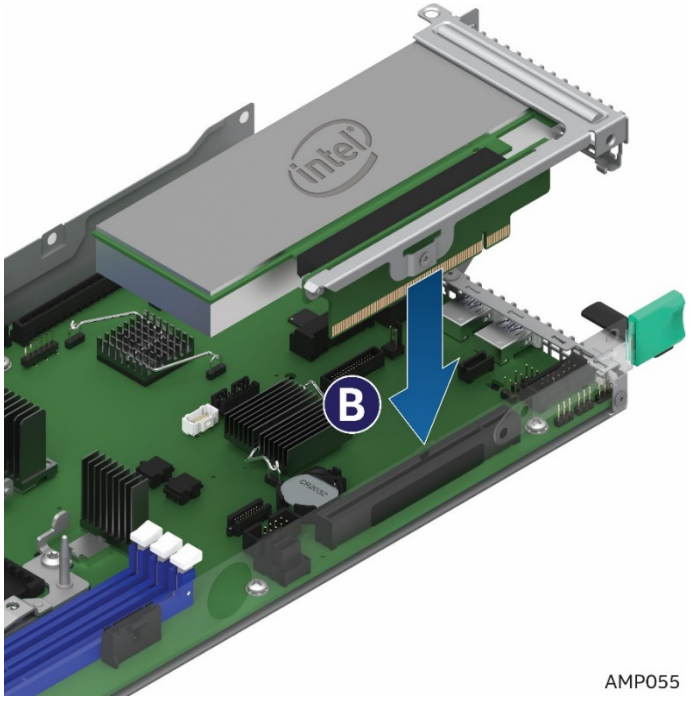


Figure 55. Installing the PCIe* Add-In Card – Step 2

7. Install and tighten the three screws (See letter **C**).

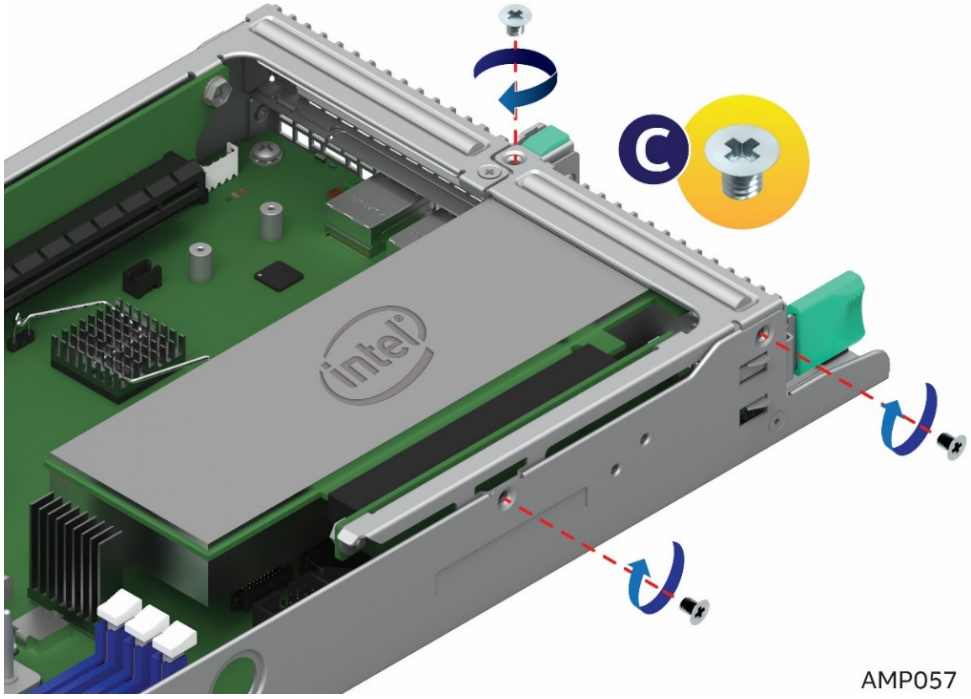


Figure 56. Installing the PCIe* Add-In Card – Step 3

2.8.2 Removing a PCIe* Add-In Card Riser 1

1. Loosen the three screws (See letter **A**).

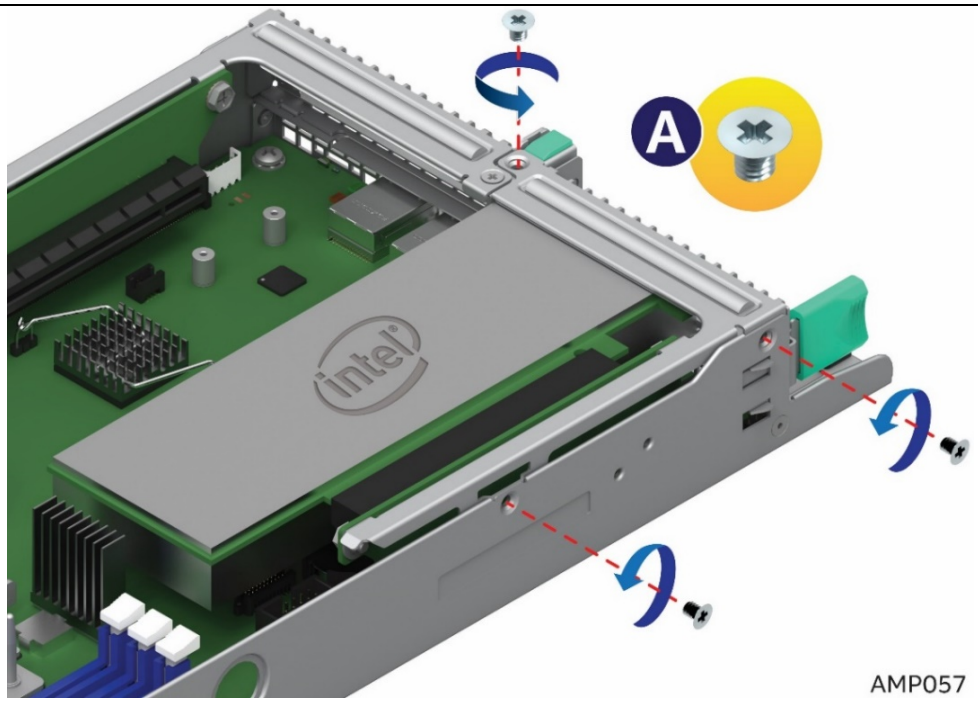


Figure 57. Removing the PCIe* Add-In Card – Step 1

2. Pull the Add-In Card assembly up and out (See letter **B**).

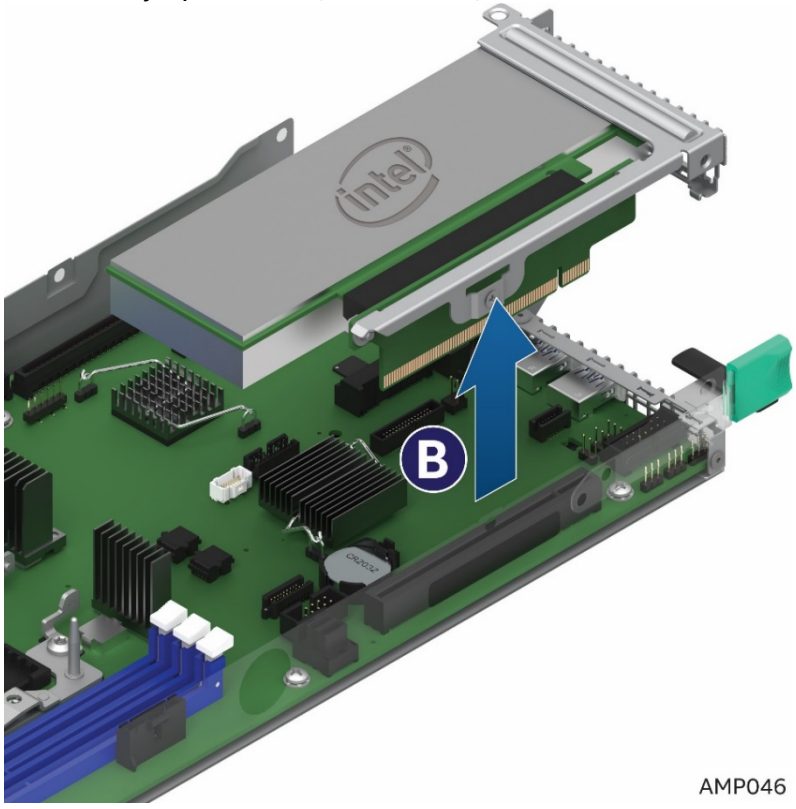


Figure 58. Removing the PCIe* Add-In Card – Step 2

3. Remove the Add-In Card from the riser (See letter **C**).
4. Re-install the filler panel
5. Re-install Riser 1 See section 2.7.2

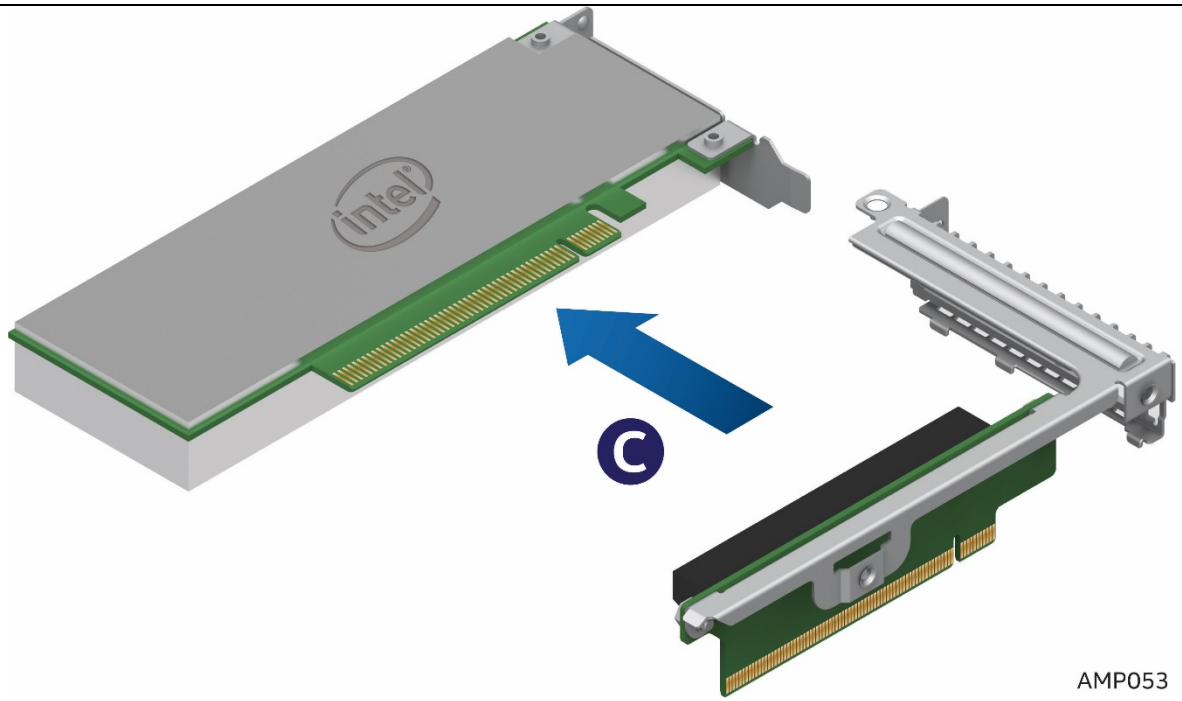


Figure 59. Removing the PCIe* Add-In Card– Step 3

2.9 Installing and Removing an Add-In Card - Riser Slot 2

2.9.1 Installing a PCIe* Add-In Card Riser 2

Note: Riser Slot 2 has two Riser options. Select the appropriate Riser (PCIe*X8 or X16 riser for slot 2) for your configuration. See the product configuration guide and technical product specification for details.

1. Power off the compute module and disconnect the power cable(s).
2. Remove the air duct. See section 2.3.1.
3. Remove Riser 2 See section 2.7.3
4. Remove the filler panel and attach the Add-In Card to the riser card assembly.
5. Insert the PCIe* Add-In Card into the riser slot (See letter **A**).

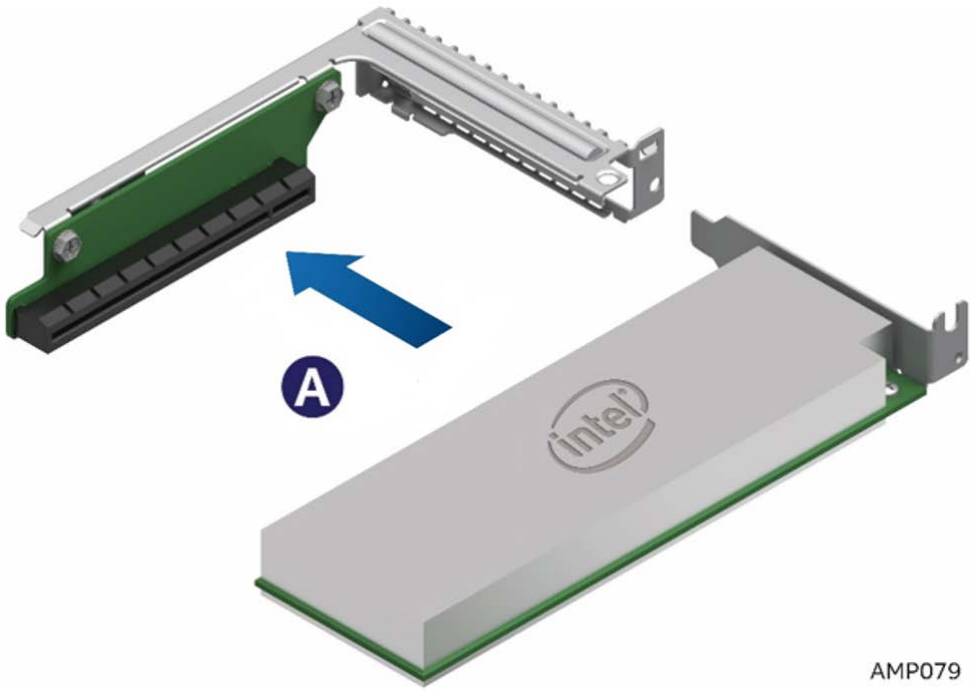


Figure 60. Installing the PCIe* Add-In Card– Step 1

6. Align and insert the PCIe riser assembly into the Riser Slot 1 on the server board (See letter **B**).

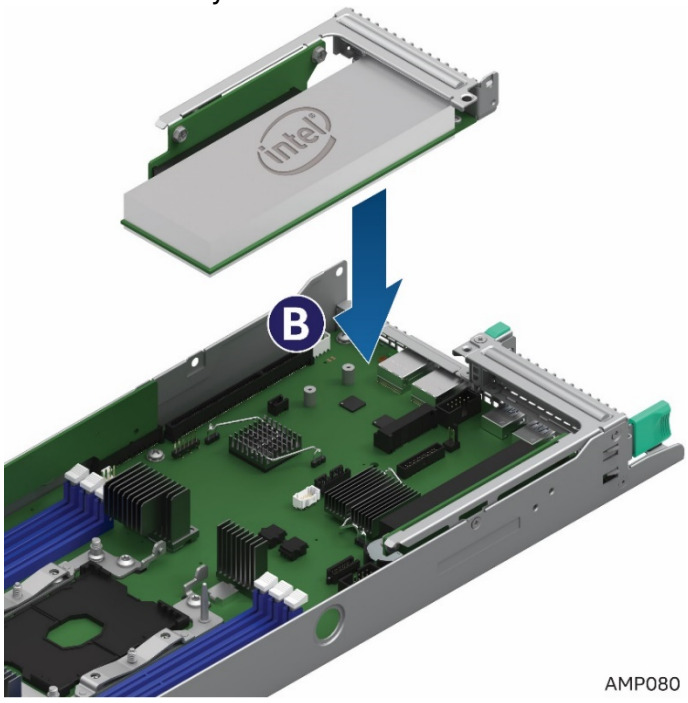


Figure 61. Installing the PCIe* Add-In Card– Step 2

7. Ensure that the Add-In Card and Riser are fully seated (See letter **C**).
8. Tighten the three screws (See letter **D**).

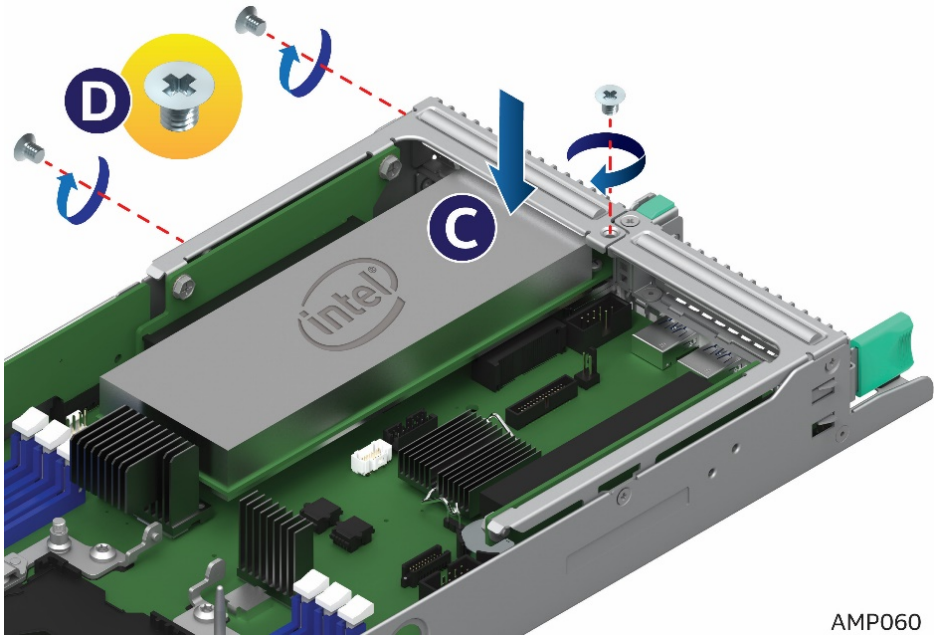


Figure 62. Installing the PCIe* Add-In Card– Step 3

2.9.2 Removing a PCIe* Add-In Card from Riser 2

1. Power off the compute module and disconnect the power cable(s).
2. Remove the air duct. See section 2.3.1.
3. Loosen the three screws (See letter **A**).
4. Pull straight up on Riser 2 with the PCIe* Add-In Card assembly (See letter **B**).

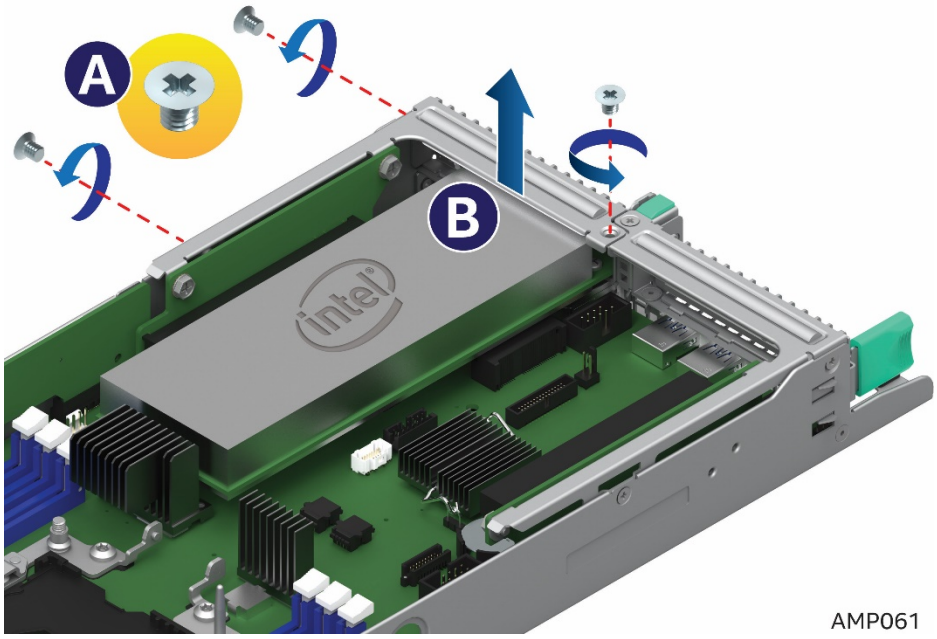


Figure 63. Removing the PCIe* Add-In Card – Step 1

5. Lift out the PCIe* Slot 2 Riser with Add-In-Card.

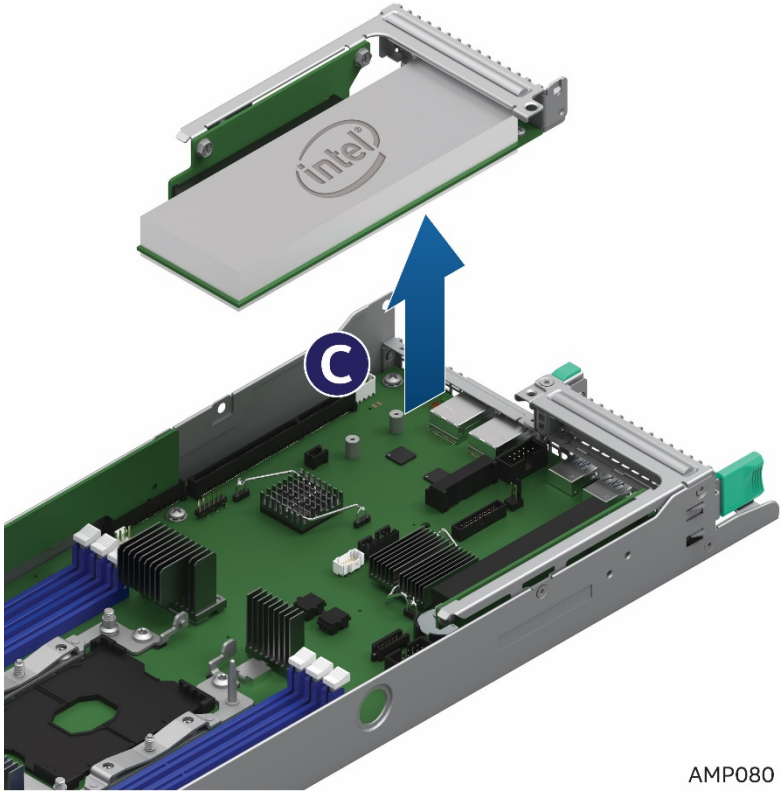


Figure 64. Lift out the Riser and Add-In-Card– Step 2

6. Remove the Add-In Card from the riser (See letter **D**).
7. Re-install the filler panel
8. Re-install Riser 2 See section 2.7.4

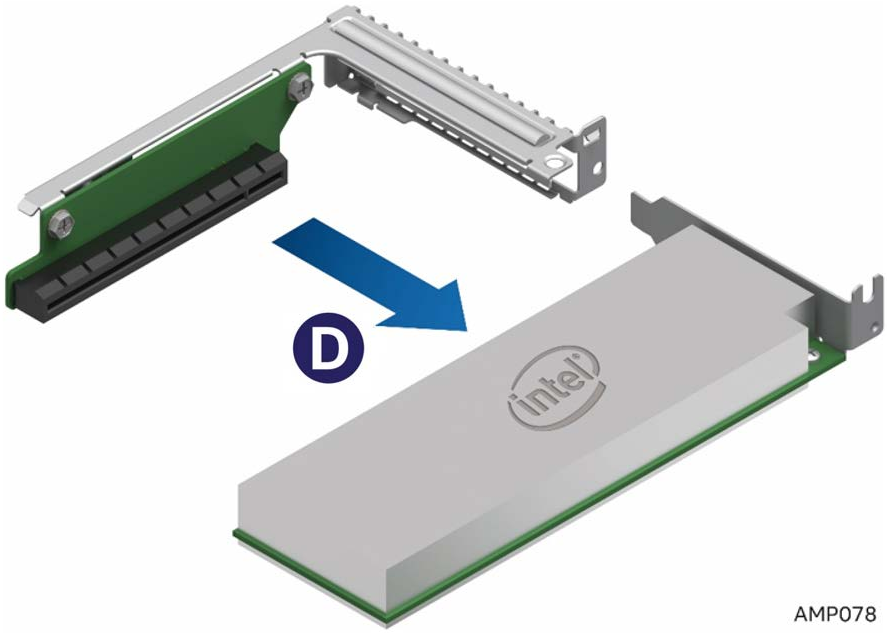


Figure 65. Remove the Add-In-Card from Riser 2– Step 3

2.10 Installation and Removal of the Intel® Omni-Path Fabric Processor Kit.

The Intel® Xeon™ Phi™ x200 Product Family CPUs with integrated Intel® Omni-Path Fabric is required for use in conjunction with the Intel® Fabric Through (IFT) carrier for full fabric connectivity. The following sections will provide procedures on how to install and remove the optional Intel® Omni-Path Fabric Processor Kit (iPC – **AXX2PFABKIT**) and the Intel® Xeon™ Phi™ (Fabric) processor. The IFT Carrier card is installed in PCIe* Riser Slot 1. Refer to the *S7200AP Family Configuration Guide & Spares/Accessories List* for ordering details.

Note: The Intel® Omni-Path Fabric Processor Kit is not supported when Intel® Xeon™ Phi™ 72x5 Product Family CPUs are installed.

2.10.1 Fabric Processor Kit Components

1. The Intel® Omni-Path Fabric Processor Kit consists of the following components:
   a) Intel® Fabric Through (IFT) carrier card
   b) Intel® Omni-Path Fabric Sideband Cable
   c) Intel® Omni-Path Fabric Processor Cable
   d) Fabric CPU carrier assembly

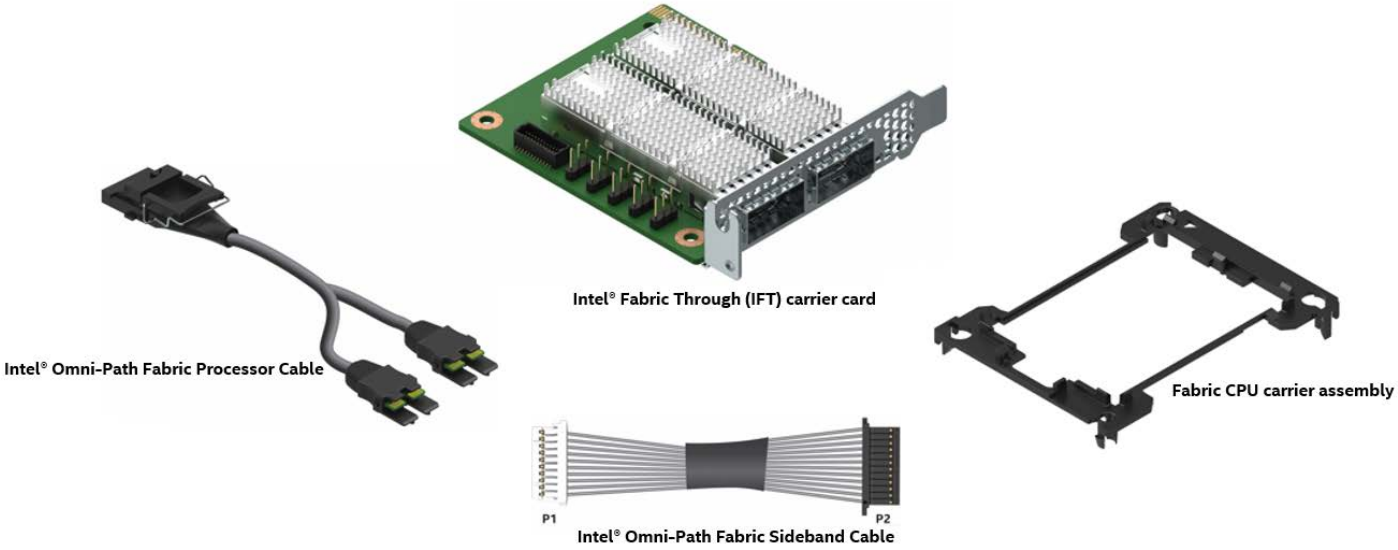


Figure 66. Installing the IFT Carrier

2.10.2 Fabric Processor Kit Cables

1. The two cables are included with the kit. Cables are labeled for illustration purposes.

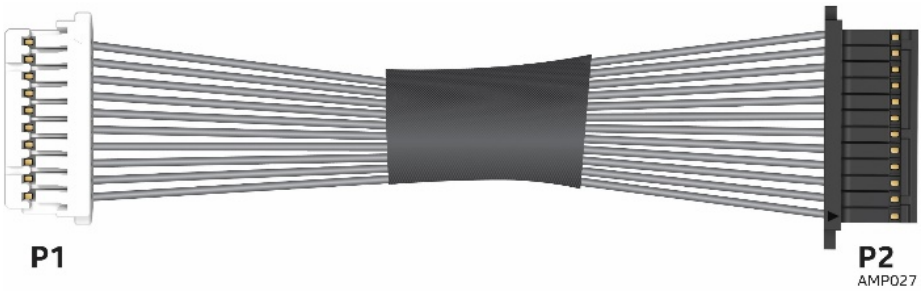


Figure 67. Intel® Omni-Path Sideband Cable Connection

Figure 68. Intel® Omni-Path Fabric Processor Cable

2.10.3 Installing the Fabric Processor Kit

1. Power off the compute module and disconnect the power cable(s).
2. Remove the air duct. See section 2.3.1.
3. See section 2.4.1 for instructions on how to assemble the (processor heat sink module) PHM, fabric CPU carrier assembly and mount it onto the server board. Note that the fabric carrier clip that comes with the kit must be used with the fabric CPU.
4. Remove the Fabric Processor Kit components
5. For ease of installation, prior to installing the carrier card into Riser 1, install the sideband cable (**P2**, black end) into carrier card connector J3A1 on the carrier card (See letter **A** in figure 51). Leave the other end of the cable (**P1**, white end) disconnected for later installation into the main board sideband fabric connector J5J2.
6. PCSD customers should ensure that IFT Carrier Card Jumper J1A2 is set for pin position 2-3 for normal operation.

NOTE: The actual view of the IFT carrier card has been modified in order to illustrate the sideband cable connection (See Figure 51). The card will be rotated 180° and thee IFT carrier ports face down in Riser Slot 1 when installed in the system.

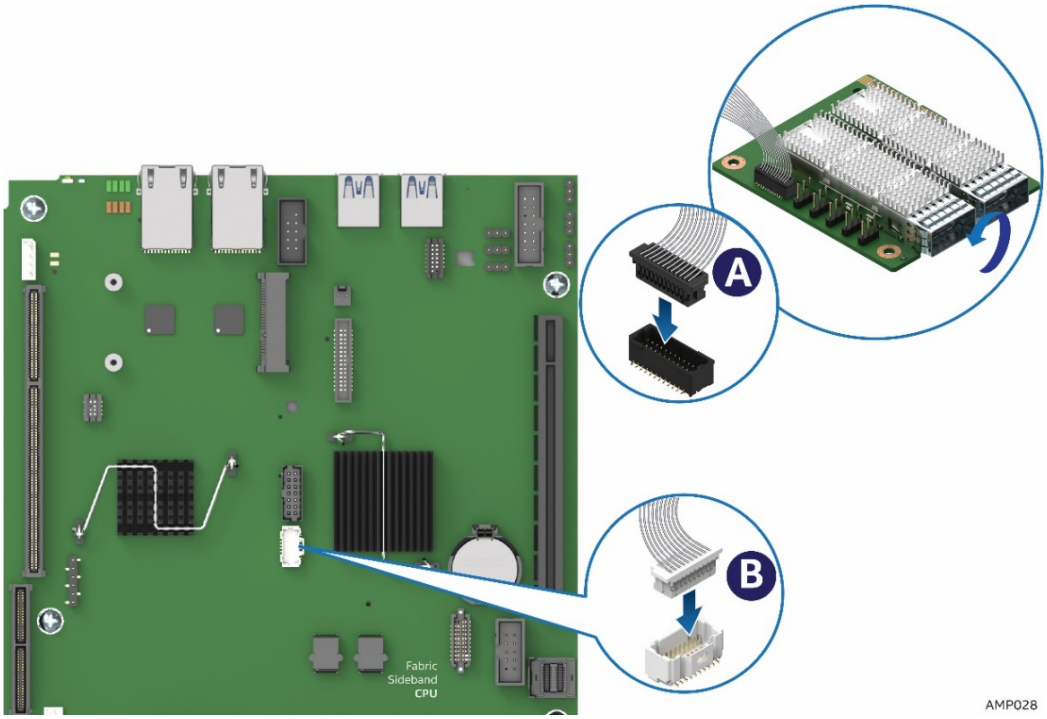


Figure 69. Sideband Cable Connection

7. Install the IFT carrier card.

Note: The IFT card should be installed in PCIe* Slot 1 for normal operation with the Intel® Xeon™ Phi™ (Fabric) processor. The IFT carrier card is not supported in PCIe* Slot 2 when the fabric CPU is installed. When the Intel® Xeon™ Phi™ (Fabric) processor is used in the server system, PCIe* Slot 2 is reduced to x4 lanes (electrical) for PCIe* device connectivity. See the Intel ® Server Board S7200AP *and Intel® Compute Module HNS7200AP Product Family Configuration Guide and Technical Product Specification* for Riser 2 options.

a) Follow the basic instructions to install an Add-In-Card in Slot 1 as shown in section 2.7.1. Install the IFT card into Riser Slot 1 card (See Figure 52, letter **A**). Note that the sideband cable (**P2,** black end) is already connected to the IFT carrier card prior to installing the carrier card into Riser 1.
b) Install IFT and Riser Slot 1 card into Riser slot 1 (See Figure 52, letter **B**).
c) Secure the riser card (See Figure 52, letter **C**).
d) Once the IFT Carrier Card is fully secured in the system, connect the other end of the sideband cable (**P1**, white end) into the main board sideband fabric connector J5J2. Refer back to Figure 51 (See

letter **B**), Sideband Cable Connection.

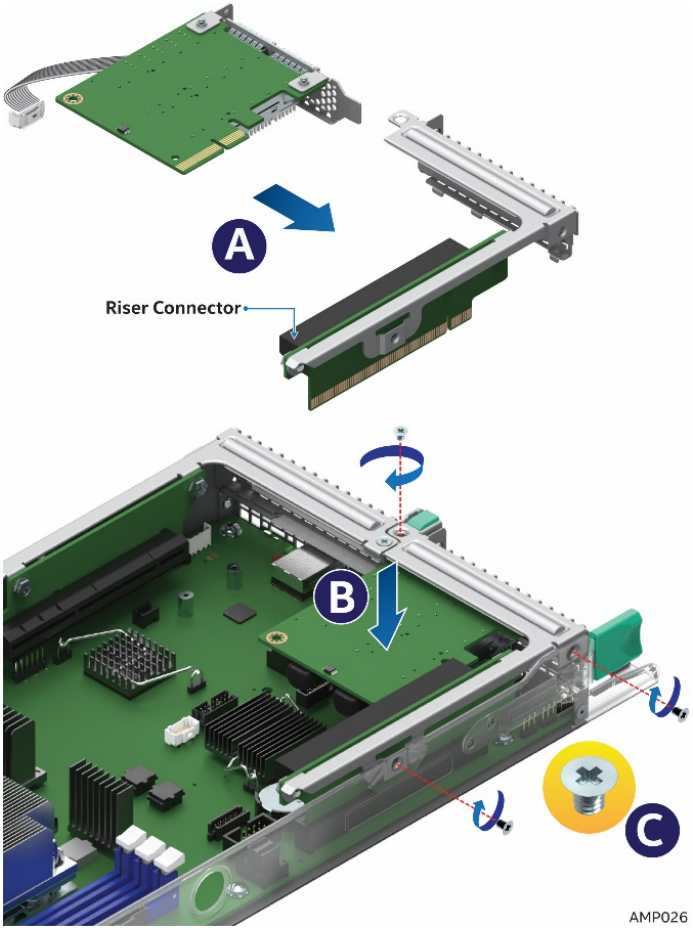


Figure 70. Installing the IFT Carrier

5. Install the Intel® Omni-Path Fabric Processor Cable
   a) Line up the cable CPU connector end and install it vertically onto the Fabric CPU connector. Push the connector forward toward the substrate until fully engaged. (See letter **A**)
   b) Rotate and snap the cable wire latch into the lock position onto the bolster plate latch posts.
   c) Insert the two IFP plugs into the IFT carrier slots on the board. When installing the two plugs, the latch release buttons are marked P1 and P2 will face down in the system. As illustrated, ensure that the connector marked P1 on the cable is inserted into the P1 connector and the P2 plug is inserted into the P2 connector (See letter B). Ensure that the cables are pushed fully forward and are fully engaged.
   d) At the rear of the system, plug in the fabric cable. See the Intel® Omni-Path Cables Matrix for a list of supported cables: http://www.intel.com/content/www/us/en/high-performance-computing-fabrics/omni-path-cables.html

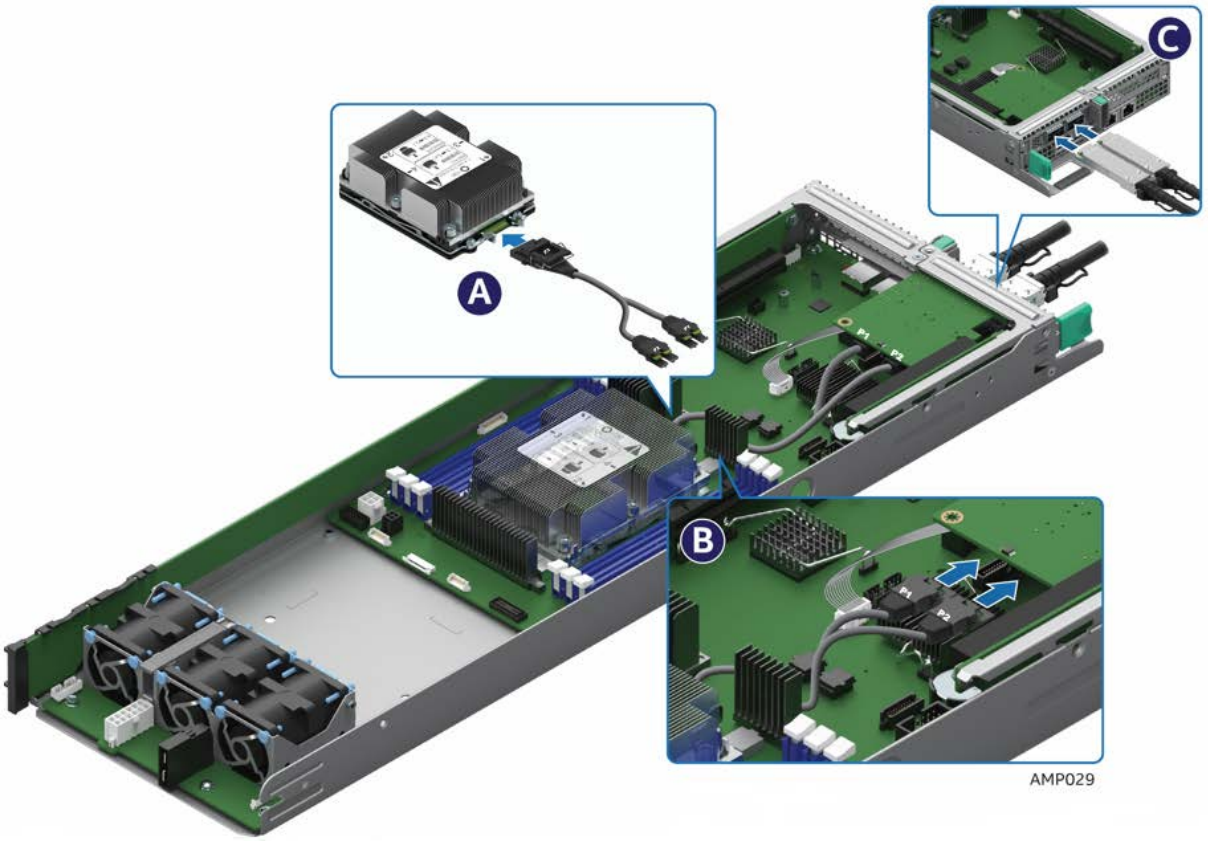


Figure 71. Fabric Processor and IFT Cable Connections

2.10.4 Removing the Fabric Processor Kit

1. Disconnect all the cable connections from the IFT carrier and the fabric processor (See letter **A**, **B** and **C**).

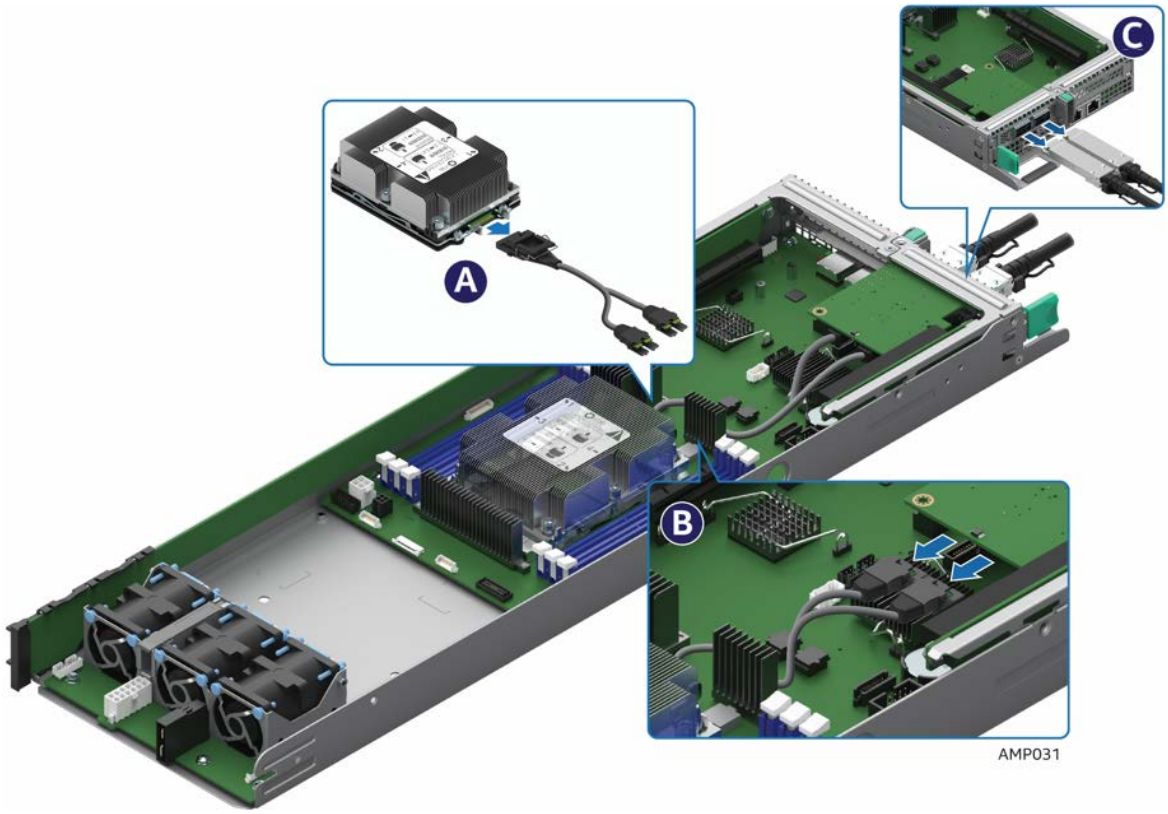


Figure 72. Disconnecting IFP Cables

2. See section 2.8.2 for instructions on how to remove the Intel® Omni-Path / Fabric processor carrier card from Riser 1.
3. See section 2.5 for instructions on how to remove the processor from the server board.

2.11 Installing and Removing the Memory

2.11.1 Installing the Memory

1. Power off the compute module and disconnect the power cable(s).
2. Remove the air duct. See section 2.3.1.
3. Locate the DIMM socket. Make sure the clips at either end of the DIMM socket are pushed outward to an open position (See letter **A**).

   NOTE: Make sure the retaining clip of the adjacent slot is NOT open and does NOT interfere with each other.

   CAUTION: Add-In Cards may need to be removed prior to servicing the DIMMs.

4. Holding the DIMM by the edges, remove it from its anti-static package. Place the DIMM within the DIMM slot guides. Ensure the DIMM notch is aligned with the DIMM slot key (See letter **B**).

5. Insert the bottom edge of the DIMM into the socket (See letter **C**). When the DIMM is inserted, push down firmly on the top edge of the DIMM until the retaining clips snap into place (See letter **D**). Ensure the retaining clips are firmly in place (See letter **E**).

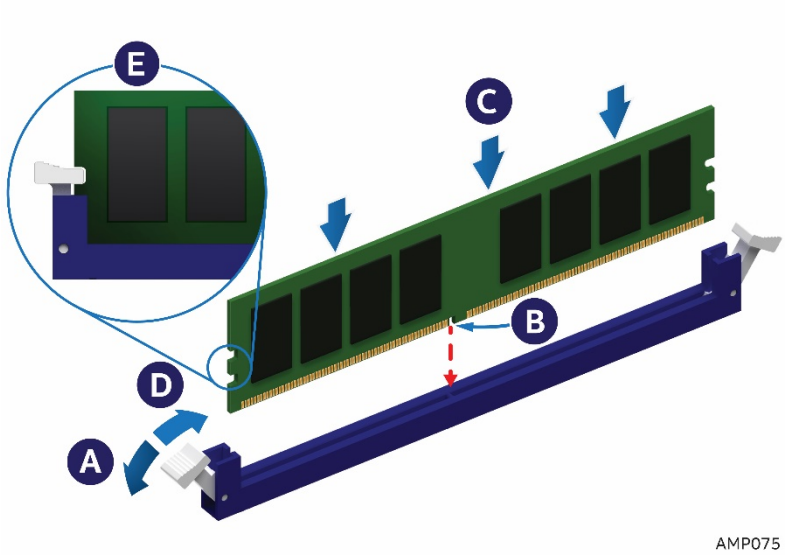


Figure 73. Installing the Memory

2.11.2 Removing the Memory

1. Locate the DIMM socket. Gently spread the retaining clips at either end of the socket. The DIMM will lift from the socket.

   NOTE: It is recommended to remove Riser Cards adjacent to DIMM slots for ease access.

2. Holding the DIMM by the edges, lift it from the socket, and store it in an anti-static package.

2.12 Installing and Removing the Intel® Remote Management Module 4 Lite

2.12.1 Installing the Intel® RMM4 Lite

1. Power off the compute module and disconnect the power cable(s).
2. Remove the air duct. See section 2.3.1.
3. Remove the Intel® RMM4 Lite from its package.
4. Locate the RMM4 Lite connector on the server board next to the Riser Slot 2.
5. Place the Intel® RMM4 Lite over the connector and match the orientation of the Intel® RMM4 Lite to that of the connector (See letter **A**).
6. Press the Intel® RMM4 Lite down onto the connector.

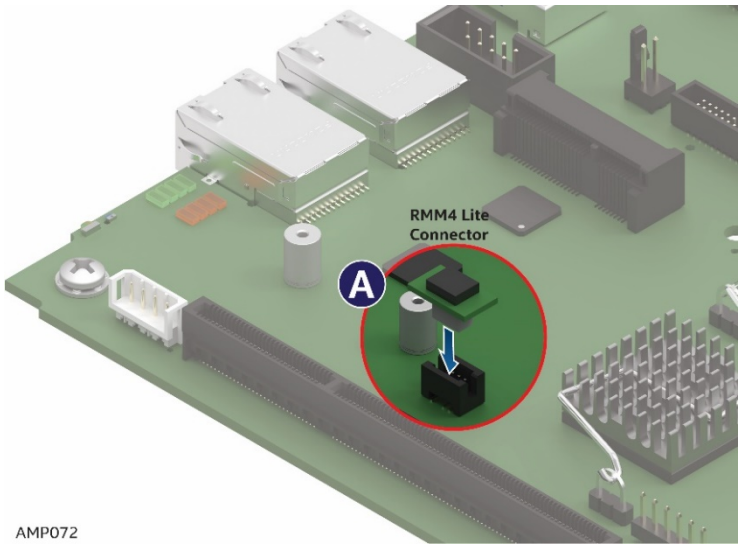


Figure 74. Installing the Intel® RMM4 Lite

2.12.2 Removing the Intel® RMM4 Lite

1. Power off the compute module and disconnect the power cable(s).
2. Remove the air duct. See section 2.3.1.
3. Carefully grasp the Intel® RMM4 Lite and pull it up until it disengages from the connector.

2.13 Replacing the Bridge Board

2.13.1 Installing the Bridge Board

1. Power off the compute module and disconnect the power cable(s).
2. Remove the air duct. See section 2.3.1.
3. Ensure the plastic holder on the front end of the bridge board is attached and seated properly (See letter **A**).
4. Insert the rear end of the bridge board into the slot on the server board (See letter **B**).
5. Secure the bridge board to the side wall with the six screws (See letter ***C***).

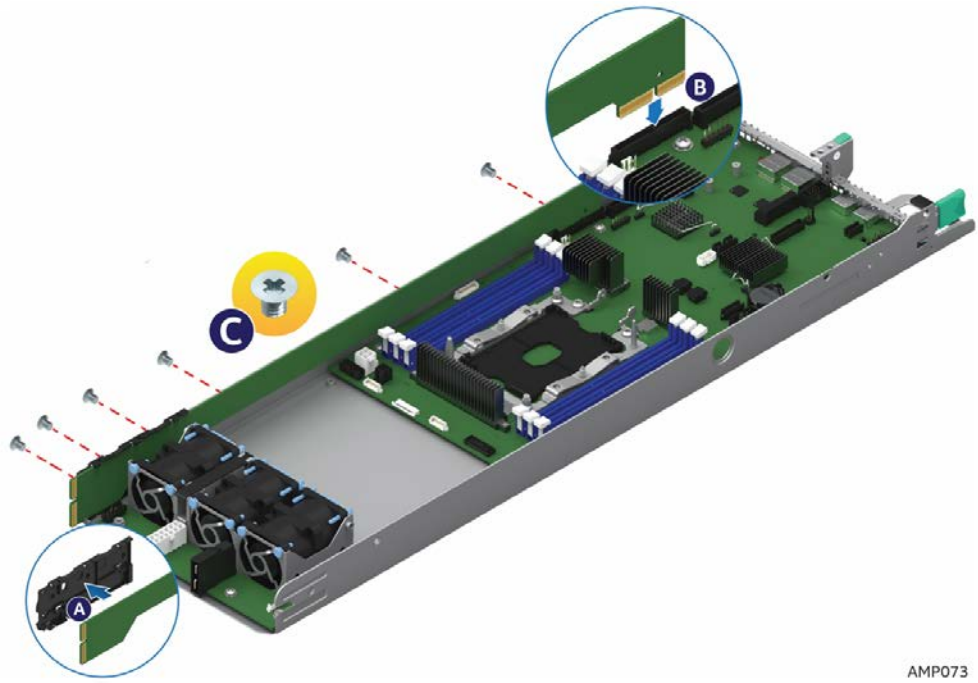


Figure 75. Installing the Bridge Board

2.13.2 Removing the Bridge Board

1. Power off the compute module and disconnect the power cable(s).
2. Remove the air duct. See section 2.3.1.
3. Remove the six screws (See letter **A**) on the bridge board.
4. Lift the bridge board straight up to remove it from the server board (See letter ***B***).

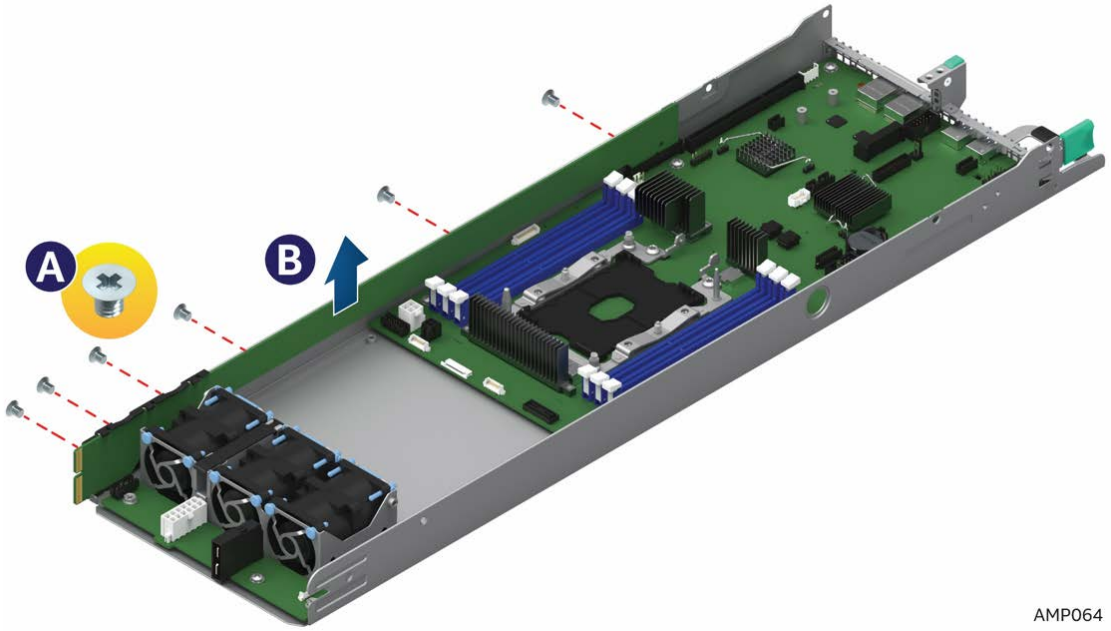


Figure 76. Removing the Bridge Board

2.14 Replacing the Server Main Board

2.14.1 Removing the Server Board

1. Power off the compute module and disconnect the power cable(s).
2. Remove the air duct. See section 2.3.1
3. Remove the processors and DIMMs. See section 2.5 and section 2.11.2.
4. Remove the bridge board. See section 2.13.2.
5. Remove the PCIe* Riser and Add-In Card from the Riser Slot 1 if there is any. See section 2.8.2
6. Remove the PCIe* Riser and Add-In Card from the Riser Slot 2 if there is any. See section 2.9.2.
7. Remove the TPM if installed. See section 2.18.2
8. Remove RMM if installed. See section 2.12.2
9. Disconnect the cables from the server board. (See letter **A**)

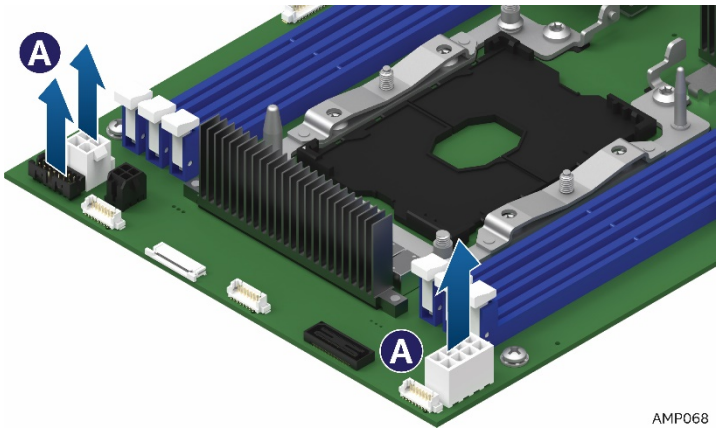


Figure 77. Removing the Cable Connections from the Server Board

10. Remove the six screws from the server board (See letter **B**).
11. Move the board slightly forward, then lift straight up and out of the node enclosure. Be careful not to damage the components at the rear of the board when removing (See letter ***C***).

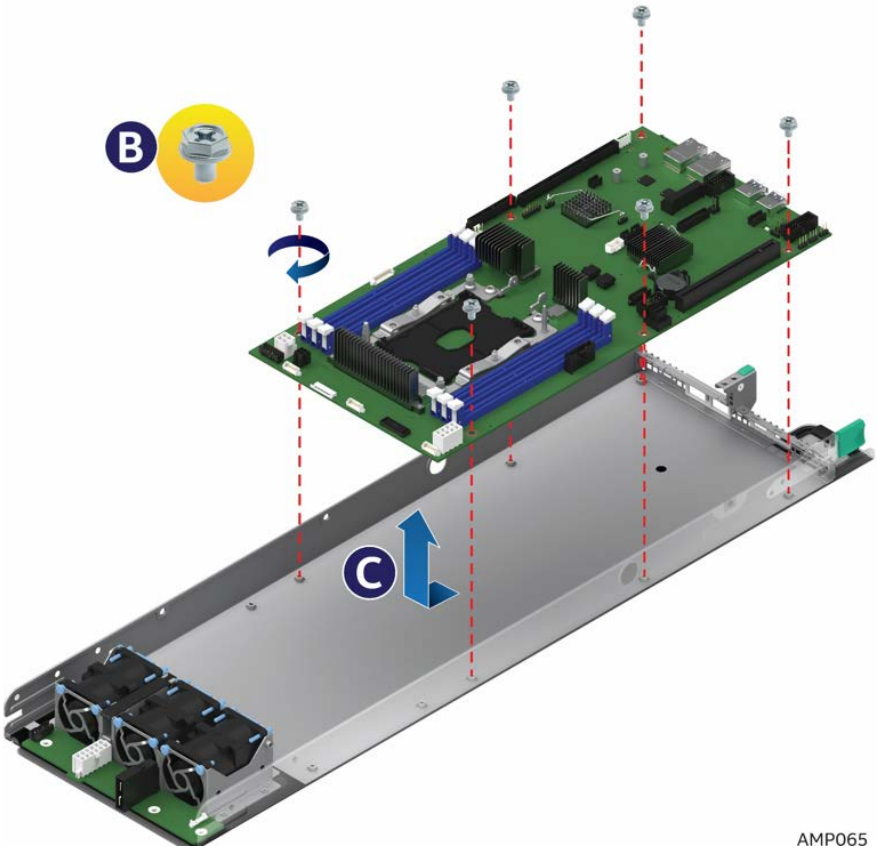


Figure 78. Removing the Server Board

2.14.2 Installing the Server Board

1. Carefully lower the server board into the compute module so that the rear I/O connectors of the server board align with and are fully seated into the matching holes on the compute module back panel.
2. The server board is accurately placed when the two end screws nearest the front edge of the server board (See letter ***A***) sit securely onto the compute module enclosure standoffs.
3. Install and tighten the six screws (See letter ***B***).

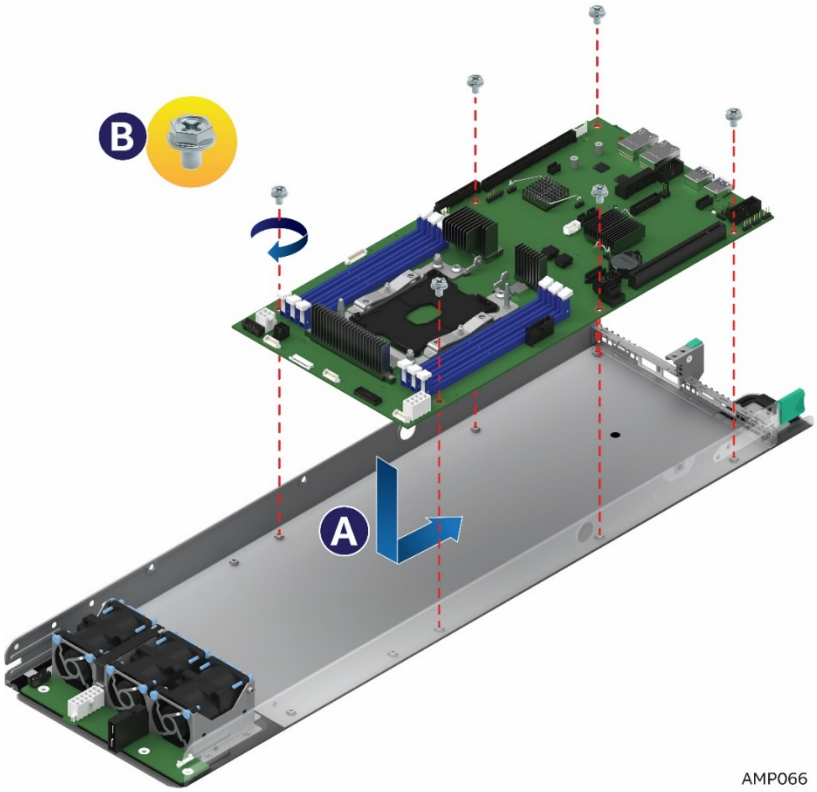


Figure 79. Installing the Server Board

4. Connect all cable connections to the server board.

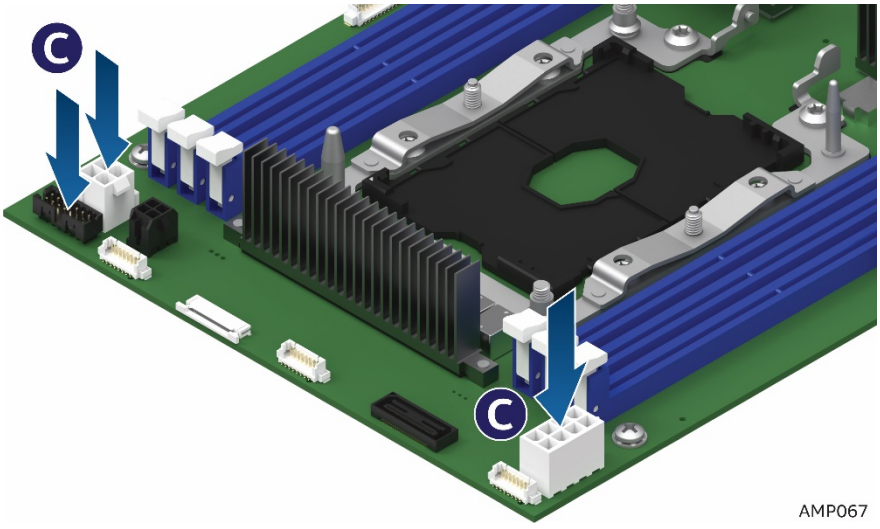


Figure 80. Connecting all Cables

5. Re-install the bridge board. See section 2.13.1.
6. Re-install the PCIe* riser and Add-In Card in Riser Slot 1. See section 2.8.1.
7. Re-install the PCIe* riser and Add-In Card in Riser Slot 2. See section 2.9.1
8. Re-install the processors and DIMMs. See sections 2.4.2 and 2.11.1.
9. Re-install the air duct. See section 2.3.2.
10. Install other components as necessary.

2.15 Installing and Removing the Power Docking Board

2.15.1 Removing the Power Docking Board

1. Power off the compute module and disconnect the power cable(s).
2. Remove the air duct. See section 2.3.1.
3. Pull up retaining latch (See letter **A**) and disconnect all cables from the power docking board (PDB).
4. Remove the four screws (See letter **B**).
5. Lift the power docking board straight up and out of the enclosure (See letter **C**).

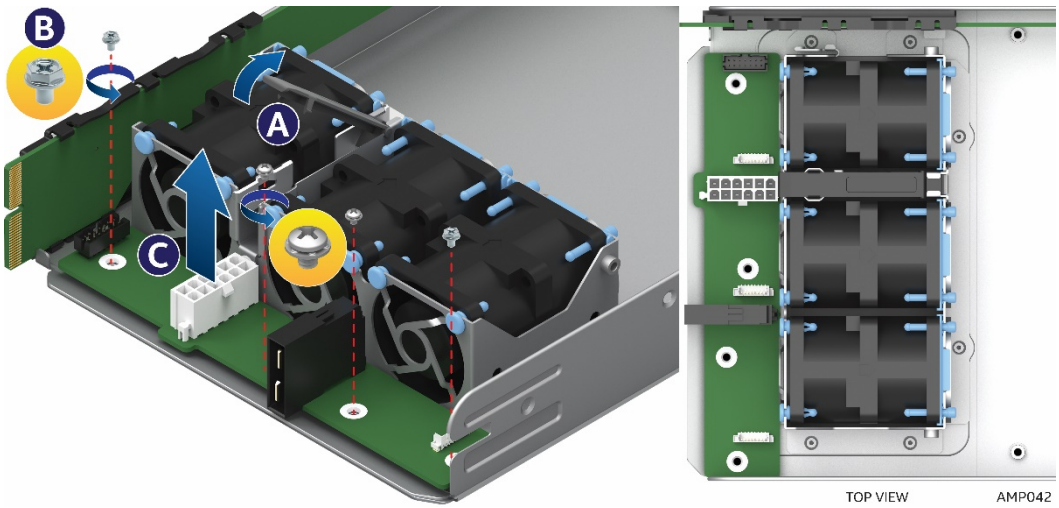


Figure 81. Removing the Power Docking Board

2.15.2 Installing the Power Docking Board

1. Power off the compute module and disconnect the power cable(s).
2. Remove the air duct. See section 2.3.1.
3. Place the power docking board into the compute module base (See letter **A**).
4. Ensure that the two inside screws have the washer and are inserted first. (See letter **B**).
5. Secure the power docking board using the four screws (See letter **C**).
6. Connect all cables to the power docking board and close retainer latch (See letter **D**).

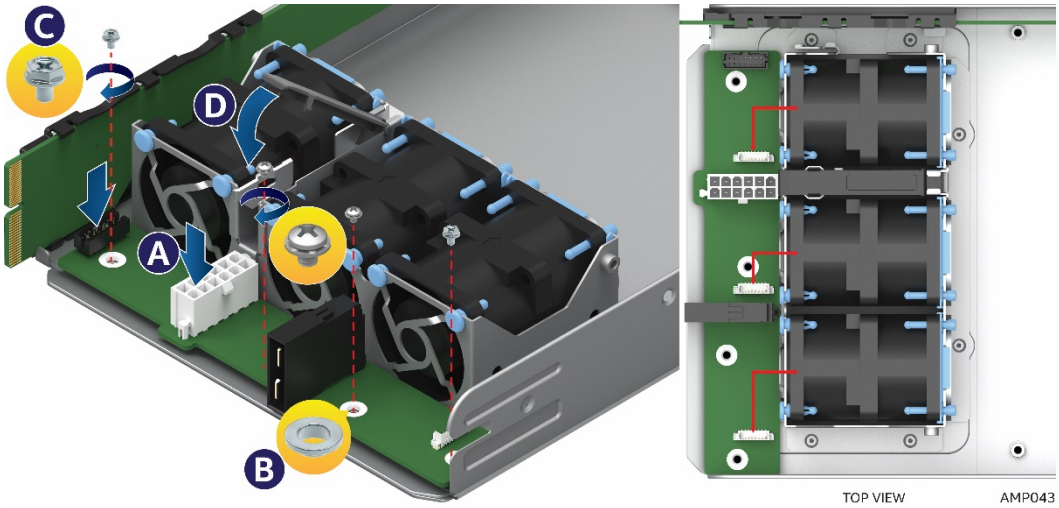


Figure 82. Installing the Power Docking Board

2.16 Replacing the Fan

2.16.1 Removing the Fan

1. Remove the air duct. See section 2.3.1.
2. Disconnect the fan cables from the power docking board.
3. Pull out the blue rivets from the fan bracket to release the fan.
4. Grasp the fan from the top and pull it out of the fan bracket.

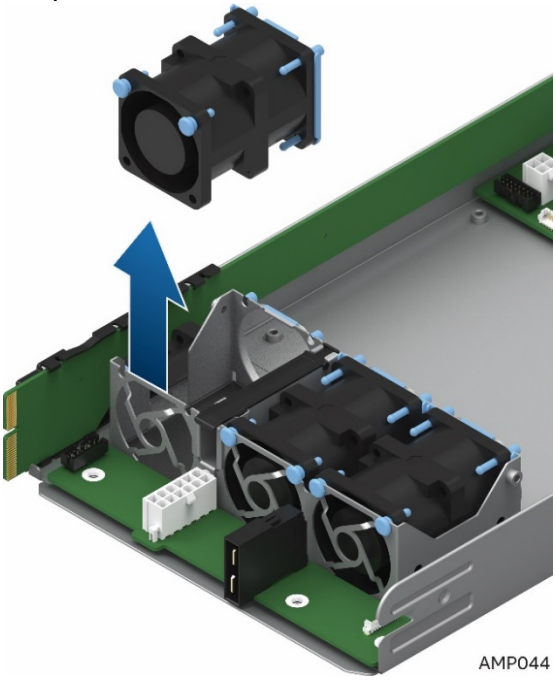


Figure 83. Removing the Fan

2.16.2 Installing the Fan

1. Remove the air duct. See section 2.3.1.
2. Place the fan into the fan bracket.
3. After fans are seated, push in on the blue rivets to secure them into the bracket.
4. Connect the fan cables to the connectors on the power docking board.

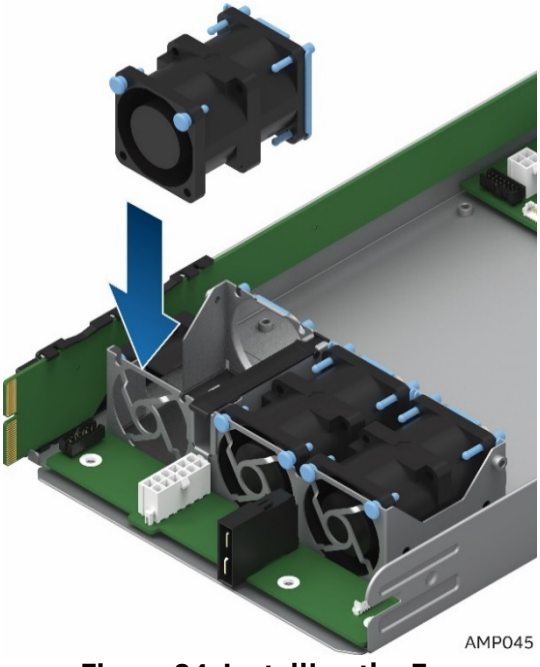


Figure 84. Installing the Fan

2.17 Replacing the Backup Battery

The lithium battery on the server board powers the RTC for up to 10 years in the absence of power. When the battery starts to weaken, it loses voltage, and the server settings stored in CMOS RAM in the RTC (for example, the date and time) may be wrong. Contact your customer service representative or dealer for a list of approved devices.

- 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.
- Lithiumbatteri – Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.
- Lithiumbatteri – Eksplosjonsfare. Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten. Brukt batteri returneres apparatleverandøren.
- Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

1. Locate the battery on the server board.
2. Gently press the detent at the rear of the battery housing to release the battery (See letter **A**).
3. Remove the battery from the plastic socket (See letter ***B***). If necessary a small flat tip screwdriver may be used. Be careful not to damage the battery housing/socket.

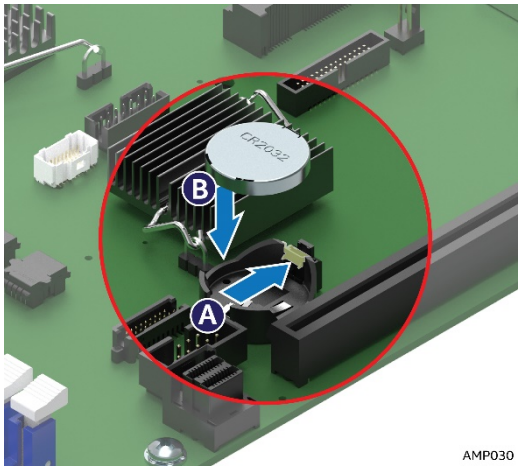


Figure 85. Replacing the Backup Battery

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 into the battery socket.
6. You will need to run the BIOS Setup to restore the configuration settings to the RTC.

2.18 Installing and Removing the Intel® Trusted Platform Module

The Intel® Trusted Platform Module (TPM) is a hardware-based security device that addresses the growing concern on boot process integrity and offers better data protection. TPM protects the system start-up process by ensuring it is tamper-free before releasing system control to the operating system. A TPM device provides secured storage to store data, such as security keys and passwords. In addition, a TPM device has encryption and hash functions. The Intel® TPM module implements TPM as per TPM PC Client specifications revision 2.0 by the Trusted Computing Group (TCG). Refer to the *S7200AP Family Configuration Guide & Spares/Accessories List* for ordering details.

2.18.1 Installing the TPM

1. Power off the compute module and disconnect the power cable(s).
2. Remove the air duct. See section 2.3.1.
3. Remove the TPM from the package.
4. Locate the TPM board connector on the rear of the server board near the internal video connector.
5. Place the TPM over the board connector and ensure that the TPM connector and mounting hole is oriented correctly to the board mounting hole. (See letter **A**).
6. Press the TPM down onto the connector.
7. Secure the TPM to the board by using either the plastic retainer, standard screw, or tamper resistant screw.

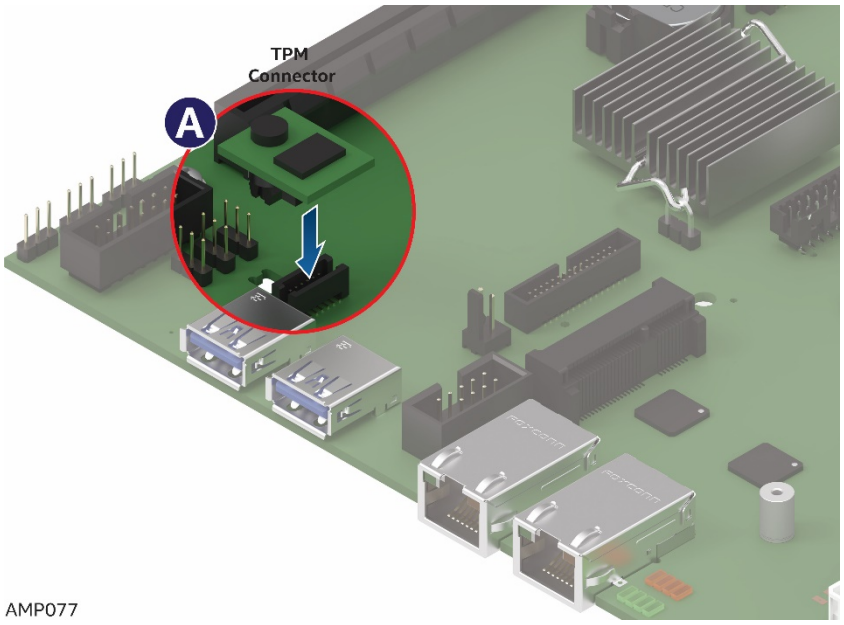


Figure 86. Installing the Intel® Trusted Platform Module

2.18.2 Removing the TPM

1. Power off the compute module and disconnect the power cable(s).
2. Remove the air duct. See section 2.3.1.
3. Unmount the TPM from the board by using either the plastic retainer, standard screw, or tamper resistant screw.
4. Carefully grasp the TPM and pull it up until it disengages from the connector.

2.19 Installing and Removing the VGA (Video) Debug Cable

The S7200AP Video Debug Cable Option is a VGA video cable that connects to the internal header on the S7200AP board and can be routed through the Riser 1 bracket on the rear node panel when used with the HNS7200AP product. The cable is intended for debug use when deploying S7200AP-based systems and is not intended for normal product operation. Refer to the *S7200AP Family Configuration Guide & Spares/Accessories List* for ordering details.

2.19.1 Installing Video Debug Cable

1. Power off the compute module and disconnect the power cable(s).
2. Remove the air duct. See section 2.3.1.
3. Remove the Slot 1 Riser and the PCIe* adapter if there is one installed See section 2.8.2 .
4. Remove the video cable from the package
5. Route the video cable through Riser 1 bracket as shown in Figure 86

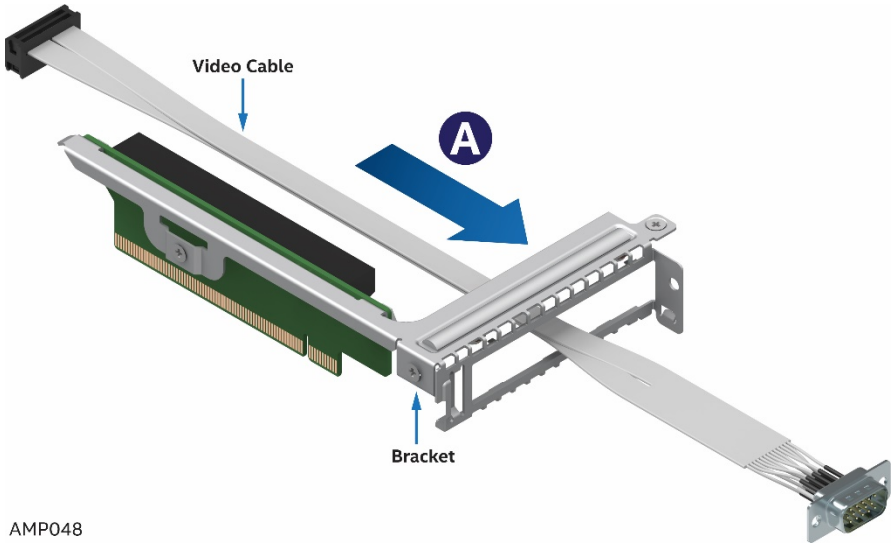


Figure 87. Video Cable Routing

6. Plug in the cable into the correct board header (**J1B1**) prior to installing Riser 1 back into the slot. The connector is keyed, so ensure that the orientation is correct (See **A**).

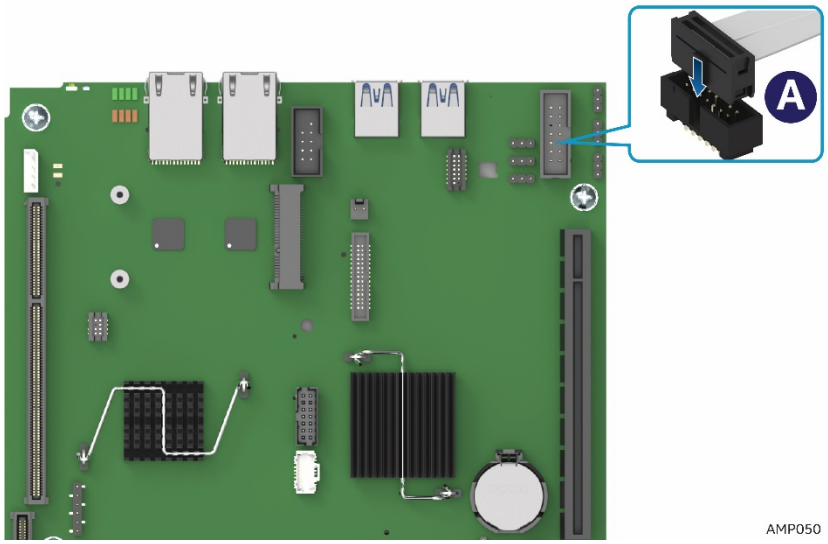


Figure 88. Connecting video cable to board VGA connector

7. Reseat Riser 1 with video cable back into Riser Slot 1. Re-install and tighten all Riser 1 screws.

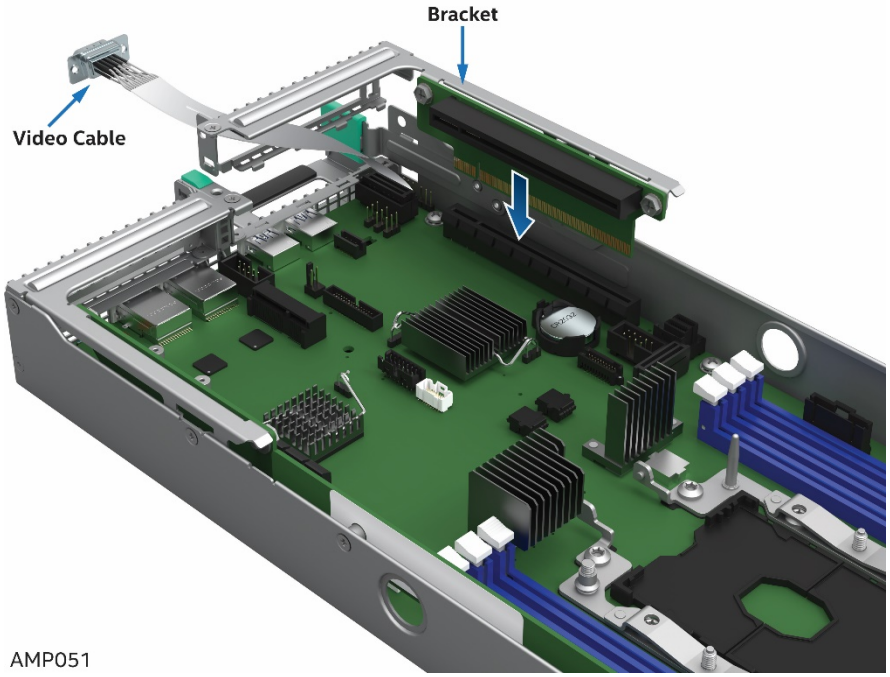


Figure 89. Reseat Riser with video cable

8. Ensure that video cable is properly routed through to the rear of the system.

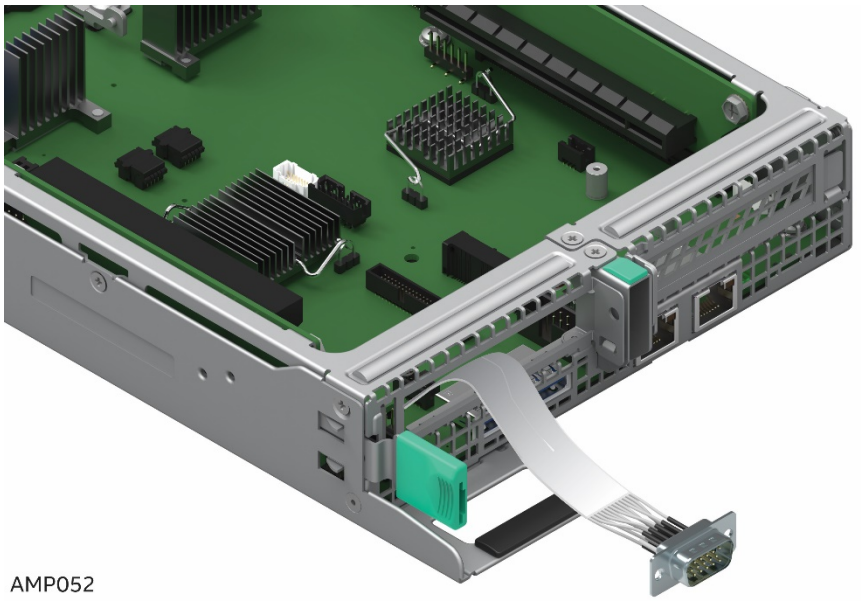


Figure 90. Video Cable Routing

2.19.2 Removing the Video Debug Cable

1. Power off the compute module and disconnect the power cable(s).
2. Remove the air duct. See section 2.3.1.
3. Follow the procedures to remove PCIe* Riser 1. See section 2.7.1.
4. After lifting Riser 1 up slightly out of the system, unplug the VGA connector from the board.
5. Carefully route the video cable through Riser 1 slot and out of the system.
6. Re-install Riser 1 and/or the PCIe* Add-In Card back into the system. See section 2.7.2

3 System Software Updates and Configuration

3.1 Updating the System Software Stack

The system includes a software stack to operate. This includes a BIOS, BMC firmware, ME firmware, and FRU & 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.

The latest system software stack can be downloaded from Intel at the Intel web site *http://downloadcenter.intel.com*.

At a minimum, after the initial configuration, the system's FRU and SDR data must be updated to ensure that the embedded platform management subsystem is configured properly. The system's FRU and SDR data is updated by running the FRUSDR utility. Properly loaded FRU and SDR data allows platform management to monitor the appropriate system sensors which are 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 referenced above. The System Update Package will include full system update instructions.

3.2 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.
Entering the BIOS Setup. Refer to the BIOS Setup Guide for all BIOS supported options.

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.
At initial system power on, a USB keyboard will not be functional until the USB controller has been initialized during the power on self-test (POST) process. When the USB controller is initialized, the system will beep 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 will be displayed on the Diagnostic Screen or under the Quiet Boot Logo Screen:

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

After pressing the <F2> key, the system will eventually load the BIOS Setup utility and display the BIOS Setup Main Menu screen.
Should serious system errors occur during the POST process, the regular system boot will stop and the system will load the BIOS Setup utility and display the Error Manager screen. The Error Manager screen will list and provide information about the specific boot errors detected.
No Access to the BIOS Setup Utility

If the BIOS Setup utility is not accessible by hitting the <F2> key or other described access methods, it may be necessary to restore the BIOS default settings.
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 that are used to navigate through the Setup utility. These commands are displayed at all times.

If no Administrator or User password is used, all available settings are configurable and can be set by anyone with access to the BIOS Setup.

System settings that are not configurable, because of security settings or configuration limits, will be grayed out and are not accessible.

Table 7. 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, the <Enter> key selects the currently highlighted item, undoes the pick list, and returns the focus to the parent menu.
<Esc>	Exit	The <Esc> key provides a mechanism for backing out of any field. When the <Esc> key is pressed while editing any field or selecting features of a menu, the parent menu is re-entered. When the <Esc> key is pressed in any submenu, the parent menu is re-entered. When the <Esc> key is pressed in any major menu, the exit confirmation window is displayed and the user is asked whether changes can be discarded. If "No" is selected and the <Enter> key is pressed, or if the <Esc> key is pressed, the user is returned to where they were before <Esc> was pressed, without affecting any existing settings. If "Yes" is selected and the <Enter> key is pressed, the setup is exited 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. The selected item must then be activated 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. The selected item must then be activated 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 if a submenu or pick list is displayed.
<Tab>	Select Field	The <Tab> key is used to move between fields. For example, <Tab> can be used 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. This key scrolls 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. This key scrolls 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.
<F9>	Setup Defaults	Pressing the <F9> key causes the following to display: Load default configuration? Press 'Y' to confirm, 'N' / 'ESC' to ignore If "Yes" is highlighted and <Enter> is pressed, all Setup fields are set to their default values. If "No" is highlighted and <Enter> is pressed, or if the <Esc> key is pressed, the user is returned to where they were before <F9> was pressed without affecting any existing field values.
<F10>	Save and Exit	Pressing the <F10> key causes the following message to display: Save configuration changes and exit? Press 'Y' to confirm, 'N' / 'ESC' to ignore If "Yes" is highlighted and <Enter> is pressed, all changes are saved and the Setup is exited. If "No" is highlighted and <Enter> is pressed, or the <Esc> key is pressed, the user is returned to where they were before <F10> was pressed without affecting any existing values.

4 Server Utilities

Intel provides the following utilities for Intel's server products. The utilities and user's guides can be downloaded from *www.intel.com/support*.

4.1 Intel® System Information Retrieve Utility (Sysinfo)

The Intel® System Information Retrieval Utility (Sysinfo) is used for collecting system information. The utility dumps system information, for example, Sensor Data Records, Baseboard FRU, BMC System Event Log, BMC Settings, BIOS Settings, Operating System Event Log, PCI Bus Device Information, RAID settings and RAID log. Log information results may vary between different versions; refer to the detailed information from specific sections.

4.2 Intel® One Boot Flash Update Utility (OFU)

The Intel® One-Boot Flash Update Utility (Intel® OFU) is used to update the BIOS and firmware on the Intel® Server Boards while the operating system is running. The utility may be launched from a command prompt in either the Windows* or Linux* operating systems. This utility can also be executed remotely through a secure network connection using a Telnet Client and Terminal Services in Windows* or using a Telnet Client and Remote Shell under Linux*.

4.3 Intel® System Event Log (SEL) Viewer Utility

The Intel® System Event Log (SEL) Viewer Utility provides the ability to view system event records stored on the server management storage device of a server. The utility displays the SEL records in either a text or a hexadecimal format. The utility also allows you to save SEL entries to a file and load SEL entries from a file for viewing. You can also reload SEL entries from a server and see properties of SEL entries. The SEL entries can be viewed in two modes: interpreted text mode and hex mode.

4.4 Intel® System Configuration Utility (SYSCFG)

The Intel® System Configuration Utility (Syscfg) is a command-line utility that can be used to save and restore BIOS and firmware settings to a file or to set and display individual settings. Refer to the User Guide for a command reference. The User Guide also provides an overview of the features of the module and instructions for configuring the BIOS and management firmware on the Intel's server products.

Appendix A. Technical Reference

System Environmental Specifications

The following table defines the system level operating and non-operating environmental limits.

Table 8. System Environmental Limits Summary

Parameter	Limits
Operating Temperature	+10°C to +27°C with the maximum rate of change not to exceed 10°C per hour
Non-Operating Temperature	-40°C to +70°C
Non-Operating Humidity	90%, non-condensing at 27°C
Acoustic noise	Sound power: 7.0BA with hard disk drive stress only at room ambient temperature (23 +/- 2°C)
Shock, operating	Half sine, 2g peak, 11 mSec
Shock, unpackaged	Trapezoidal, 25g, velocity change 175 inches/second (80 lbs. to < 100 lbs.)
Vibration, unpackaged	5 Hz to 500 Hz, 2.20 g RMS random
Shock and vibration, packaged	ISTA (International Safe Transit Association) Test Procedure 3A
ESD	+/-12 KV except I/O port +/- 8 KV per Intel® Environmental Test Specification
System Cooling Requirement in BTU/Hr.	2130 Watt Max – 7263 BTU/hour

Disclaimer Note: Intel ensures the unpackaged server board and system meet the shock requirement mentioned above through its own chassis development and system configuration. It is the responsibility of the system integrator to determine the proper shock level of the board and system if the system integrator chooses different system configuration or different chassis. Intel Corporation cannot be held responsible, if components fail or the server board does not operate correctly when used outside any of its published operating or non-operating limits.

Appendix B. POST Code Diagnostic LED Decoder

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 #7, #6, #5, #4. The lower nibble bits are represented by Green Diagnostics LEDs #3, #2, #1 and #0. 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 (Lit LED = 1, Off LED = 0).

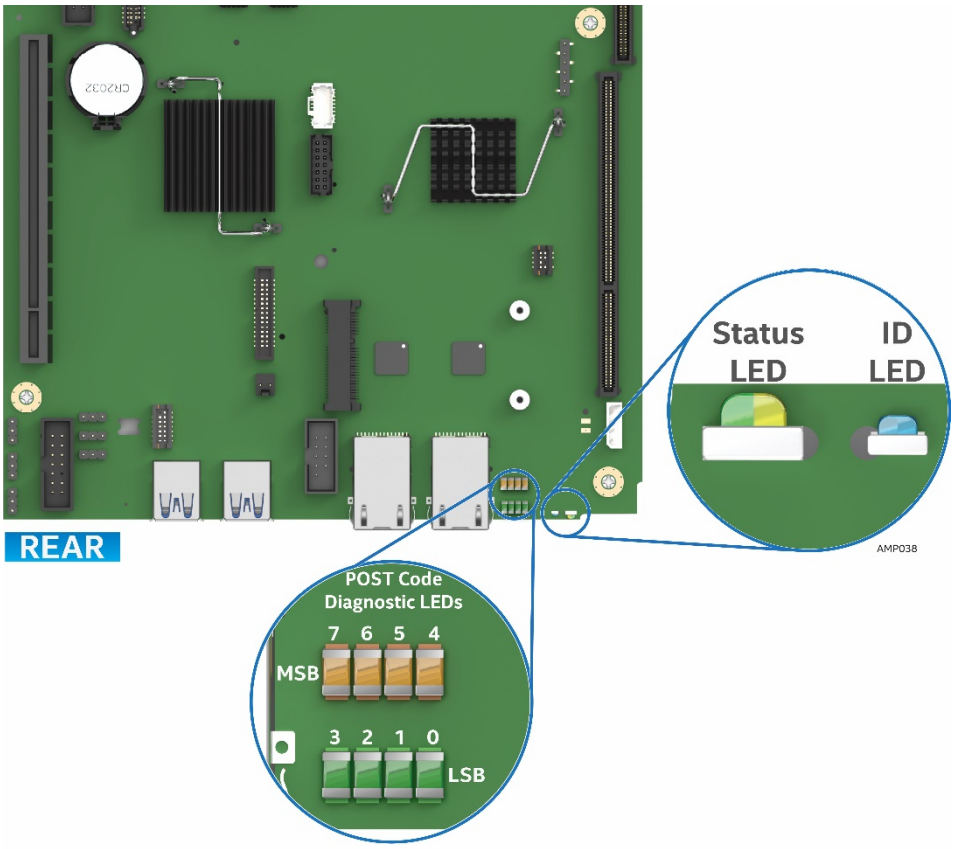


Figure 91. POST Diagnostic LED Location

NOTE: All POST Diagnostic codes must be read from left to right starting from MSB to LSB in given numerical order (7-6-5-4-3-2-1-0) when user is facing the back of the system as shown in **Error! Reference source not found.**. Failing to follow this instruction will result on a wrong interpretation.

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

Table 9. POST Progress Code Decoding 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, including: 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.

Below is a brief list of the Diagnostic LED codes displayed during memory initialization by the Memory Reference Code (MRC), the BIOS component responsible for it. There are two types of POST Diagnostic Codes used by the MRC, Fatal Error Codes and Progress Codes.

MRC Fatal Error Codes are necessary because if the Memory Initialization fails badly for some reason – like no usable memory installed – the system would not have the resources to give any other error indication. So in the case of a major failure during Memory Initialization, the system outputs a Fatal Error Code to Port 80 (the Diagnostic LEDs) and executes a Halt. These Fatal Error Halts do not change the System Status LED, and they do not get logged as SEL Events.

The MRC Progress Codes are displays to the Diagnostic LEDs that show the execution point in the MRC operational path at each step. The intent is that if the system hangs during execution of the MRC, the LED display will tell at what point in the code the system was executing.

Be aware that these are Diagnostic LED display codes used in early POST by the MRC. Later in POST, these same Diagnostic LED display codes are used for other BIOS Progress Codes.

Also, MRC Fatal Error Codes and MRC Progress Codes are ***not controlled by the BIOS*** and are subject to change based upon changes implemented in the memory reference code.

Table 10. MRC Fatal Error Codes

Error Code	Fatal Error Code Explanation (with MRC Internal Minor Code)
0xE8	No Usable Memory Error: 01h = No memory was detected via 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. 03h = No memory installed. All channels are disabled.
0xE9	Memory is locked by Intel® Trusted Execution Technology and is inaccessible.
0xEA	DDR4 Channel Training Error: 01h = Error on read DQ/DQS (Data/Data Strobe) init 02h = Error on Receive Enable 03h = Error on Write Leveling 04h = Error on write DQ/DQS (Data/Data Strobe)
0xEB	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.*
0xED	DIMM Configuration/Population Error: 01h = Different DIMM types (RDIMM, LRDIMM) are detected installed in the system. 02h = Violation of DIMM population rules. 03h = The third DIMM slot cannot be populated when QR DIMMs are installed. 04h = UDIMMs are not supported. 05h = Unsupported DIMM Voltage.
0xEF	Indicates a CLTT table structure error.

Should a major memory initialization error occur, preventing the system from booting with data integrity, a beep code is generated, the MRC will display 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. The fatal MRC codes can be distinguished from the BIOS POST progress codes by the accompanying memory failure beep code of 3 long beeps.Table 14

Table 11. MRC Progress Codes

Progress Code	Main Sequence	Subsequences/Subfunctions
0xB0	Detect DIMM population	*—n/a—*
0xB1	Set DDR4 frequency	*—n/a—*
0xB2	Gather remaining SPD data	*—n/a—*
0xB3	Program registers on the memory controller level	*—n/a—*
0xB4	Evaluate RAS modes and save rank information	*—n/a—*
0xB5	Program registers on the channel level	*—n/a—*
0xB6	Perform the JEDEC defined initialization sequence	*—n/a—*
0xB7	Train DDR4 ranks	*—n/a—*
0x01	⇩	Read DQ/DQS training
0x02	⇩	Receive Enable training
0x03	⇩	Write Leveling training
0x04	⇩	Write DQ/DQS training
0x05	⇩	DDR channel training done
0xB8	Initialize CLTT/OLTT	*—n/a—*
0xB9	Hardware memory test and init	*—n/a—*
0xBA	Execute software memory init	*—n/a—*
0xBB	Program memory map and interleaving	*—n/a—*
0xBC	Program RAS configuration	*—n/a—*
0xBF	MRC is done	*—n/a—*

BIOS POST Progress Codes

During the system boot process, the BIOS executes a number of platform configuration processes, each of which is assigned a specific POST Progress Code, a 2-digit hexadecimal number. As each configuration routine is started, the BIOS displays the POST Progress Code on the Diagnostic LEDs found on the back edge of the server board.

To assist in troubleshooting a system hang during the POST process, the POST Progress Code displayed in the Diagnostic LEDs can be used to identify the last POST process to begin execution.

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

Table 12. POST Progress Codes

Progress Code	Description
SEC Phase	
0x01	First POST code after CPU reset
0x02	Microcode load begin
0x03	CRAM initialization begin
0x04	Pei Cache When Disabled
0x05	SEC Core At Power On Begin.
0x06	Early CPU initialization during Sec Phase.
0x07	Early SB initialization during Sec Phase.
0x08	Early NB initialization during Sec Phase.
0x09	End Of Sec Phase.
0x0E	Microcode Not Found.
0x0F	Microcode Not Loaded.
PEI Phase	
0x10	PEI Core
0x11	CPU PEIM
0x15	NB PEIM
0x19	SB PEIM
MRC Progress Codes At this point the MRC Progress Code sequence is executed See **Error! Reference source not found.**.	
0x31	Memory Installed
0x32	CPU PEIM (CPU Init)

Progress Code	Description
0x33	CPU PEIM (Cache Init)
0x4F	Dxe IPL started
DXE Phase	
0x60	DXE Core started
0x61	DXE NVRAM Init
0x62	DXE Setup Init
0x63	DXE CPU Init
0x65	DXE CPU BSP Select
0x66	DXE CPU AP Init
0x68	DXE PCI Host Bridge Init
0x69	DXE NB Init
0x6A	DXE NB SMM Init
0x70	DXE SB Init
0x71	DXE SB SMM Init
0x72	DXE SB devices Init
0x78	DXE ACPI Init
0x79	DXE CSM Init
0x80	DXE BDS Started
0x81	DXE BDS connect drivers
0x82	DXE PCI Bus begin
0x83	DXE PCI Bus HPC Init
0x84	DXE PCI Bus enumeration
0x85	DXE PCI Bus resource requested
0x86	DXE PCI Bus assign resource
0x87	DXE CON_OUT connect
0x88	DXE CON_IN connect
0x89	DXE SIO Init

Progress Code	Description
0x8A	DXE USB start
0x8B	DXE USB reset
0x8C	DXE USB detect
0x8D	DXE USB enable
0x91	DXE IDE begin
0x92	DXE IDE reset
0x93	DXE IDE detect
0x94	DXE IDE enable
0x95	DXE SCSI begin
0x96	DXE SCSI reset
0x97	DXE SCSI detect
0x98	DXE SCSI enable
0x99	DXE verifying SETUP password
0x9B	DXE SETUP start
0x9C	DXE SETUP input wait
0x9D	DXE Ready to Boot
0x9E	DXE Legacy Boot
0x9F	DXE Exit Boot Services
0xC0	RT Set Virtual Address Map Begin
0xC2	DXE Legacy Option ROM init
0xC3	DXE Reset system
0xC4	DXE USB Hot plug
0xC5	DXE PCI BUS Hot plug
0xC6	DXE NVRAM cleanup
0xC7	DXE ACPI Enable
0x00	Clear POST Code
S3 Resume	

Progress Code	Description
0x40	S3 Resume PEIM (S3 started)
0x41	S3 Resume PEIM (S3 boot script)
0x42	S3 Resume PEIM (S3 Video Repost)
0x43	S3 Resume PEIM (S3 OS wake)
BIOS Recovery	
0x46	PEIM which detected forced Recovery condition
0x47	PEIM which detected User Recovery condition
0x48	Recovery PEIM (Recovery started)
0x49	Recovery PEIM (Capsule found)
0x4A	Recovery PEIM (Capsule loaded)

Appendix C. POST Error Codes

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 screen, and an error is logged to the SEL. The system continues booting in a degraded state. The user 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 will display the error code on the Error Manager 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
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
8160	Processor 01 unable to apply microcode update	Major
8170	Processor 01 failed Self-Test (BIST)	Major
8180	Processor 01 microcode update not found	Minor
8190	Watchdog timer failed on last boot	Major

Error Code	Error Message	Response
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
8523	DIMM_B1 failed test/initialization	Major
8526	DIMM_C1 failed test/initialization	Major
8529	DIMM_D1 failed test/initialization	Major
852C	DIMM_E1 failed test/initialization	Major
852F	DIMM_F1 failed test/initialization	Major
8540	DIMM_A1 disabled	Major
8543	DIMM_B1 disabled	Major
8546	DIMM_C1 disabled	Major
8549	DIMM_D1 disabled	Major
854C	DIMM_E1 disabled	Major
854F	DIMM_F1 disabled	Major
8560	DIMM_A1 encountered a Serial Presence Detection (SPD) failure	Major
8563	DIMM_B1 encountered a Serial Presence Detection (SPD) failure	Major
8566	DIMM_C1 encountered a Serial Presence Detection (SPD) failure	Major
8569	DIMM_D1 encountered a Serial Presence Detection (SPD) failure	Major
856C	DIMM_E1 encountered a Serial Presence Detection (SPD) failure	Major
856F	DIMM_F1 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
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 POST Error Beep Codes. Prior to system video initialization, the BIOS uses these beep codes to inform users of error conditions. The beep code is followed by a user visible code displayed on the Diagnostic LEDs.

The following tables lists POST Error Beep Codes. Prior to system video initialization, the BIOS uses these beep codes to inform users of error conditions. The beep code is followed by a user visible code displayed on the Diagnostic LEDs.

Table 14. POST Error Beep (with LED) 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 following beep codes are generated by the BMC.

Table 15. Integrated BMC Beep (with LED) Codes

1-5-2-1	CPU socket population error	N/A	CPU1 socket is empty, or sockets are populated incorrectly – CPU1 must be populated before CPU2.
1-5-2-4	MSID Mismatch	N/A	MSID mismatch occurs if a processor is installed into a system board that has incompatible power capabilities.
1-5-4-2	Power fault	N/A	DC power unexpectedly lost (power good dropout) – Power unit sensors report power unit failure offset.
1-5-4-4	Power control fault	N/A	Power good assertion timeout – Power unit sensors report soft power control failure offset.
1-5-1-2	VR Watchdog Timer	N/A	VR controller DC power on sequence not completed in time.
1-5-1-4	Power Supply Status	N/A	The system does not power on or unexpectedly powers off and a Power Supply Unit (PSU) is present that is an incompatible model with one or more other PSUs in the system.

Appendix D. System Interconnects S7200AP / H2000G

S7200AP / H2000G (12x3.5” Drive Configuration) and system interconnect

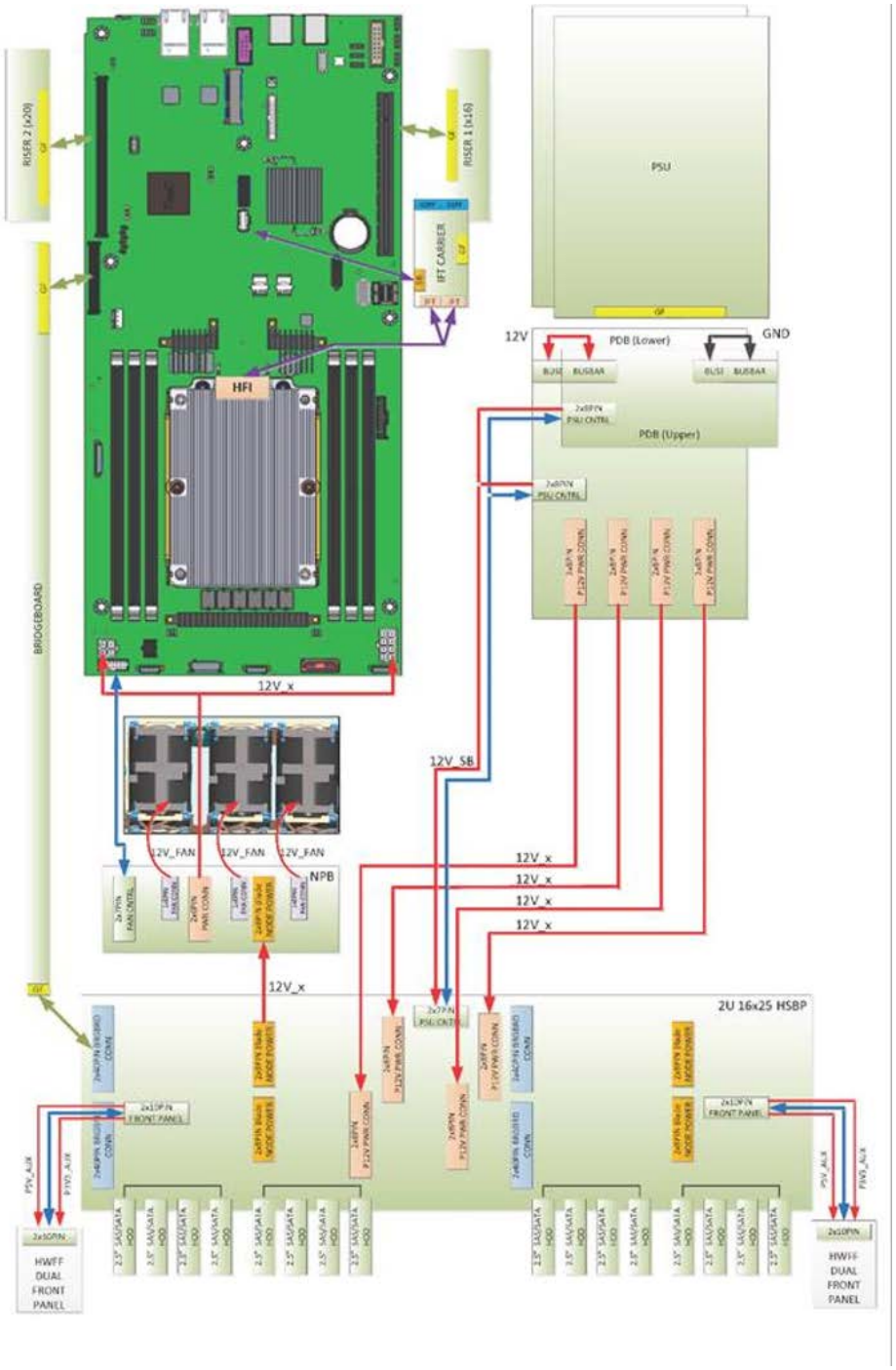


Figure 92. System Interconnect

Appendix E. Regulatory and Compliance Information

Refer to the Server Products Regulatory and Safety document for the product regulatory compliance reference. The document can be downloaded from *http://www.intel.com/support/server*.

Appendix F. Getting Help

If you encounter an issue with your compute module, follow these steps to obtain support:

1. Visit the following Intel support web page:
   http://www.intel.com/p/en_US/support/contactsupport
   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, 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 knowledgebase 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*. Lastly, you can 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). Intel also offers Channel Program members around-the-clock 24x7 technical phone support on Intel's 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/p/en_US/support/warranty

Glossary

Acronym	Description
AC	Alternating Current, a type of electrical current in which the current repeatedly changes direction
ACM	Authenticated Code Mode
ACPI	Advanced Configuration Power Interface
AP	Application Processor
BDS	Boot Device Selection
BIB	Burn in Board
BIOS	Basic Input/Output System – Firmware interface to the system hardware
BIST	Built-in Self-Test
BMC	Baseboard Management Controller
BSP	Boot strap processor. The processor selected at boot time to be the primary processor in a multi-processor system.
BTU/hour	A unit of power. 1 watt is approximately 3.41214 BTU/h[, and 1000 BTU/h is approximately 293.071 W
CLTT	Closed Loop Thermal Throttling
CMOS	Complementary Metal-oxide-semiconductor
CPU	Central Processing Unit
CRAM	Configuration RAM - a programmable bit inside an FPGA that controls its behavior
CSM	Compatibility Support Module
DC	Direct current, the flow of electric charge is only in one direction.
DIMM	Dual In-line Memory Module, a plug-in memory module with signal and power pins on both sides of the internal printed circuit board (front and back).
DQ	Data Quality
DQS	Bi-directional Data Strobe
DXE	Driver Execution Environment. Component of Intel® Platform Innovation Framework for EFI architecture
EI	Enhanced Intel
ESD	**Electrostatic Discharge**
FRU	Field Replaceable Unit
GT/s	GigaTransfers per second
HBA	Hot Bus Adapter
HPC	High Performance Computing
IDE	Integrated Drive Electronics, a disk interface standard
IFT	Intel Fabric Through
IMC	Integrated Memory Controller – memory controller integrated into the processor chip
IPL	Initial Program Load
IPMB	Intelligent Platform Management Bus
ISTA	International Safe Transit Association
JEDEC	Joint Electron Device Engineering Council, industry organization for memory standards
KVM	Keyboard, Video, and Mouse – an attachment that mimics those devices, and connects them to a remote I/O user
LAN	Local Area Network
LED	Light Emitting Diode

Acronym	Description
LOM	LAN on Board
LRDIMM	Load Reduced DIMM memory modules have buffer registers for both address and data between the SDRAM modules and the system's memory controller.
ME	Management Engine
MM#	Material Management number
MRC	Memory Reference Code
MSB	Most Significant Bit
MSID	CPU Icc Mismatch
MT/s	MegaTransfers per second
NB	Northbound
NIC	Network Interface Card
NVRAM	Non-volatile RAM
OEM	Original Equipment Manufacturer
OFU	One-Boot Flash Update
OLTT	Open Loop Thermal Throttling
OOB	Out of Band
OS	Operating System
PCH	Platform Controller Hub
PCI	Peripheral Component Interconnect, or PCI Local Bus Standard – also called “Conventional PCI”
PCIe**	PCI Express* -- an updated form of PCI offering better throughput and better error management
PEI	Pre EFI Initialization. Component of Intel® Platform Innovation Framework for EFI architecture.
PEIM	PEI Module
PERR	Parity Error
PHM	Processor Heatsink Module
POST	Power On Self-Test – BIOS activity from the time on Power On until Operating System boot begins.
PSU	Power Supply Unit
QPI	Intel® QuickPath Interconnect
QR	Quad Rank – memory DIMM organization, DRAMs organized in four ranks
RAID	Redundant Array of Inexpensive Disks – provides data security by spreading data over multiple disk drives. RAID 0, RAID 1, RAID 10, and RAID 5 are different patterns of data on varying numbers of disks to provide varying degrees of security and performance.
RAM	Random Access Memory
RAS	Reliability, Availability, and Serviceability
RC	Raw Class
RDIMM	Registered DIMM (also called buffered) memory modules have an address buffer register between the SDRAM modules and the system's memory controller.
ROM	Read-Only Memory
RT	Runtime. Component of Intel® Platform Innovation Framework for EFI architecture
RTC	Real Time Clock
SAD	Source Address Decoder
SAS	Serial Attached SCSI, a high speed serial data version of SCSI
SATA	Serial ATA, a high speed serial data version of the disk ATA interface

Acronym	Description
SB	Southbound
SBSP	System Boot-Strap Processor
SCSI	Small Computer System Interface, a connection usually used for disks of various types
SDR	Sensor Data Record
SEC	Security. Component of Intel® Platform Innovation Framework for EFI architecture
SEL	System Event Log
SERR	System Error
SFF	Small Form Factor
SFP+	The enhanced small form-factor pluggable (SFP+) is an enhanced version of the SFP that supports data rates up to 16 Gbit/s.
SIO	Super I/O
SMM	System Management Mode
SPD	Serial Presence Detect
SUP	System Updated Package
TDP	Thermal Design Power
TIM	Thermal Interface Material
TPM	Trusted Platform Module
TXT	Intel® Trusted Execution Technology
USB	Universal Serial Bus, a standard serial expansion bus meant for connecting peripherals.
VGA	Video Graphics Array
VR	Voltage Regulator