Intel® Server System M50FCP1UR

System Integration and Service Guide

A guide providing instructions for the insertion and extraction of system components and available Intel accessories and spares

Rev. 1.0

January 2023

Delivering Breakthrough Data Center System Innovation–Experience What's Inside!
<This page intentionally left blank>
## Document Revision History

<table>
<thead>
<tr>
<th>Date</th>
<th>Revision</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 2023</td>
<td>1.0</td>
<td>Production Release</td>
</tr>
</tbody>
</table>


Disclaimers

Intel technologies’ features and benefits depend on system configuration and may require enabled hardware, software, or service activation. Performance varies depending on system configuration. No computer system can be absolutely secure. Check with your system manufacturer or retailer or learn more at intel.com.

You may not use or facilitate the use of this document in connection with any infringement or other legal analysis concerning Intel products described herein. You agree to grant Intel a non-exclusive, royalty-free license to any patent claim thereafter drafted which includes subject matter disclosed herein.

No license (express or implied, by estoppel or otherwise) to any intellectual property rights is granted by this document.

The products described may contain design defects or errors known as errata, which may cause the product to deviate from published specifications. Current characterized errata are available on request.

Intel disclaims all express and implied warranties, including without limitation, the implied warranties of merchantability, fitness for a particular purpose, and non-infringement, as well as any warranty arising from course of performance, course of dealing, or usage in trade.

Copies of documents that have an order number and are referenced in this document may be obtained by calling 1-800-548-4725 or by visiting www.intel.com/design/literature.htm.

Intel, the Intel logo, Xeon, and Intel Optane are trademarks of Intel Corporation or its subsidiaries in the U.S. and/or other countries.

*Other names and brands may be claimed as the property of others.

© Intel Corporation
Safety 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 in which the product is sold.

System power on/off: The power button does not turn off the system AC power. To remove power from the system, you must unplug the AC power cord. Make sure that 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.

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 tools you use to remove a jumper, or you may bend, or break the pins on the board.

Electrostatic Discharge (ESD)

Electrostatic discharge can damage the 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 that 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 workbench pad. Do not place electronic devices on to the outside of any protective packaging.
Caution: Slide / Rail mounted equipment is not to be used as a shelf or a workspace.

Intel warranties that this product performs to its published specifications. However, all computer systems are inherently subject to unpredictable system behavior under various environmental and other conditions. This product is not intended to be the sole source for any critical data, and the user must maintain a verified backup. Failure to do so, or to comply with other user notices in the product user guide and specification documents, may result in loss of or access to data.

Weight of the system:

- Due to the weight of a system, Intel recommends carrying the system with two people supporting the system from the sides or using a mechanical lift or a cart when moving the system from one location to another.
- If your system has rack handles installed, do not lift or carry the system by the rack handles.
- When lifting or moving a chassis, always grasp it by all four corners. Do not grasp the chassis by two points at opposing diagonal corners, doing so may damage the internal components.
- If you can only grasp the chassis at two different points, always grasp the chassis by the sides at the midpoint.
# Table of Contents

1. **Introduction** ............................................................................................................................................................... 14  
   1.1 Reference Documents and Support Collaterals ...................................................................................................... 16  

2. **L6 Integrated System–Essential System Component Installation** .................................................................................. 18  
   2.1 Chassis Component Identification ........................................................................................................................... 19  
   2.2 System Top Cover Removal / Installation .................................................................................................................. 19  
   2.2.1 System Cover Removal ............................................................................................................................................ 19  
   2.2.2 System Cover Installation ........................................................................................................................................ 21  
   2.3 Processor Assembly and Installation .......................................................................................................................... 21  
   2.3.1 Processor Heat Sink Module (PHM) Assembly ........................................................................................................ 24  
   2.3.2 Processor Installation ............................................................................................................................................. 26  
   2.4 Memory Module Installation ........................................................................................................................................ 29  
   2.5 Power Supply Module Installation ............................................................................................................................. 30  

3. **System Options / Accessory Kit Installation** ................................................................................................................ 31  
   3.1 System Top Cover Removal / Installation .................................................................................................................. 31  
   3.1.1 System Cover Removal ............................................................................................................................................ 31  
   3.1.2 System Cover Installation ........................................................................................................................................ 32  
   3.2 System Cable Routing ................................................................................................................................................. 33  
   3.3 Riser Card / Add-in Card Installation ........................................................................................................................... 34  
   3.3.1 Riser Card Bracket Removal .................................................................................................................................. 35  
   3.3.2 Riser Card Installation ............................................................................................................................................. 35  
   3.3.3 PCIe* Add-in Card Installation ................................................................................................................................. 36  
   3.3.4 Riser Card Assembly Installation–for All Riser Assemblies .................................................................................. 37  
   3.4 Front Drive Installation ................................................................................................................................................. 38  
   3.4.1 Drive Blank Removal ................................................................................................................................................ 39  
   3.4.2 7 mm 2.5" SSD Drive Support .................................................................................................................................. 39  
   3.4.3 2.5" SSD Drive Installation ......................................................................................................................................... 40  
   3.5 Ethernet Network Adapter for OCP* Installation ......................................................................................................... 41  
   3.5.1 OCP* Adapter Bay Filler Removal / Installation ..................................................................................................... 42  
   3.5.2 OCP* Adapter with Pull Tab Installation ................................................................................................................ 43  
   3.5.3 OCP* Adapter with Internal Lock Installation ......................................................................................................... 43  
   3.6 M.2 Storage Device Installation .................................................................................................................................. 44  
   3.7 Trusted Platform Module (TPM) Installation ............................................................................................................... 45  
   3.8 Intel® RAID Maintenance Free Backup Unit (RMFBU) Installation ............................................................................. 46  

4. **System Software Updates and Configuration** ............................................................................................................. 48  

5. **System Service–System Features Overview** .................................................................................................................. 49  
   5.1 Front Drive Bay Options ................................................................................................................................................. 49  
   5.2 Back Panel, Front Control Panel, Front I/O Features .................................................................................................. 49  
   5.3 Drive Bay LED Identification .......................................................................................................................................... 51
6. System Service and FRU Replacement

5.4 Server Board Features
5.5 System Configuration and Recovery Jumpers

6.1 System Top Cover Removal / Installation
6.1.1 System Cover Removal
6.1.2 System Cover Installation
6.2 System Fan Replacement
6.3 Memory Module Replacement
6.4 Power Supply Replacement
6.5 Processor Replacement
6.5.1 Processor Heat Sink Module (PHM) and Processor Removal
6.5.2 Processor Heat Sink Module (PHM) Assembly
6.5.3 Processor Installation
6.6 Riser Card Replacement
6.7 Front Drive Replacement
6.7.1 2.5" SSD Drive Removal
6.7.2 7 mm 2.5" SSD Drive Replacement
6.7.3 2.5" SSD Drive Installation
6.8 2.5" Drive Mounting Rail Replacement
6.9 Ethernet Network Adapter for OCP* Replacement
6.9.1 OCP* Adapter with Pull Tab Replacement
6.9.2 OCP* Adapter with Internal Lock Replacement
6.10 M.2 Storage Device Replacement
6.11 Intel® RAID Maintenance Free Backup Unit (RMFBU) Replacement
6.12 Backplane Replacement
6.12.1 4 X 2.5" Backplane Replacement
6.12.2 12 X 2.5" Backplane Replacement
6.13 System Battery Replacement
6.14 Server Board Replacement

Appendix A. Getting Help

Appendix B. Memory Population Rules
B.1 DDR5 DIMM Population Rules
B.2 Intel® Optane™ Persistent Memory (PMem) 300 Series Module Rules
B.3 Intel® DDR5 DIMM Support Disclaimer

Appendix C. System Status LED Operating States and Definition

Appendix D. POST Code Diagnostic LED Decoder
D.1 Early POST Memory Initialization MRC Diagnostic Codes
D.2 BIOS POST Progress Codes

Appendix E. POST Code Errors
E.1 POST Error Beep Codes
E.2 Processor Initialization Error Summary

Appendix F. System Packaging Assembly Instructions
List of Figures

Figure 1. System Features Identification ................................................................................................. 14
Figure 2. Required Components for Basic System Operation ........................................................................ 18
Figure 3. Chassis Component Identification ............................................................................................... 19
Figure 4. System Top Cover Panel Shipping Screws .................................................................................... 20
Figure 5. System Cover Removal .................................................................................................................. 20
Figure 6. System Cover Installation ............................................................................................................... 21
Figure 7. 1U Heat Sinks ................................................................................................................................. 22
Figure 8. Processor Heat Sink Handling ........................................................................................................ 22
Figure 9. Supported Processor Carrier Clips ................................................................................................. 22
Figure 10. Processor Carrier Clip Identifier Markings .................................................................................. 23
Figure 11. Processor Heat Sink Module (PHM) Reference Diagram ............................................................. 23
Figure 12. Installing Processor Carrier Clip onto Processor–Part 1 ............................................................... 24
Figure 13. Installing Processor Carrier Clip onto Processor–Part 2 ............................................................. 24
Figure 14. Removing Heat Sink from its Packaging ...................................................................................... 25
Figure 15. Setting the Processor Heat Sink Anti-Tilt Wires to the Outward Position .................................. 25
Figure 16. Pin 1 Indicator of Processor Carrier Clip ..................................................................................... 25
Figure 17. Socket Protective Cover Removal ............................................................................................... 26
Figure 18. PHM Alignment with Socket Assembly ....................................................................................... 27
Figure 19. PHM Installation onto Server Board ............................................................................................ 27
Figure 20. Tighten Heat Sink Extension Fasteners ....................................................................................... 28
Figure 21. DIMM Blank Removal ................................................................................................................ 29
Figure 22. Memory Module Installation ....................................................................................................... 29
Figure 23. Power Supply Installation ........................................................................................................... 30
Figure 24. System Top Cover Panel Shipping Screws ................................................................................ 31
Figure 25. System Cover Removal ............................................................................................................... 32
Figure 26. System Cover Installation ........................................................................................................... 32
Figure 27. System Cable Routing Channels ................................................................................................. 33
Figure 28. Bracket for Riser Card on Riser Slot #1 – Two Views ................................................................. 34
Figure 29. Bracket for Riser Card on Riser Slot #2 – Two Views ................................................................. 34
Figure 30. Bracket for PCIe* Interposer Riser Card – Two Views ............................................................... 34
Figure 31. Chassis Riser Card Bracket Screws Removal .............................................................................. 35
Figure 32. Riser Card Bracket Removal ..................................................................................................... 35
Figure 33. Riser Card Installation onto the Bracket ..................................................................................... 35
Figure 34. PCIe* Add-in Card Installation for Riser Slot #1 or PCIe* Interposer Riser Assemblies .................. 36
Figure 35. PCIe* add-in Card Installation for Riser Card on Riser Slot #2 .................................................. 36
Figure 36. Riser Card Assembly Installation ............................................................................................... 37
Figure 37. 2.5" Drive Bay Components ....................................................................................................... 38
Figure 38. Drive Blank Removal .................................................................................................................. 39
Figure 39. Separating Top and Bottom Parts of Drive Blank ....................................................................... 39
Figure 40. Attaching the Drive Blank to 7 mm SSD ................................................................................... 40
Figure 83. Removing Heat Sink from its Packaging ................................................................. 67
Figure 84. Setting the Processor Heat Sink Anti-tilt Wires to the Outward Position .............. 67
Figure 85. Pin 1 Indicator of Processor Carrier Clip ............................................................. 68
Figure 86. Socket Protective Cover Removal ........................................................................ 68
Figure 87. PHM Alignment with Socket Assembly ............................................................... 69
Figure 88. PHM Installation onto Server Board ................................................................. 69
Figure 89. Tighten Heat Sink Extension Fasteners .............................................................. 70
Figure 90. Chassis Riser Card Bracket Screws .................................................................... 71
Figure 91. Riser Card Bracket Removal ............................................................................... 71
Figure 92. Add in Card Removal from Bracket .................................................................... 72
Figure 93. Riser Card Removal from Bracket ....................................................................... 72
Figure 94. Riser Card Installation onto the Bracket ............................................................. 72
Figure 95. Add-in Card Installation ...................................................................................... 73
Figure 96. Add-in Card Assembly Installation .................................................................... 73
Figure 97. Back Panel Shipping Screw Locations ............................................................... 74
Figure 98. Drive Bay Components ...................................................................................... 75
Figure 99. 2.5" 15 mm Drive Removal ................................................................................ 75
Figure 100. Detaching a 7mm SSD from its mounting bracket ............................................ 76
Figure 101. 7mm SSD Assembly ......................................................................................... 76
Figure 102. Drive Extraction Lever Release ........................................................................ 77
Figure 103. 7mm (Drive + Bracket) Drive Placement Orientation–Bracket Side Up ............ 77
Figure 104. 2.5" Drive installation into drive bay ................................................................. 77
Figure 105. Drive Mounting Rail Features Identification .................................................... 78
Figure 106. Removing Drive Mounting Rail ........................................................................ 78
Figure 107. Installing Drive Mounting Rail .......................................................................... 79
Figure 108. OCP* Adapter with Pull Tab Removal ............................................................ 80
Figure 109. OCP* Adapter with Pull Tab Installation ......................................................... 80
Figure 110. Internal Lock with Unlock and Lock Orientation ............................................. 81
Figure 111. OCP* Adapter with Internal Lock Removal ...................................................... 81
Figure 112. OCP* Adapter with Internal Lock Installation .................................................. 81
Figure 113. M.2 SSD Removal ............................................................................................ 82
Figure 114. M.2 SSD Installation ......................................................................................... 82
Figure 115. Intel® RMFBU Mounting Bracket Removal - Chassis ....................................... 83
Figure 116. RMFBU Housing Assembly ............................................................................. 83
Figure 117. Intel® RMFBU Mounting Bracket Installation .................................................. 84
Figure 118. 4 x 2.5" Backplane Removal ........................................................................... 85
Figure 119. 4 x 2.5" Backplane Installation ........................................................................ 86
Figure 120. 12 x 2.5" Backplane Removal .......................................................................... 87
Figure 121. 12 x 2.5" Backplane Installation ...................................................................... 88
Figure 122. Replacing the System Battery ........................................................................ 89
Figure 123. Server Board Removal .................................................................................... 90
Figure 124. Server Board Installation ................................................................................ 91
List of Tables

Table 1. Intel® Server M50FCP Family Reference Documents and Support Collaterals................................................. 16
Table 2. Drive Status LED States........................................................................................................................................ 51
Table 3. Drive Activity LED States .................................................................................................................................... 51
Table 4. Intel® Optane™ PMem 300 Series Module Support............................................................................................ 95
Table 5. Standard DDR5 DIMMs Compatible with Intel® Optane™ PMem 300 Series Module.................................. 95
Table 6. DDR5 DIMM Attributes Table for “Identical” and “Like” DIMMs ................................................................. 96
Table 7. System Status LED State Definitions.................................................................................................................. 97
Table 8. POST Progress Code LED Example .................................................................................................................. 99
Table 9. MRC Progress Codes......................................................................................................................................... 100
Table 10. MRC Fatal Error Codes................................................................................................................................. 101
Table 11. POST Progress Codes..................................................................................................................................... 101
Table 12. POST Error Messages and Handling............................................................................................................... 106
Table 13. POST Error Beep Codes.................................................................................................................................. 111
Table 14. Integrated BMC Beep Codes ........................................................................................................................... 111
Table 15. Mixed Processor Configurations Error Summary .......................................................................................... 112
1. Introduction

The Intel® Server System M50FCP1UR is a purpose-built, rack mount server that delivers power and performance in a 1U form factor. The system supports up to two 4th Gen Intel® Xeon® Scalable processors, delivering high core count and new hardware-enhanced security features. Previous generation Intel® Xeon® processor and Intel® Xeon® Scalable processor families are not supported.

The Intel® Server System M50FCP1UR supports up to 32 DDR5 DIMMs, providing high memory bandwidth for memory intensive workloads. The product family also supports Intel® Optane™ persistent memory (PMem) 300 series modules.

For details on all system features, refer to the Intel® Server System M50FCP1UR Technical Product Specification (TPS).

![Figure 1. System Features Identification](image-url)
About This Document

This document provides system integrators and service technicians with instructions for the installation and removal of system components. The document also covers available Intel accessories supported by this server system.

The document is organized into two sections. The first section (Chapters 2–4) is focused on the installation of system components and accessories into an L6 or L9 integrated server system.

The second section (Chapters 5, 6, and appendices A-G) is focused on system service. These chapters provide the service technician with valuable system information and procedures necessary to identify and replace a faulty system component.

System Integration

Chapter 2, L6 System Integration—Essential System Components. Installation procedures for the following system components: processors, memory, and power supply. Removal and installation of the system top cover are covered.

Chapter 3, L9 System Integration. Provides detailed instructions necessary to enhance system configurations by installing additional components and/or available accessory kits.

Chapter 4, System Software Update and Configuration. A short overview describing the system software stack installed on new Intel servers and where to get the latest revisions.

System Service

Chapter 5 – System Service—System Features Overview. An overview that identifies and locates the features associated with the Intel® Server System M50FCP1U.

Chapter 6 – System Service and FRU Replacement. Installation procedures for system field replaceable units (FRUs).

Appendix A – Getting Help. Provides server system support and contact information.

Appendix B – Memory Population Rules. Provides a summary of memory population rules.

Appendix C – System Status LED Operating States and Definition. System status LED operating states and definition.

Appendix D – POST Code Diagnostic LED Decoder. Lists of Diagnostic LED codes.

Appendix E – POST Code Errors. List of POST code errors that represent specific failures, warnings, or information.

Appendix F – System Packaging Assembly Instructions. Provides detailed instructions to repack the server system into the original Intel packaging.

---

1 An L6 integrated system requires essential components to be installed to make it power-on ready. An L9 integrated system is power-on ready but has no operating system installed. It may require additional options and/or accessories to be installed to enable specific system features.
1.1 Reference Documents and Support Collaterals

For additional information and other support collaterals related to this Intel® server product, see Table 1. Listed documents and utilities can be downloaded from the following Intel websites or can be ordered through a local Intel support representative.

**Note:** Some of the Intel documents listed in Table 1 are classified as “Intel Confidential”. These documents are only made available under a nondisclosure agreement (NDA) with Intel. All Intel product documentation and support collaterals can be downloaded from Intel's Resource & Documentation Center website: https://www.intel.com/content/www/us/en/documentation-resources/developer.html.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Document Title or Support Collateral</th>
<th>Document Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>System integration instructions and service guidance</td>
<td>Intel® Server System M50FCP2UR System Integration and Service Guide</td>
<td>Public</td>
</tr>
<tr>
<td>System integration instructions and service guidance</td>
<td>Intel® Server System M50FCP1UR System Integration and Service Guide</td>
<td>Public</td>
</tr>
<tr>
<td>Technical system-level description</td>
<td>Intel® Server System M50FCP2UR Technical Product Specification</td>
<td>Public</td>
</tr>
<tr>
<td>Technical system-level description</td>
<td>Intel® Server System M50FCP1UR Technical Product Specification</td>
<td>Public</td>
</tr>
<tr>
<td>Technical board-level description</td>
<td>Intel® Server Board M50FCP2SBSTD Technical Product Specification</td>
<td>Public</td>
</tr>
<tr>
<td>Server configuration guidance and compatibility</td>
<td>Intel® Server M50FCP Family Configuration Guide</td>
<td>Public</td>
</tr>
<tr>
<td>BIOS technical information on product family</td>
<td>BIOS Firmware External Product Specification (EPS)</td>
<td>Intel Confidential</td>
</tr>
<tr>
<td>BIOS setup information on product family</td>
<td>BIOS Setup Utility User Guide</td>
<td>Public</td>
</tr>
<tr>
<td>BMC technical information on product family</td>
<td>Integrated Baseboard Management Controller Firmware External Product Specification (EPS)</td>
<td>Intel Confidential</td>
</tr>
<tr>
<td>Base specifications for the IPMI architecture and interfaces</td>
<td>Intelligent Platform Management Interface Specification Second Generation v2.0</td>
<td>Intel Confidential</td>
</tr>
<tr>
<td>Specifications for the PCIe* 3.0 architecture and interfaces</td>
<td>PCIe Base Specification, Revision 3.0 <a href="http://www.pcisig.com/specifications">http://www.pcisig.com/specifications</a></td>
<td>Public</td>
</tr>
<tr>
<td>Specifications for the PCIe* 4.0 architecture and interfaces</td>
<td>PCIe Base Specification, Revision 4.0 <a href="http://www.pcisig.com/specifications">http://www.pcisig.com/specifications</a></td>
<td>Public</td>
</tr>
<tr>
<td>Specifications for the PCIe* 5.0 architecture and interfaces</td>
<td>PCIe Base Specification, Revision 5.0 <a href="http://www.pcisig.com/specifications">http://www.pcisig.com/specifications</a></td>
<td>Public</td>
</tr>
<tr>
<td>Specification for OCP*</td>
<td>Open Compute Project (OCP) 3.0 Specification</td>
<td>Intel Confidential</td>
</tr>
<tr>
<td>TPM for PC Client specifications</td>
<td>TPM PC Client Specifications, Revision 2.0</td>
<td>Intel Confidential</td>
</tr>
<tr>
<td>Processor thermal design specifications and recommendations</td>
<td>Sapphire Rapids Thermal and Mechanical Specifications and Design Guide (TMSDG): Document ID 609847</td>
<td>Intel Confidential</td>
</tr>
<tr>
<td>Topic</td>
<td>Document Title or Support Collateral</td>
<td>Document Classification</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>Technical information on Intel® Optane™ persistent memory (PMem) 300 series</td>
<td>Intel® Optane™ Persistent Memory 300 Series Operations Guide</td>
<td>Intel Confidential</td>
</tr>
<tr>
<td>Set up information for Intel Optane PMem 300 series</td>
<td>Intel® Optane™ Persistent Memory Startup Guide</td>
<td>Public</td>
</tr>
<tr>
<td>Latest system software updates: BIOS and firmware</td>
<td>Intel® System Update Package (SUP) for Intel® Server M50FCP Family; Intel® Server Firmware Update Utility - Various operating system support</td>
<td>Public</td>
</tr>
<tr>
<td>To obtain full system information</td>
<td>Intel® Server Information Retrieval Utility - Various operating system support; Intel® Server Information Retrieval Utility User Guide</td>
<td>Public</td>
</tr>
<tr>
<td>To configure, save, and restore various system options</td>
<td>Intel® Server Configuration Utility - Various operating system support; Intel® Server Configuration Utility User Guide</td>
<td>Public</td>
</tr>
</tbody>
</table>

**Note:** Intel Confidential documents are made available under a nondisclosure agreement (NDA) with Intel and must be ordered through your local Intel representative.
2. L6 Integrated System—Essential System Component Installation

The Intel® Server System M50FCP1UR options are offered with different level of system integration. System configurations that are not power-on ready are identified as L6 integrated systems. An L6 integrated system requires essential components (sold separately) to be installed. If your Intel system did not come preinstalled with any of the following components, then follow the procedures in this chapter:

- Processors – 4th Gen Intel® Xeon® Scalable processor family
- Memory—Up to 32 DDR5 DIMMs or a combination of standard DDR5 DIMMs and Intel® Optane™ PMem 300 series modules
- Power supply – two required for redundancy

If your Intel server system came preinstalled with all listed components, then skip this chapter and go to Chapter 3 for installation procedures associated with all other system options and accessories.

![Figure 2. Required Components for Basic System Operation](Ref #: FCP20201)

Before You Begin

Before integration of any system components, review all the safety and ESD precautions found in the Safety Warnings section at the beginning of this document.

System Reference

In the following procedures, all references to left, right, front, top, and bottom assume that the reader is facing the front of the server chassis.

Instruction Format

Each procedure described in this chapter follows an illustration first format. This format gives the reader the option to follow a quicker path to component integration by first seeing an illustration of the intended procedure. If necessary, the reader can then follow the step-by-step instructions that accompany each procedure.
2.1 Chassis Component Identification

The following figure shows the chassis components.

![Chassis Component Identification](image)

2.2 System Top Cover Removal / Installation

The system top cover consists of two panels, one over the front half of the system, and one over the back half of the system. To maintain system thermals, both top cover panels must be in place when the system is operational.

**Required Tools and Supplies**

- Anti-static wrist strap and conductive workbench pad (recommended)
- Phillips* head screwdriver #1

2.2.1 System Cover Removal

Removal of both top cover panels is necessary when servicing any system component integrated within the system. Before removing the top cover, power down the system and unplug all peripheral devices and the system power cords.
The system ships from the factory with the front cover panel and back cover panel screwed to the chassis. A total of four screws, one on each side of the front cover panel, and one on each side of the back cover panel, need to be removed to detach both top cover panels from the chassis.

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

For each top cover panel:

1. While pushing down on both the left and right buttons of the given top panel (see Letter A), slide the top cover panel towards the front (front panel) or back (back panel) of the chassis (see Letter B).
2. Carefully lift the top cover panel up and away from the chassis.

**Note:** Each top cover panel can slide along the chassis base for 10 mm and then needs to be lifted.
2.2.2 System Cover Installation

For each top cover panel:

1. Carefully align and set the top cover panel on top of the chassis. Then, slide it inwards until it locks into place (see Letter A).

**Shipping Note:** When transporting the server system, Intel recommends installing the four top cover screws before shipping.

2.3 Processor Assembly and Installation

**Components Required:**
- 4th Gen Intel® Xeon® Scalable processors
- Processor tray—Packaging tray that came with the processor
- Processor carrier clip—one for each processor
- Processor heat sink—1U standard heat sink or 1U Enhanced Volume Air Cooling (EVAC) heat sink

**Required Tools and Supplies**
- Anti-static wrist strap and conductive workbench pad (recommended)
- T-30 Torx* screwdriver
- ESD Gloves
- Phillips* head screwdriver #2

The Intel® Server System M50FCP1UR includes dual Socket-E LGA4677 processor sockets compatible with the 4th Gen Intel® Xeon® Scalable processor family.

The server system supports two types of heat sinks as shown in the following figure: The standard 1U heat sink and Enhanced Volume Air Cooling (EVAC) heat sink. The type of heat sink used depends on the system configuration. The 2.5” x 4 front drive system must use the EVAC heat sink on both processors. The 2.5” x 12 front drive system must use the standard 1U heat sink on both processors. For more information, refer to the Intel® Server M50FCP Family Configuration Guide.
**Caution:** Fin edges of the processor heat sink are very sharp. Intel recommends wearing thin ESD protective gloves when handling the PHM during the following procedures.

**Caution:** Processor heat sinks are easily damaged if handled improperly. See the following image for proper handling.

---

For the 4th Gen Intel® Xeon® Scalable processors, two types of processor carrier clips are supported (see following figure). The type of carrier clip used is determined by the processor SKU.

Two types of processor carrier clips are supported by the 4th Gen Intel® Xeon® Scalable processor family for this server product family, they are identified as “E1A” and “E1B”.

---

![E1A Processor Carrier Clip](image1)

![E1B Processor Carrier Clip](image2)
Each type of processor carrier clip will include identifier markings as shown in Figure 10. Match the processor clip to the clip identifier that is etched on the processor heat spreader, as shown in Figure 10.

**Note**: The etched identifier location in the figure is for illustration purposes only. The location and color may be different on the actual processor and carrier clip.

A processor heat sink module (PHM) assembly and processor socket assembly are necessary to install a processor to the server board. Figure 11 identifies each component associated with the PHM and processor socket assemblies.

![Figure 10. Processor Carrier Clip Identifier Markings](image1)

![Figure 11. Processor Heat Sink Module (PHM) Reference Diagram](image2)
The procedures described in the following sections must be followed in the order specified to assemble the PHM and install it to the server board. These instructions assume that all PHM components are new, and the Thermal Interface Material (TIM) is already applied to the bottom of the heat sink.

### 2.3.1 Processor Heat Sink Module (PHM) Assembly

**Caution:** Wear ESD gloves to prevent electrostatic damage and oxidation or foreign material on processor package and land pads.

**Note:** Installation procedures in the following sections apply to both types of processor heat sink. Steps unique to one heat sink type will be identified.

---

**Figure 12. Installing Processor Carrier Clip onto Processor—Part 1**

1. Position the Pin 1 indicator of the carrier clip with the Pin 1 indicator of the processor (See Figure 12).
2. With the processor still on its shipping tray, place the processor carrier clip over the processor.

---

**Figure 13. Installing Processor Carrier Clip onto Processor—Part 2**

3. Gently press down on two opposite sides at a time of the processor carrier clip until it clicks in place.
4. Remove the heat sink from its packaging. To avoid damage to the heat sink, grasp it by its narrower top and bottom edges.

5. Set the anti-tilt wires to the outward position.
6. Turn the heat sink over and place it bottom side up on a flat surface.
7. Remove the plastic protective film from the Thermal Interface Material (TIM).
8. Align Pin 1 indicator of processor carrier clip with the corner cut-out on the heat sink. For the EVAC heat sink, align the processor carrier clip and the heat sink as shown in Figure 16.

**Note:** In a standard heat sink there are two cut-out corners, either can be used to align Pin 1 indicators.

9. Gently press down the heat sink onto the processor carrier clip until it clicks into place.
10. Ensure that all four heat sink corners are securely latched to the tabs on the processor carrier clip.

### 2.3.2 Processor Installation

**Caution:** Do not touch the socket pins. The pins inside the processor socket are extremely sensitive. A damaged processor socket may produce unpredictable system errors.

![Figure 17. Socket Protective Cover Removal](image)

1. (If present) Remove the processor socket cover by squeezing the finger grips (see Letter A) and pulling the cover up from the processor socket (see Letter B).

**Caution:** Ensure that the processor socket is free of damage or contamination before installing the PHM. If debris is observed, blow it away gently with an air blower. Do not use tweezers or any other hard tools to remove it manually.
1. Set all four anti-tilt wires on the heat sink to the inward position (see Letter A in Figure 19).
2. Align the Pin 1 indicators of the processor carrier clip and processor with the Pin 1 indicator on the bolster plate located around the processor socket.

**Caution:** Processor socket pins are delicate and bend easily. Use extreme care when placing the PHM onto the processor socket. Do not drop it.

3. Holding the PHM horizontally, carefully lower it onto the bolster plate's alignment pins (see Letter B).
4. Set all four anti-tilt wires on the heat sink to the outward position. See Letter D in Figure 19.
5. (EVAC Heat Sink Only) Using a Phillips #2 screwdriver, tighten the heat sink extension screws. See Letter C in Figure 19.
6. Using a T30 Torx* screwdriver, tighten the heat sink fasteners to 8 in-lb. No specific sequence is needed for tightening.

**Important:** A processor socket cover should be installed onto any unpopulated processor socket. Do not install a processor heat sink over a processor socket that is empty.
2.4 Memory Module Installation

Required Tools and Supplies

- Anti-static wrist strap and conductive workbench pad (recommended)

The Intel® Server System M50FCP1UR supports DDR5 standard RDIMMs, 3DS-RDIMMs, and 9x4 RDIMMs. In addition, the server board supports Intel® Optane™ persistent memory 300 series modules (also known as, Intel® Optane™ PMem).

DDR5 DIMM and Intel® Optane® PMem devices are commonly referred to as “memory module” in the following procedure.

Notes:

- DIMM blanks should only be removed when installing a memory module in its place.
- See Appendix C for memory population rules.

Figure 21. DIMM Blank Removal

1. Remove the DIMM blank from the desired memory slot:
   - Open the ejection tabs at both ends of the selected memory slot to lift the DIMM blank from the slot (see Letter A).
   - Carefully remove the DIMM Blank from the system (see Letter B).

Figure 22. Memory Module Installation
2. Ensure that the ejection tabs at both ends of the memory slot are pushed outward to the open position (see Letter A).
3. Carefully unpack the replacement memory module, taking care to handle the device by its outer edges.
4. Align the notch at the bottom edge of the memory module, with the key in the memory slot (see Letter B).
5. Insert the memory module into the memory slot.
   - Using even pressure along the top edge, push down on the memory module (see Letter C) until the ejection tabs of the memory slot snap into place (see Letter D).
6. Ensure that the ejection tabs are firmly in place (see Letter E).
7. Repeat the procedure for each memory module to be installed.

**Note:** Intel® Optane™ PMem devices require additional steps to enable and configure them. Refer to the appropriate Intel® Optane™ PMem documentation to complete the installation process.

### 2.5 Power Supply Module Installation

**Required Tools and Supplies**

- Intel power supply kit
- Anti-static wrist strap and conductive workbench pad (recommended)

![Figure 23. Power Supply Installation](image)

1. If present, remove the insert from the power supply bay (see Letter A).
2. Locate and carefully unpack the power supply module.
3. Slide the power supply into the power supply bay until it locks in place (see Letter B).

**Note:** The power supply bay filler panel must be installed in the unused bay for all single power supply configurations.

4. (If installing a second power supply–Repeat steps 1–3.)
3. System Options / Accessory Kit Installation

This chapter provides instructions for the integration of system options and other Intel accessories. If your integrated Intel server system did not come preinstalled with processors, memory, or power supplies, installation procedures for these components are in Chapter 2.

Before You Begin

Before integration of any system components, review all the safety and ESD precautions found in the Safety Warnings section at the beginning of this document.

System Reference

In the following procedures, all references to left, right, front, top, and bottom assume that the reader is facing the front of the server chassis.

Instruction Format

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

3.1 System Top Cover Removal / Installation

The system top cover consists of two panels, one over the front half of the system, and one over the back half of the system. To maintain system thermals, both top cover panels must be in place when the system is operational.

Required Tools and Supplies

- Anti-static wrist strap and conductive workbench pad (recommended)
- Phillips® head screwdriver #1

3.1.1 System Cover Removal

Removal of both top cover panels is necessary when servicing any system component in the server chassis. Before removing the top cover, power down the system and unplug all peripheral devices and system power cords.

![Figure 24. System Top Cover Panel Shipping Screws](image)

The system ships from the factory with the front cover panel and back cover panel screwed to the chassis. A total of four screws, one on each side of the front cover panel and one on each side of the back cover panel, need to be removed to detach both top cover panels from the chassis.
**Note:** A non-skid surface or a stop behind the server system may be needed to prevent the server system from sliding on the work surface.

![System Cover Removal](image1)

**Figure 25. System Cover Removal**

For each top cover panel:

1. While pushing down on both the left and right buttons of the given top panel (See Letter A), slide the top cover panel towards the front (front panel) or back (back panel) of the chassis. See Letter B.
2. Carefully lift the top cover panel up and away from the chassis.

**Note:** Each top cover panel can slide along the chassis base for 10 mm and then needs to be lifted.

### 3.1.2 System Cover Installation

![System Cover Installation](image2)

**Figure 26. System Cover Installation**

For each top cover panel:

1. Carefully align and set the top cover panel on top of the chassis. Then, slide it inwards until it locks into place. See Letter A.

**Shipping Note:** When transporting the server system, Intel recommends installing the four top cover screws before shipping.
3.2 System Cable Routing

All internal cables routed between the back of the system and the front of the system must be routed using the cable channel located between the right air baffle and the right chassis sidewall. See Figure 27.

Cables connected between the onboard PCIe MCIO connectors and the backplane behind the front drive bay are routed using the cable channel located between system fans 4 and 5.

No cables should be routed between the left chassis sidewall and left air baffle, or between the memory modules and processors.

Figure 27. System Cable Routing Channels
3.3 Riser Card / Add-in Card Installation

The Intel® Server System M50FCP1UR supports various riser card options. Depending on the system configuration, your system may or may not come pre-configured with riser card options installed. This section provides assembly and installation instructions for systems that require riser card installation. Reference the Intel® Server System M50FCP1UR Technical Product Specification for more information on available riser card options.

All system configurations include the mounting brackets for each supported riser card option.

![Figure 28. Bracket for Riser Card on Riser Slot #1– Two Views](image)

![Figure 29. Bracket for Riser Card on Riser Slot #2– Two Views](image)

![Figure 30. Bracket for PCIe* Interposer Riser Card – Two Views](image)

**Required Tools and Supplies**

- Anti-static wrist strap and conductive workbench pad (recommended)
- Phillips* head screwdriver #1
3.3.1 Riser Card Bracket Removal
As shown in the previous figures, there are multiple types of riser card brackets included with the system. The instructions for installation are the same for each.

1. Power off the system and disconnect the system power cords.
2. Remove the system top cover. See Section 3.1.1.
3. If present, disconnect all cables (internal or external) that may be attached to the riser assembly.
4. If present, remove the four fastener screws on the chassis back panel. See Figure 31.

5. On the front and back of the riser card bracket, loosen the two screw heads securing the bracket to the server board. See Letter A.
6. Grasp the riser card bracket with both hands and carefully pull it up and away from the chassis. See Letter B.

3.3.2 Riser Card Installation
The following installation procedure for riser card to bracket is the same for all included riser card brackets and supported riser card options.
1. Locate and carefully unpack the riser card. Hold the riser card by its edges. To NOT touch the gold edge connector pins.
2. Align the riser card to the threaded standoffs on the mounting bracket.
3. Using the supplied screws, secure the riser card to the bracket. Tighten to 5 in-lb.

### 3.3.3 PCIe* Add-in Card Installation

Add-in cards installed to riser card #1 or the PCIe* interposer riser card must be oriented with their component side up. See Figure 34.

![Figure 34. PCIe* Add-in Card Installation for Riser Slot #1 or PCIe* Interposer Riser Assemblies](image)

An add-in card installed to riser card #2 must be oriented with its component side down as shown in Figure 35.

![Figure 35. PCIe* add-in Card Installation for Riser Card on Riser Slot #2](image)
1. If the riser card assembly (bracket and riser card) is still inside the system, remove it from the system following instructions in Section 3.2.1.
2. Remove the screw (see Letter A) holding the filler plate to the bracket. Remove the filler plate. See Letter B.
3. Insert the add-in card until it is fully seated inside the PCIe* slot on the riser card. See Letter C.
4. Using the screw, secure the add-in card to the riser card bracket. See Letter D. Tighten to 5 in-lb.

**Note:** For add-in cards with internal cable connectors, it may be necessary to connect cables before installing the riser card assembly into the system. See Appendix B for cable routing guidance.

### 3.3.4 Riser Card Assembly Installation—for All Riser Assemblies

1. Position the riser card's edge connector over the riser slot on the server board.
2. Align the two key slots on the back edge of the riser card assembly with the mounting keys on the back of the chassis.
3. Once aligned, press the riser card assembly straight down into the riser slot (see Letter A).
4. Using the two static screw heads on the riser bracket, secure the riser card assembly to the server board (see Letter B). Tighten to 5 in-lb.
5. Connect any cables to the add-in card that are required. See your add-in card documentation for additional information.
6. Reinstall the system top cover. See Section 3.1.2.
3.4 Front Drive Installation

The Intel® Server System M50FCP1UR has front drive bays that only support 2.5" SSDs. Supported SSDs can have a drive height of 7mm or 15mm. 7mm must be attached to a supplied drive mounting bracket to be compatible with the front drive bays.

All drives are mounted to a tool-less, non-detachable, drive rail. Drives interface with a backplane that is mounted to the back side of the front drive bay. Data I/O cables are attached between the backplane and various storage controller options within the system. The front drives are hot swap capable with supported redundant RAID configurations.

This section provides procedures for drive blank removal, 7mm SSD assembly, and drive installation into the drive bay.

**Required Tools and Supplies**

- Anti-static wrist strap and conductive workbench pad (recommended)

2.5" Drive Bay

The following figure identifies the 2.5" drive bay components.

![Figure 37. 2.5" Drive Bay Components](image)

**Note:** To ensure proper system airflow requirements, all front drive bays must be populated with either a drive or supplied drive blank.

All drive bays included an integrated drive rail that is used to mount an SSD to. The integrated drive rail does not fully remove from the drive bay. When the drive extraction lever is in the open position, it is used to pull out the rail just enough to allow an SSD to be installed or removed from the rail.
3.4.1 Drive Blank Removal
Each drive carrier includes a 2.5” drive blank. Drive blanks should only be removed when replacing it with an SSD.

![Figure 38. Drive Blank Removal](image)

1. Press the button on the drive extraction lever to release it. See Letter A.
2. Using the lever, pull the drive rail out from the drive bay as far as it allows (see Letter B).
3. Pull the drive blank from the drive bay (see Letter C).

3.4.2 7 mm 2.5” SSD Drive Support
All drive bays can support a 2.5” SSD that has a height of 7mm. To support these drives, a section of the drive blank is used to mount to the SSD, making it compatible for installation into the drive bay.

![Figure 39. Separating Top and Bottom Parts of Drive Blank](image)

1. Remove the drive blank from the system (see Section 3.4.1).
2. One side of the drive blank has a latch used to secure both halves of the drive blank together. To separate the halves, squeeze the latch tabs together (see Letter A), and pull the two halves apart (see Letter B).
3. The blank half without the latch is used as the SSD mounting bracket.
4. Slide the SSD drive into SSD mounting bracket. See Figure 40.

**Important:** To avoid damaging the SSD connector, insert the drive into the supplied blank in the direction shown.

### 3.4.3 2.5” SSD Drive Installation

Front drive bays can support SSDs with a height of 7mm or 15mm. With the SSD mounting bracket attached to the 7mm drive, installation into the front drive bay is the same for both drive sizes. Note the location of the drive interface connector before installing the drive into the drive bay. Ensure its orientation matches with the interface connector on the backplane.
1. Ensure that the drive extraction lever is in the open position, and the drive rail is pulled out as far as possible.
2. Align and insert the drive into the drive bay. See Letter A.

   **Note:** Intel recommends holding the drive with one hand while holding the lever with the other hand.

3. Slide the drive into the drive bay until it is fully seated within the drive interface connector on the backplane (see Letter B).
4. Close the drive extraction lever until it locks into place. See Letter C.

### 3.5 Ethernet Network Adapter for OCP* Installation

This section provides instructions for the installation of an OCP* add-in card. OCP add-in cards will have one of two possible methods to secure the card within the OCP bay. Refer to the sub-section that supports the card to be installed.

- Pull-Tab and Thumb Screw – Section 3.5.1
- Internal Lock – Section 3.5.2

**Required Tools and Supplies**

- Anti-static wrist strap and conductive workbench pad (recommended)
- Phillips* head screwdriver #1

**Note:** Reference the Intel® Server M50FCP Family Configuration Guide for a list of supported adapter cards.
3.5.1 OCP* Adapter Bay Filler Removal / Installation

Figure 43. OCP* Adapter Bay Filler Removal

Remove the filler insert to install an OCP add-in card.

1. Loosen the thumb screw on the right side of the filler (see Letter A).
2. Pull out the right side of the filler first and move the filler slightly to the right, ensuring the left end of the filler is out of the slot.
3. Pull the filler away from the chassis (see Letter B).

Figure 44. OCP* Adapter Bay Filler Installation

Install the filler insert when the OCP bay is empty.

1. Insert the left side of the filler on the slot.
2. Push the filler until the mounting screw goes into the mounting hole on the right side (see Letter A).
3. Tighten the thumb screw (see Letter B).
### 3.5.2 OCP* Adapter with Pull Tab Installation

![Figure 45. OCP* Adapter with Pull Tab Installation](image)

1. Align the OCP adapter with the open OCP bay slot and slide forward until the connectors make secure contact (see Letter A).
2. Tighten the thumb screw on the right side of the OCP adapter (see Letter B).

### 3.5.3 OCP* Adapter with Internal Lock Installation

All L6 and L9 integrated systems come with an internal lock on the OCP rail. This lock is a piece of blue plastic. The OCP rail in the system has a dedicated space to accommodate the lock. The lock can be mounted on the rail in two different orientations. When the keying features of the lock are facing up, it is in an unlocked orientation. When the keying features are facing down, it is in a locked orientation. A lock symbol is included in each side of the plastic lock to indicate its orientation. The following figure shows the features of the lock.

![Figure 46. Internal Lock with Unlock and Lock Orientation](image)
1. Power off the system and disconnect the system power cords.
2. Remove the system top cover (see Section 3.1.1)
3. If present, remove the riser card assembly above the OCP adapter area, (see Section 3.2.1).

   **Note:** In the default shipping configuration, the internal lock is set to the unlock orientation.

4. Squeeze the two hooks of the internal lock and pull it out (see Letter A).
5. Align the OCP* adapter with the open OCP bay slot and slide forward until the connectors make secure contact (see Letter B).
6. Reinstall the internal lock with the lock orientation (see Letter C).
7. Reinstall the riser card assembly as needed (see Section 3.2.4).
8. Reinstall the system top cover (see Section 3.1.2).

### 3.6 M.2 Storage Device Installation

The server board includes two M.2 connectors as shown in the following figure. Each M.2 connector supports a PCIe* NVMe* or SATA SSD drive that conforms to a 22110 (110 mm) or 2280 (80 mm) form factor.

**Required Tools and Supplies**

- M.2 SSD
- Anti-static wrist strap and conductive workbench pad (recommended)
- Phillips* head screwdriver #1

![Figure 48. M.2 SSD Connector Location](image)
1. Power off the system and disconnect the system power cords.
2. Remove the system top cover (see Section 3.1.1).
3. Remove the riser card #1 bracket from the system (see Section 3.2.1).
4. Locate the M.2 connectors towards the back edge of the server board. See Figure 48.
5. Position and install the onboard M.2 mounting stand-off at the appropriate location to match the length of the selected M.2 SSD.
6. Align the notch within the SSD edge connector with the key in the server board M.2 connector.
7. Insert the SSD into the connector (see Letter A).
8. Using the fastener screw, secure the SSD to the M.2 mounting stand-off on the server board. See letter B. Tighten to 1.5 in-lb.
9. Repeat steps 4–7 for the second M.2 SSD if needed.
10. Reinstall the riser card assembly (see Section 3.2.4).
11. Reinstall the system top cover (see Section 3.1.2).

3.7 Trusted Platform Module (TPM) Installation

This section provides instructions to install a Trusted Platform Module (TPM) in the system. Refer to the Intel® Server M50FCP Family Configuration Guide for available options.

Required Tools and Supplies

- Intel® TPM accessory kit
- Anti-static wrist strap and conductive workbench pad (recommended)
- Phillips* head screwdriver #1

1. Power off the system and disconnect the system power cords.
2. Remove the system top cover (see Section 3.1.1).
3. Locate and carefully unpack the TPM kit contents.
4. Locate the TPM module connector on the server board.
5. Insert the plastic stand-off connector into the mounting hole in the server board (see Letter A).
6. Place the TPM module over the connector and confirm the orientation of the module.
7. Press the module down onto the connector (see Better B).
8. Secure the TPM module to the stand-off with the tamper resistant fastener screw (see Letter C).
9. Reinstall the system top cover (see Section 3.1.2).

3.8 Intel® RAID Maintenance Free Backup Unit (RMFBU) Installation

This section provides instructions to install an RMFBU bracket and assembly in the system. Refer to the Intel® Server M50FCP Family Configuration Guide for available Intel RAID card options.

Required Tools and Supplies

- Anti-static wrist strap and conductive workbench pad (recommended)
- Phillips® head screwdriver #1

The RMFBU assembly has the following elements:

- RMFBU Mounting Plate
- RMFBU plastic housing
- RMFBU plastic housing latch
- RMFBU super-capacitor

The RMFBU mounting plate and housing assembly are installed in between the system fans and hot-swap backplane.

The following three elements need to be assembled before attaching them to the mounting plate.

\[\text{Figure 51. Installing Latch on the Plastic Case}\]

1. Insert the plastic housing latch into the opening on the plastic housing (see Letter A).
2. Carefully lift on the latch holder (see Letter B) and insert the latch into the opening until it clicks into place (see Letter C).
3. Bring the latch down until it is aligned vertically (see Letter D).

\[\text{Figure 52. Insert Super Cap}\]
4. Insert the RMFBU super capacitor into the plastic housing with the cable protruding out from one of the cable routing openings. Choose the opening that results in the best cable routing to the RAID module.

![Figure 53. Intel® RMFBU Mounting Plate Installation](image)

5. If the system is powered on, power off the system and then disconnect the system power cords.
6. Remove the system top cover (see Section 3.1.1).
7. (If installed) Remove the cable clip by removing the two screws securing it to the chassis.
8. Locate the RMFBU mounting plate.
9. Align the two screw holes of the RMFBU mounting plate with the matching threaded holes on the chassis base (see Letter A).
10. Secure the RMFBU mounting plate to the chassis using two screws (see Letter B). Tighten to 5 in-lb.
11. Slide the RMFBU housing assembly in the direction as indicated on the mounting plate (see Letter C) until the latch locks in place.
12. Attach cables as required.
13. Reinstall the system top cover (see Section 3.1.2).
4. **System Software Updates and Configuration**

The Intel® Server System M50FCP1UR includes a system software stack that consists of:

- System BIOS
- Baseboard Management Controller (BMC) firmware
- Intel® Management Engine (Intel® ME) firmware

Together, they configure and manage features and functions of the server system. A full software stack is installed during the system manufacturing process but may not be the latest available version. Intel highly recommends updating the system software stack to the latest available version for optimal performance and system reliability. A System Update Package (SUP) containing the latest available system software stack can be downloaded from the following Intel website: [http://downloadcenter.intel.com](http://downloadcenter.intel.com).

See the following Intel documents for more in-depth information about the system software stack and their functions:

- *BIOS Firmware External Product Specification (EPS)—Intel NDA required*
- *Integrated Baseboard Management Controller Firmware External Product Specification (EPS)—Intel NDA Required*

For guidelines and overview on BIOS Boot Menu, Setup, and hot keys, see the *Intel® Server Board M50FCP2SBSTD Technical Product Specification.*
5. System Service–System Features Overview

This chapter provides service personnel a reference to identify and locate the features associated with the Intel® Server System M50FCP1UR. For more information, refer to Intel® Server System M50FCP2UR Technical Product Specifications.

5.1 Front Drive Bay Options

![Figure 54. 4 x 2.5" Front Drive Bay Configuration–M50FCP1UR204](image1)

![Figure 55. 12 x 2.5" Front Drive Bay Configuration–M50FCP1UR212](image2)

5.2 Back Panel, Front Control Panel, Front I/O Features

![Figure 56. Back Panel Features](image3)
Figure 57. Front Control Panel Features

Figure 58. Front I/O Features
5.3 Drive Bay LED Identification

![Figure 59. Hot Swap Drive Bay LED Identification](image)

### Table 2. Drive Status LED States

<table>
<thead>
<tr>
<th>Amber LED State</th>
<th>Drive Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>No access and no fault</td>
</tr>
<tr>
<td>Solid on</td>
<td>Hard drive fault has occurred</td>
</tr>
<tr>
<td>1 Hz blinking</td>
<td>RAID rebuild in progress</td>
</tr>
<tr>
<td>2 Hz blinking</td>
<td>Locate (identify)</td>
</tr>
</tbody>
</table>

### Table 3. Drive Activity LED States

<table>
<thead>
<tr>
<th>Condition</th>
<th>Drive Type</th>
<th>LED Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power on with no drive activity</td>
<td>SAS/NVMe*</td>
<td>LED stays on</td>
</tr>
<tr>
<td></td>
<td>SATA</td>
<td>LED stays off</td>
</tr>
<tr>
<td>Power on with drive activity</td>
<td>SAS/NVMe*</td>
<td>LED blinks off when processing a command</td>
</tr>
<tr>
<td></td>
<td>SATA</td>
<td>LED blinks on when processing a command</td>
</tr>
<tr>
<td>Power on and drive spun down</td>
<td>SAS/NVMe*</td>
<td>LED stays off</td>
</tr>
<tr>
<td></td>
<td>SATA</td>
<td>LED stays off</td>
</tr>
<tr>
<td>Power on and drive spinning up</td>
<td>SAS/NVMe*</td>
<td>LED blinks</td>
</tr>
<tr>
<td></td>
<td>SATA</td>
<td>LED stays off</td>
</tr>
</tbody>
</table>

**Note:** The drive activity LED is driven by signals from the drive itself. Drive vendors may choose to operate the activity LED different from what is described in Table 3. If the activity LED on a given drive type behaves differently than what is described, customers should reference the drive vendor specifications for the specific drive model to determine the expected drive activity LED operation.
5.4 Server Board Features

The following figure provides a general overview of the physical server board, identifying key feature and component locations.

Figure 60. Intel® Server Board M50FCP2SBSTD Component / Feature Identification
The server board includes LEDs to identify system status and/or indicate a component fault. The following figures identify the diagnostic LEDs and their location on the server board.

Figure 61. Intel® Light-Guided Diagnostics–LED Identification

Figure 62. View of POST Code Diagnostic, System ID, and System Status LEDs Area
5.5 System Configuration and Recovery Jumpers

The server board includes several jumper blocks that can be used to configure, protect, or recover specific features of the server board. The following figure identifies the location of each jumper block on the server board. For more information on the jumpers, see the Intel® Server Board M50FCP2SBSTD Technical Product Specification (TPS).

![Figure 64. Reset and Recovery Jumper Block Locations](image-url)
6. System Service and FRU Replacement

This chapter provides instructions for replacement of system components considered to be field replaceable (FRU). Only system features that are identified as hot-swappable can be replaced while the system remains operational. These items include:

- Power Supply—in dual power supply configurations only
- Drives mounted in the front drive bay—Redundant RAID (1, 5, 6, and 10) configurations only
- System Fans

All other components in the system can only be serviced after the system has been powered off and AC power cords have been disconnected from the server system.

Before You Begin

Before integration of any system components, review all the safety and ESD precautions found in the Safety Warnings section at the beginning of this document.

System Reference

In the following procedures, all references to left, right, front, top, and bottom assume that the reader is facing the front of the server chassis.

Instruction Format

Each procedure described in this chapter follows an illustration first format. This format gives the reader the option to follow a quicker path to component integration by first seeing an illustration of the intended procedure. If necessary, the reader can then follow the step-by-step instructions that accompany each procedure.
6.1 **System Top Cover Removal / Installation**

The system top cover consists of two panels, one over the front half of the system and one over the back half of the system. To maintain system thermals, both top cover panels must be in place when the system is operational.

**Required Tools and Supplies**

- Anti-static wrist strap and conductive workbench pad (recommended)
- Phillips* head screwdriver #1

6.1.1 **System Cover Removal**

Removal of both top cover panels is necessary when servicing any system component in the server chassis. Before removing the top cover, power down the system and unplug all peripheral devices and the system power cords.

**Figure 65. System Top Cover Panel Shipping Screws**

The top cover panels may be secured to the chassis using four screws, two on each side of the chassis. See Figure 65. If present, these need to be removed to detach both top cover panels from the chassis.

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

**Figure 66. System Cover Removal**
For each top cover panel:

1. While pushing down on both the left and right buttons of the given top panel (see Letter A), slide the top cover panel towards the front (front panel) or back (back panel) of the chassis (see Letter B).
2. Carefully lift the top cover panel up and away from the chassis.

**Note:** Each top cover panel can slide along the chassis base for 10 mm and then needs to be lifted.

### 6.1.2 System Cover Installation

![Figure 67. System Cover Installation](image)

For each top cover panel:

1. Carefully align and set the top cover panel on top of the chassis. Then, slide it inwards until it locks into place (see Letter A).

**Shipping Note:** When transporting the server system, Intel recommends installing the four top cover screws before shipping.
6.2 System Fan Replacement

All system fans are designed to be hot-swappable and require no tools for replacement. All system fans include a fan fault LED on the server board next to each system fan connector. The integrated baseboard management system will light the LED when it detects a fan fault. Remove the front top cover panel to access any of the system fans.

**Note:** a faulty system fan with dual rotors may still have a functional rotor. Because fan rotors spin at very high speeds, extreme caution should be taken when performing a hot replacement of a system fan. For safety, Intel recommends replacing a faulty system fan with the system powered off whenever possible.

**Required Tools and Supplies**

- Anti-static wrist strap and conductive workbench pad (recommended)

**Caution:** To minimize possible performance degradation, and other thermal related issues, system fan replacement while the system is operational should be performed as quickly as possible.

System fans operate at very high speeds. Keep all tools and fingers away from all operational system fans when swapping out a defective fan.

Components in an operational system can get very hot. Avoid touching any components in the system while swapping out a defective system fan.

---

**Figure 68. Individual Fan Removal**

1. Remove the front top cover panel (see Section 6.1.1).

   **Note:** For hot fan replacement, the system power cords do not need to be disconnected before removing the top cover.

2. If performing a hot replacement, identify the faulty fan by locating the illuminated FAN FAULT LED on the server board next to the connector of the faulty fan.

3. Grasp the faulty system fan on both green marked ends and pull it up away from the system (see Letter A). This step also disconnects the fan cable from the onboard 8-pin fan connector (see Letter B).

4. Carefully place the fan onto a flat surface.
5. Locate and unwrap the replacement fan.
6. Ensure that the empty fan slot within the assembly housing is clear of any cables.
7. Align the fan connector with the server board connector, and carefully lower the fan into the fan assembly housing. Gently push down until fully seated (see Letter A).
8. Ensure that the fan connector is fully seated within the connector on the server board. See Letter B.
9. Reinstall the system top cover (see Section 6.1.2).
6.3 Memory Module Replacement

Required Tools and Supplies

- Anti-static wrist strap and conductive workbench pad (recommended)
- Replacement memory module

**Note:** Replacement DDR5 DIMMs must be identical or have “Like DIMM” attributes defined in Appendix C2. See Appendix C for memory population rules.

**Average Time to Complete:** ~ 5 minutes (Complete Intel® Optane™ PMem 300 series replacement and setup is longer).

**Procedure Prerequisites**

- Memory modules are NOT hot-swappable. The system must be powered down and unplugged from the AC power source before replacing a faulty memory module from the system.

The following figures show standard DDR5 DIMMs, but the physical replacement procedure is the same for both standard DDR5 DIMMs and Intel® Optane™ PMem modules.

DDR5 DIMM and Intel Optane PMem devices are commonly referred to as “memory module” in the following instructions.

![Memory Module Removal](image)

**Figure 70. Memory Module Removal**

1. Power off the system and disconnect the system power cords.
2. Remove the top cover panels (see Section 6.1.1).
3. Identify and locate the memory module to be removed.
4. Ensure that the ejection tabs of adjacent memory slots are closed.
5. Open the ejection tabs at both ends of the selected memory slot (see Letter A). The memory module lifts slightly out from the memory slot.
6. Holding the memory module by its edges, lift it away from the slot (see Letter B).
7. Ensure that the ejection tabs at both ends of the memory slot are pushed outward to the open position (see Letter A).
8. Carefully unpack the replacement memory module, taking care to handle the device by its outer edges only.
9. Align the notch in the memory module edge connector edge with the key in the memory slot (see Letter B).
10. Insert the memory module into the memory slot.
   - Using even pressure along the top edge, push down on the memory module (see Letter C) until the ejection tabs of the memory slot snap into place (see Letter D).
11. Ensure that the ejection tabs are firmly in place (see Letter E).
12. Reinstall the system top cover (see Section 6.1.2).

**Note:** Replacing Intel® Optane™ PMem 300 series modules require additional steps to enable and configure them. Refer to the appropriate Intel® Optane™ PMem 300 series documentation to complete the installation process for these devices.
6.4 Power Supply Replacement

Required Tools and Supplies

- Anti-static wrist strap and conductive workbench pad (recommended)

Caution: The power supply is only hot-swappable (system does not have to be powered down) if the system has both power supplies installed, and the system is still operational with a single functional power supply.

Figure 72. Power Supply Removal

1. Detach the power cord from the power supply to be removed.
2. Push and hold the green latch in the direction shown (see Letter A).
3. Use the handle to pull the power supply module from the system (see Letter B).

Figure 73. Power Supply Installation

4. Locate the replacement power supply.
5. Slide the power supply into the power supply bay until it locks in place (see Letter A).
6.5 Processor Replacement

Components Required:

- New 4\textsuperscript{th} Gen Intel\textsuperscript{®} Xeon\textsuperscript{®} Scalable processor + included shipping tray
- Existing processor carrier clip
- Existing 1U standard heat sink or 1U Enhanced Volume Air Cooling (EVAC) heat sink + new thermal interface material (TIM)

Required Tools and Supplies

- Anti-static wrist strap and conductive workbench pad (recommended)
- ESD Gloves (recommended)
- T-30 Torx\textsuperscript{*} screwdriver
- Phillips\textsuperscript{*} head screwdriver #2

\textbf{Note:} The following sections show the EVAC heat sink in the figures. The procedures described apply to both heat sink types.

\textbf{Caution:} Fin edges of the processor heat sink are very sharp. Intel recommends wearing thin ESD protective gloves when handling the PHM during the following procedures.

\textbf{Caution:} Processor heat sinks are easily damaged if handled improperly. See the following figure for proper handling.

Two types of processor carrier clips are supported by the 4\textsuperscript{th} Gen Intel\textsuperscript{®} Xeon\textsuperscript{®} Scalable processor family for this server product family, they are identified as “E1A” and “E1B”.

\textbf{Figure 74. Processor Heat Sink Handling}

\textbf{Figure 75. Supported Processor Carrier Clips}
Each type of processor carrier clip will have an identifier marking: E1A or E1B. The processor will have an etch on its heat spreader identifying the supported type of carrier clip. Match the processor to the supported processor clip as shown in Figure 76.

![Figure 76. Processor Carrier Clip Identifier Markings](image)

**Note:** The etched identifier location in the figure is for illustration purposes only. The location and color may be different on the actual processor and carrier clip.

6.5.1 Processor Heat Sink Module (PHM) and Processor Removal

![Figure 77. PHM Assembly Removal from Processor Socket](image)

1. Power off the system and disconnect the system power cords.
2. Remove the system top cover (see Section 6.1.1).
3. Remove or set aside all system components preventing access to the processors.
4. Ensure the anti-tilt wire on the four corners of the heat sink, is in the outward position (see Letter A).
5. Fully unscrew all four heat sink fasteners in any order (see Letter B).
6. Push the anti-tilt wire on the four corners of the heat sink, to the inward position (see Letter C).
7. Lift the PHM straight up and away from the server board (see Letter D).
8. Place the PHM, bottom side up, on a flat surface.
9. Visually inspect that the socket is free of damage or contamination.
Caution: If debris is observed, blow it away gently with an air blower. Do not use tweezers or any other hard tools to remove it manually.

If reinstalling the processor later, then Intel highly recommends installing the processor socket protective cover that shipped with the system to prevent possible pin damage while the socket is not populated.

- Squeeze the finger grips at each end of the cover (see Letter A) and carefully lower the cover on the socket (see Letter B). Then, release finger grips.
- Ensure that the socket cover is locked in place.

Caution: Do not press the center of the socket cover.

10. While holding down the PHM, carefully rotate the lever (see Letter A) from left to right until the processor lifts from the processor carrier clip.
11. While holding down the processor carrier clip, carefully lift the processor from it (see Letter B).
12. Return the lever to the original position (see Letter C).
13. Unlatch the tab on each corner of the processor carrier clip to release it from the heat sink (see Letter D).
14. Lift the processor carrier clip up and away from the heat sink (see Letter E).

### 6.5.2 Processor Heat Sink Module (PHM) Assembly

The procedures described in the following sections must be followed in the order specified to assemble the PHM and install it on to the server board. These instructions assume that the Thermal Interface Material (TIM) is already applied to the bottom of the heat sink.

![Figure 81. Installing Processor Carrier Clip onto Processor–Part 1](image)

1. Position the Pin 1 indicator of the carrier clip with the Pin 1 indicator of the processor (See Figure 81).
2. With the processor still on its shipping tray, place the processor carrier clip over the processor.
3. Gently press down on two opposite sides of the carrier clip until it clicks into place. Repeat with the other two sides (See Figure 82).

4. Locate the processor heat sink. To avoid damage to the heat sink, grasp it by its narrower top and bottom edges as shown in Figure 83.

5. Set the anti-tilt wires to the outward position.

6. Turn the heat sink over and place it bottom side up on a flat surface.

7. Clean any residual old Thermal Interface Material (TIM) from the heat sink and apply new TIM.
8. Carefully lift and turn over the heat sink.
9. Align the Pin 1 indicator of the processor carrier clip with the corner cut-out on the heat sink (See Figure 85.

**Note:** For the standard heat sink, there are two cut-out corners; either can be used to align Pin 1 indicators.

10. Gently press down the heat sink onto the processor carrier clip until it clicks into place.
11. Ensure that all four heat sink corners are securely latched to the carrier clip tabs.

### 6.5.3 Processor Installation

**Caution:** Do not touch the socket pins. The pins inside the processor socket are extremely sensitive. A damaged processor socket may produce unpredictable system errors.

1. (If present) Remove the protective cover by squeezing the finger grips (see Letter A) and pulling the cover up and away from the processor socket. See Letter B.

**Caution:** Ensure that the processor socket is free of damage or contamination before installing the PHM. If debris is observed, blow it away gently with an air blower. Do not use tweezers or any other hard tools to remove it manually.
2. Set anti-tilt wires on all four corners of the heat sink to the inward position (see Letter A in Figure 88).
3. Align the Pin 1 indicators of the processor carrier clip and processor with the Pin 1 indicator on the bolster plate located around the processor socket (See Figure 87).

**Caution:** Processor socket pins are delicate and bend easily. Use extreme care when placing the PHM onto the processor socket. Do not drop it.

4. Carefully lower the PHM onto the bolster plate alignment pins (see Letter B).
5. Using a Phillips #2 screwdriver, tighten the heat sink extension screws (see Letter C).
6. Set all four anti-tilt wires on the heat sink to the outward position (see Letter D).
7. Using a T30 Torx* screwdriver, tighten the heat sink fasteners to 8 in-lb. No specific sequence is needed for tightening.
8. Reinstall the system top cover (see Section 6.1.2).
6.6 Riser Card Replacement

This section provides instructions for the replacement of a riser card.

Required Tools and Supplies

- Replacement riser card accessory kit
- Anti-static wrist strap and conductive workbench pad (recommended)
- Phillips* head screwdriver #1

The system includes three different riser card brackets. The replacement instructions are the same for each.

1. Power off the system and disconnect the system power cords.
2. Remove the system top cover (see Section 6.1.1).
3. (If present) Unscrew the four fastener screws on the chassis back panel. See Figure 90.
4. (If present) Disconnect all cables (internal and external) that may be attached to the riser assembly.

5. On the front and back of the riser card bracket, loosen the two screw heads securing the bracket to the server board. See Letter A.
6. Grasp the riser card bracket with both hands and carefully pull it up and away from the chassis. See Letter B.
7. If an add-in card is present, remove it from the riser bracket assembly.
8. Remove the riser card from the Bracket.

9. Locate and carefully unpack the riser card. Hold the riser card by its edges. To NOT touch the gold pins of the edge connector.

10. Install the riser card to the riser card bracket

**Note:** The following installation instructions for riser card to bracket are the same for all included riser card brackets and supported riser card options.

- Align the riser card to the threaded standoffs on the mounting bracket.
- Using the supplied screws, secure the riser card to the bracket. Tighten to 5 in-lb.
10. Reinstall the add-in card into the riser card
11. Using the fastener screws, secure the add-in card to the riser card bracket (see Letter B). Tighten to 5 in-lb.

**Note:** For add-in cards with internal cable connectors, it may be necessary to connect cables before installing the riser card assembly into the system. See Section 3.2 for cable routing guidance.

The following installation procedure is the same for all riser card assemblies.

12. Position the riser card edge connector over the server board riser slot.
13. Align the two key slots on the back edge of the riser card assembly with the mounting keys on the back of the chassis.
14. Once aligned, press the riser card assembly straight down into the riser slot (see Letter A).
15. Using the two static screw heads on the riser bracket, secure the riser card assembly to the server board (see Letter B). Tighten to 5 in-lb.
16. Connect any cables to the add-in card that are required. See your add-in card documentation for additional information.
17. Reinstall the system top cover.
18. Reinstall the system top cover (see Section 6.1.2).

**Note:** To transport a fully integrated system, Intel highly recommends the system include four shipping screws (not included) installed to the system back panel (see **Figure 97**). These screws provide the chassis with additional support by reducing possible chassis flex and minimizing possible sag of the base plate. Installed screws should meet the following specifications: flat head, 6–32 thread, 3.75 mm length.

![Figure 97. Back Panel Shipping Screw Locations](image)
6.7 Front Drive Replacement

The Intel® Server System M50FCP1UR has front drive bays that only support 2.5” SSDs. Supported SSDs can have a drive height of 7mm or 15mm. 7mm must be attached to a supplied drive mounting bracket to be compatible with the front drive bays.

All drives are mounted to a tool-less, non-detachable, drive rail. Drives interface with a backplane that is mounted to the back side of the front drive bay. Data I/O cables are attached between the backplane and various storage controller options within the system. The front drives are hot swap capable with supported redundant RAID configurations.

This section provides procedures for the replacement of a faulty SSD.

**Required Tools and Supplies**

- Replacement 2.5” Solid State Drive (SSD)
- Anti-static wrist strap and conductive workbench pad (recommended)

The following figure identifies the 2.5” drive bay components.

---

**Note:** To ensure proper system airflow requirements, all front drive bays must be populated with either a drive or supplied drive blank.

**Note:** The integrated 2.5” drive rails are not removable. They slide out far enough to allow SSDs or drive blanks to be serviced. When sliding out a drive rail from the drive bay, only pull it as much as it allows without forcing it.

---

6.7.1 2.5” SSD Drive Removal

---

**Figure 99. 2.5” 15 mm Drive Removal**
1. Press the button on the drive extraction lever to release it. See Letter A.
2. Using the lever, pull the drive rail out from the drive bay as far as it allows (see Letter B).
3. Pull the drive from the drive bay (see Letter C).

### 6.7.2 7 mm 2.5” SSD Drive Replacement

**Note:** Skip this section if replacing a 15mm SSD.

SSDs with a height of 7 mm are attached to a mounting bracket. When replacing a 7 mm drive, the mounting bracket must be detached from the SSD and re-attached onto its replacement before it can be installed into the drive bay.

![Figure 100. Detaching a 7mm SSD from its mounting bracket](image1)

1. Slide the mounting bracket up and away from the SSD
2. Locate and carefully unpack the replacement SSD

![Figure 101. 7mm SSD Assembly](image2)

3. Slide the 7mm SSD up into the mounting bracket
6.7.3  2.5” SSD Drive Installation

The procedure to install a drive into a drive bay is the same for both 7mm (drive + bracket) and 15mm SSDs. Note the drive orientation before installing the drive into the drive bay. Installing a drive incorrectly can damage the interface connectors of the drive and the backplane.

1. Release the drive extraction lever and pull out the drive rail as far as it allows.

2. Align the drive with the open drive bay.

3. Insert the drive into the drive bay (see Letter A).
4. Slide the drive forward until it is fully connected with the backplane (see Letter B).
5. Complete the drive installation by closing the drive extraction lever until it locks into place (see Letter C).

### 6.8 2.5" Drive Mounting Rail Replacement

Removal of the drive rail from the drive bay is not required when servicing an SSD. However, if damaged, the drive rail can be removed from the chassis for repair and or replacement.

**Required Tools and Supplies**
- 2.5" drive mounting rail kit
- Anti-static wrist strap and conductive workbench pad (recommended)

The following figure shows the backside of the drive mounting rail identifying the two mounting rail studs and the tab.

![Figure 105. Drive Mounting Rail Features Identification](image1)

1. Remove the drive mounting rail from the front drive bay.

![Figure 106. Removing Drive Mounting Rail](image2)

- Release and set the extraction lever to the fully open position
- Looking inside the drive bay, visually locate the locking tab on the drive rail
• Using a flat head screwdriver, carefully twist the locking tab inward to unlock the drive rail from the drive bay (see Letter A).
• Gently lift the drive rail from the alignment slot and pull it out and away from the drive bay.

**Note:** Handle the drive rail with care. Do not bend or twist it.

2. Install the drive mounting rail in the front drive bay.

**Figure 107. Installing Drive Mounting Rail**

• Release and set the extraction lever to the fully open position
• Align the two mounting studs on the drive rail with the alignment slot on the side of the drive bay (see Letter A).
• With the mounting studs in the slot, slide the mounting rail towards the back of the bay until the drive rail tab locks in place (see Letter B).
6.9 Ethernet Network Adapter for OCP* Replacement

This section provides instructions for replacement of an OCP* add-in card. OCP add-in cards will have one of two possible methods to secure the card within the OCP bay. Refer to the section that supports the card type to be replaced.

- Pull-Tab and Thumb Screw – Section 6.9.1
- Internal Lock – Section 6.9.2

Required Tools and Supplies

- OCP Ethernet Network Adapter
- Anti-static wrist strap and conductive workbench pad (recommended)
- Phillips* head screwdriver #1

6.9.1 OCP* Adapter with Pull Tab Replacement

Figure 108. OCP* Adapter with Pull Tab Removal

1. Loosen the thumb screw on the right side of the OCP adapter (see Letter A).
2. Pull the OCP adapter out of the bay using the tab on the left side of the OCP adapter (see Letter B).

Figure 109. OCP* Adapter with Pull Tab Installation

3. Locate and carefully unpack the replacement card.
4. Align the OCP adapter with the open OCP bay slot and slide forward until the connectors make secure contact (see Letter A).
5. Tighten the thumb screw on the right side of the OCP adapter (see Letter B).
6.9.2 OCP* Adapter with Internal Lock Replacement

All L6 and L9 integrated systems come with an internal lock on the internal OCP mounting rail. This lock is a piece of blue plastic. The OCP rail in the system has a dedicated space to accommodate the lock. The lock can be mounted on the rail in two different orientations. When the keying features of the lock are facing up, it is in an unlocked orientation. When the keying features are facing down, it is in a locked orientation. A lock symbol is included in each side of the plastic lock to indicate its orientation. The following figure shows the features of the lock.

![Figure 110. Internal Lock with Unlock and Lock Orientation](image)

Figure 110. Internal Lock with Unlock and Lock Orientation

1. Remove the system top cover (see Section 6.1.1).
2. (If present) Remove the riser card assembly from above the OCP adapter area (see Section 6.6).
3. Squeeze the two hooks of the internal lock and pull it from the chassis (see Letter A).
4. Turn the lock over and reinstall it back into the chassis (see Letter B).
5. Push the OCP adapter out of the bay from inside the chassis (see Letter C).

Figure 111. OCP* Adapter with Internal Lock Removal

![Figure 112. OCP* Adapter with Internal Lock Installation](image)

Figure 112. OCP* Adapter with Internal Lock Installation
6. Squeeze the two hooks of the internal lock and pull it out (see Letter A).
7. Align the OCP adapter with the open OCP* bay slot and slide forward until the connectors make secure contact (see Letter B).
8. Reinstall the internal lock with the lock orientation (see Letter C).
9. Reinstall the riser card assembly as needed (see Section 6.6).
10. Reinstall the system top cover (see Section 6.1.2).

6.10 M.2 Storage Device Replacement

The server board includes two M.2 connectors as shown in the following figure. Each M.2 connector supports a PCIe* NVMe* or SATA SSD drive that conforms to a 22110 (110 mm) or 2280 (80 mm) form factor.

**Required Tools and Supplies**

- Replacement M.2 SSD
- Anti-static wrist strap and conductive workbench pad (recommended)
- Phillips* head screwdriver #1

1. Power off the system and disconnect the system power cords.
2. Remove the system top cover (see Section 6.1.1).
3. If installed, remove the riser #1 assembly (see Section 6.6).
4. Locate the M.2 to be replaced.
5. Remove the screw to release the M.2 SSD from the server board (see Letter A).
6. Carefully lift the free end of the M.2 SSD and gently remove it from the connector in the direction shown (see Letter B).

7. Locate and carefully unpack the replacement M.2 SSD. Hold it by its edges.
8. Depending on the length of the M.2 SSD, use the onboard M.2 mounting stand-off at the appropriate location.
9. Align and insert the M.2 SSD with the connector on the server board. See Letter A.
10. Using the screw, secure the SSD to the mounting stand-off on the server board (see Letter B). Tighten to 1.5 in-lb.
11. Reinstall the riser card assembly (see Section 6.6).
12. Reinstall the system top cover (see Section 6.1.2).

6.11 Intel® RAID Maintenance Free Backup Unit (RMFBU) Replacement

This section provides instructions to replace an RMFBU bracket and assembly in the system.

Required Tools and Supplies

- Replacement RMFBU Kit
- Anti-static wrist strap and conductive workbench pad (recommended)

![Figure 115. Intel® RMFBU Mounting Bracket Removal - Chassis](image)

1. Remove the system top cover (see Section 6.1.1).
2. Disconnect RMFBU cables.
3. Locate the RMFBU housing assembly and slide the latch up to unlock the assembly from the mounting plate (see Letter A).
4. Slide the RMFBU housing assembly (see Letter B) towards the system fans. When free from the mounting plate, lift it up and out of the system.
5. Remove the RMFBU from the plastic housing
6. Locate and carefully unpack the replacement RMFBU

![Figure 116. RMFBU Housing Assembly](image)
7. Insert the RMFBU super capacitor into the plastic housing with the cable protruding out from one of the cable routing openings. Choose the opening resulting in the best cable routing to the RAID module.

![Figure 117. Intel® RMFBU Mounting Bracket Installation](image)

8. Slide the RMFBU housing assembly in the direction as indicated on the mounting plate (see Letter C) until the latch locks in place.

9. Attach cables as required.

10. Reinstall the system top cover (see Section 6.1.2).
6.12 **Backplane Replacement**

Depending on the system configuration, the Intel® Server System M50FCP1UR includes either a 4 x 2.5" backplane or 12 x 2.5" backplane. This section provides the procedures necessary to replace both types.

6.12.1 **4 X 2.5" Backplane Replacement**

**Required Tools and Supplies**

- Intel backplane kit
- Anti-static wrist strap and conductive anti-static wrist strap and conductive workbench pad (recommended)
- Phillips® head screwdriver #1

1. Power off the system and disconnect the system power cords.
2. Remove the system top cover (see Section 6.1.1).
3. Remove all drives and drive blanks from the front drive bays. NOTE: If drives are configured to a RAID partition, label the drives to identify the drive bay location they were removed from.
4. Disconnect all cables from the backplane. NOTE: If drives are configured to a RAID partition, label each drive I/O cable to identify the backplane cable connection they were disconnected from.
5. Remove the three screws securing the backplane to drive bay (see Letter A).
6. Lift the backplane up from the chassis base and pull it out from the system (see Letter B).
7. Locate and carefully unpack the replacement backplane.

**Note:** Hold the backplane by its edges. Do not touch any components mounted to the backplane.

8. Align and lower the bottom edge of the backplane with the three tabs on the chassis base. See Figure 119 (see Letter A).

9. Verify the alignment of the three backplane mounting holes with the threaded studs of the front drive bay.

10. Secure the backplane with three screws as shown (see Letter B).

11. Re-attach all cables to the backplane.

12. Reinstall all drives and/or drive blanks into the front drive bay.

**Notes:**
- All front drive bays must be populated with an SSD or supplied drive blank.
- If the front drives were configured as part of a RAID partition, ensure that all drive I/O cables and drives were reinstalled to the same locations as they were configured before the procedure.

13. Reinstall the system top cover (see Section 6.1.2).
6.12.2 12 X 2.5" Backplane Replacement

Required Tools and Supplies

- Intel backplane kit
- Anti-static wrist strap and conductive anti-static wrist strap and conductive workbench pad (recommended)
- Phillips® head screwdriver #1

1. Power off the system and disconnect the system power cords.
2. Remove the system top cover (see Section 6.1.1).
3. Remove all drives and drive blanks from the front drive bays. NOTE: If drives are configured to a RAID partition, label the drives to identify the drive bay location they were removed from.
4. Disconnect all cables from the backplane. NOTE: If drives are configured to a RAID partition, label each drive I/O cable to identify the backplane cable connection they were disconnected from.
5. Remove the seven screws securing the backplane to drive bay (see Letter A).
6. Lift the backplane up from the chassis base and pull it out from the system (see Letter B).
7. Locate and carefully unpack the replacement backplane.
8. Note: Hold the backplane by its edges. Do not touch any components mounted to the backplane.
9. Align and lower the bottom edge of the backplane with the three tabs on the chassis base. See Figure 127 (see Letter A).
10. Verify the seven mounting holes of the backplane align with the threaded studs of the front drive bay.
11. Secure the backplane with seven screws as shown (see Letter B).
12. Re-attach all cables to the backplane.
13. Reinstall all drives and/or drive blanks into the front drive bay.

Notes:
- All front drive bays must be populated with an SSD or supplied drive blank.
- If the front drives were configured as part of a RAID partition, ensure that all drive I/O cables and drives were reinstalled to the same locations as they were configured before the procedure.

14. Reinstall the system top cover (see Section 6.1.2).
6.13 System Battery Replacement

Required Tools and Supplies

- Compatible CR2032 lithium battery
- Anti-static wrist strap and conductive workbench pad (recommended)

Figure 122. Replacing the System Battery

1. Power off the system
2. Remove the system top cover (see Section 6.1.1).
3. If present, remove riser card assembly above the battery location (see Section 6.6).
4. Locate the battery on the server board.
5. Gently press the metal clip as shown to release the battery (see Letter A).
6. Remove the battery from the plastic socket (see Letter B).
7. Dispose of the battery according to local laws.
8. Remove the new lithium battery from its package. Being careful to observe the correct polarity, insert it into the battery socket.
9. Reinstall riser card assemblies if needed (see Section 6.6).
10. Reinstall the system top cover (see Section 6.1.2).
11. Use the <F2> BIOS Setup Utility to restore BIOS Settings and reset the system time and date.
6.14 Server Board Replacement

Required Tools and Supplies

- Intel® Server Board M50FCP2SBSTD spare
- Anti-static wrist strap and conductive workbench pad (recommended)
- Phillips* head screwdriver #2

1. Power off system and remove power cords from each power supply module installed.
2. Disconnect all externally attached cables.
3. Remove the system top cover (see Section 6.1.1).
4. Remove power supply modules (see Section 6.4).
5. Remove all system fans (see Section 6.2).
6. Disconnect all internal cables attached to PCIe add-in cards.
7. Remove riser card assemblies (see Section 6.6).
8. If present, remove the OCP add-in card
9. If present, remove all options installed onto the server board, including: TPM Module and M.2 SSDs
10. Remove processors (see Section 6.5).
11. Remove all memory modules and DIMM blanks (see Section 6.3).
12. Disconnect all cables attached to connectors on the server board.
13. Remove the two metal air baffles attached to the left and right edges of the server board
14. Remove all fasteners used to secure the server board to the chassis (see Letter ‘A’).
15. Slide the server board towards the front of the chassis to disengage all external connectors from the chassis cut-outs on the chassis back panel.
16. Carefully lift the server board from the chassis and place it into an anti-static bag.
17. Verify that all cables are clear of the board placement target.
18. Locate and carefully remove the server board from its anti-static bag. Hold the server board by its edges. Do not touch any components on the server board.

19. Carefully lower the server board into the chassis.
20. Slide the server board towards the back of the chassis until all external connectors on the back edge of the server board are in place with the cut outs on the chassis back panel.
21. Verify that all screw holes align with the chassis standoffs (see Letter A).
22. Secure the server board to the chassis using all the fasteners removed in Step 14. (See Letter B),
   Tighten to 5 in-lb.
23. Place and secure the right and left metal air baffles to edges of the server board. Tighten to 5 in-lb.
24. Re-attach all cables previously disconnected from the server board.
25. Reinstall processors (see Section 6.5).
26. Reinstall memory modules and DIMM blanks (see Section 6.3).
27. Reinstall all options previously removed from the server board.
28. Reinstall riser card assemblies (see Section 6.6).
29. Re-attach all internal cables previously detached from PCIe add-in cards. See Section 3.2 for cable
   routing.
30. Reinstall all system fans (see Section 6.2).
31. Reinstall power supply modules (see Section 6.4).
32. Reinstall the system top cover (see Section 6.1.2).
Appendix A. Getting Help

Available Intel support options with your Intel Server System:


Information available at the support site includes:

- Latest BIOS, firmware, drivers, and utilities
- Product documentation, setup, and service guides
- Full product specifications, technical advisories, and errata
- Compatibility documentation for memory, hardware add-in cards, and operating systems
- Server and chassis accessory parts list for ordering upgrades or spare parts
- A searchable knowledge base to search for product information throughout the support site

Quick Links:

<table>
<thead>
<tr>
<th>Use the following links for support on Intel Server Boards and Server Systems</th>
<th>Download Center</th>
<th>BIOS Support Page</th>
<th>Troubleshooting Boot Issue</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Use the following links for support on Intel® Data Center Block (DCB) Integrated Systems*</th>
<th>Download Center</th>
<th>Technical Support Documents</th>
<th>Warranty and Support Info</th>
</tr>
</thead>
</table>

* Intel DCB comes pre-populated with processors, memory, storage, and peripherals based on how it was ordered through the Intel Configure to Order tool.

2. If a solution cannot be found at Intel’s support site, submit a service request via Intel’s online service center at https://supporttickets.intel.com/servicecenter?lang=en-US. In addition, you can also view previous support requests. (Login required to access previous support requests)

3. Contact an Intel support representative using one of the support phone numbers available at https://www.intel.com/content/www/us/en/support/contact-support.html (charges may apply).

   Intel also offers Partner Alliance Program members around-the-clock 24x7 technical phone support on Intel® server boards, server chassis, server RAID controller cards, and Intel® Server Management at https://www.intel.com/content/www/us/en/partner-alliance/overview.html

**Note:** The 24x7 support number is available after logging in to the Intel Partner Alliance website.

Warranty Information

Appendix B. Memory Population Rules

B.1 DDR5 DIMM Population Rules

Note: Although mixed DDR5 DRAM DIMM configurations are supported, Intel only performs platform validation on systems that are configured with identical DIMMs installed.

The following memory population rules apply when installing DDR5 DIMMs:

- Mixing rules:
  - Mixing DDR5 DIMMs of different frequencies and latencies is not supported within or across processors. If a mixed configuration is encountered, the BIOS attempts to operate at the highest common frequency and the lowest latency possible.
  - x4 and x8 width DIMMs may be mixed in the same channel.
  - Mixing of DDR5 DIMM types (standard RDIMM, 3DS-RDIMM, 9x4 RDIMM) within or across processors is not supported. This is a Fatal Error Halt in Memory Initialization.

- For a single DDR5 DIMM in a dual-slot channel, populate slot 1 (blue slot).

- For multiple DDR5 DIMMs per channel:
  - When populating a quad-rank DDR5 DIMM with a single- or dual-rank DDR5 DIMM in the same channel, the quad-rank DDR5 DIMM must be populated farthest from the processor. Incorrect DIMM placement results in an MRC error code. A maximum of 8 logical ranks can be used on any one channel, as well as a maximum of 10 physical ranks loaded on a channel.
  - For RDIMM, 3DS-RDIMM, 9x4 RDIMM, always populate DIMMs with higher electrical loading in slot 1 (blue slot) followed by slot 2 (black slot).

- Memory slots associated with a given processor are unavailable if the corresponding processor socket is not populated.

- Processor sockets are self-contained and autonomous. However, all memory subsystem support (such as memory RAS and error management) in the BIOS Setup are applied commonly for each installed processor.

- For best system performance, memory must be installed in all eight channels for each installed processor.

- For best system performance in dual processor configurations, installed DDR5 DIMM type and population for DDR5 DIMMs configured to CPU 1 must match DDR5 DIMM type and population configured to CPU 0.

B.2 Intel® Optane™ Persistent Memory (PMem) 300 Series Module Rules

- Only Intel Optane PMem 300 series modules are supported. Previous Intel Optane PMem generations (such as 100 series and 200 series) are not supported.

- Intel Optane PMem 300 series modules of different capacities cannot be mixed within or across processor sockets.

- Memory slots supported by Integrated Memory Controller 0 (memory channels A and B) of a given processor must be populated before memory slots on other IMCs.

- For multiple DIMMs per channel:
  - Only one Intel Optane PMem 300 series module is supported per memory channel.
  - Intel Optane PMem 300 series modules are only supported in memory module slot 2 (black slot) when mixed with standard RDIMM, 3DS-RDIMM, 9x4 RDIMM.

- No support for SDRAM SRx8 DIMM that is populated within the same channel as the Intel Optane PMem 300 series module in any operating mode.
- Ensure that the same DDR5 DIMM type and capacity is used for each DDR5 + Intel Optane PMem 300 series module combination.
- Minimum of one DDR5 DIMM per IMC (IMC 0, IMC 1, IMC 2 and IMC 3) for each installed processor.
- Minimum of one Intel Optane PMem 300 series module for the board.
- Intel Optane PMem 300 series modules must be populated symmetrically for each installed processor (corresponding slots populated on either side of each processor).

### Table 4. Intel® Optane™ PMem 300 Series Module Support

<table>
<thead>
<tr>
<th>Processor Shelf</th>
<th>Intel® Optane™ Persistent Memory 300 Series Capacity (GB)</th>
<th>Maximum Speed (MT/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold 5xxx processors</td>
<td>128, 256, 512</td>
<td>4400</td>
</tr>
<tr>
<td>Gold 6xxx Processors</td>
<td>128, 256, 512</td>
<td>4400</td>
</tr>
<tr>
<td>Platinum 8xxx processors</td>
<td>128, 256, 512</td>
<td>4400</td>
</tr>
</tbody>
</table>

### Table 5. Standard DDR5 DIMMs Compatible with Intel® Optane™ PMem 300 Series Module

<table>
<thead>
<tr>
<th>Type</th>
<th>Ranks per DIMM and Data Width</th>
<th>DIMM Size (GB) 16 Gb DRAM density</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDIMM</td>
<td>SRx8</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>SRx4</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>DRx8</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>DRx4</td>
<td>64</td>
</tr>
<tr>
<td>3DS-RDIMM</td>
<td>QRx4 (2H)</td>
<td>128 (2H)</td>
</tr>
<tr>
<td></td>
<td>ORx4 (2H)</td>
<td>256 (2H)</td>
</tr>
</tbody>
</table>

Notes:

1. SR = Single Rank, DR = Dual Rank, QR = Quad Rank, OR = Oct Rank, H = Stack Height
2. Intel Optane PMem 300 series is not supported with 9x4 DDR5 DIMMs.
B.3 Intel® DDR5 DIMM Support Disclaimer

Intel validates, and only supports system configurations, where all installed DDR5 DIMMs have matching “Identical” or “Like” attributes (see following table). A system configured concurrently with DDR5 DIMMs from different vendors are supported by Intel if all other DDR5 “Like” DIMM attributes match.

Intel does not perform system validation testing, nor will it support system configurations, where all populated DDR5 DIMMs do not have matching “Like” DIMM attributes, as listed in the following table. Intel only supports Intel server systems configured with DDR5 DIMMs that have been validated by Intel and are listed on Intel's Tested Memory list for a given Intel server family.

Intel configures and ships fully integrated L9 server systems. All DDR5 DIMMs within an L9 server system as shipped by Intel, are identical. All installed DIMMs have matching attributes as the attributes listed in the “Identical” DDR5 DIMM Attributes column in the following table.

When purchasing more than one integrated L9 server system with the same configuration from Intel, Intel reserves the right to use “Like” DIMMs between server systems. At a minimum, “Like” DIMMS will have matching DIMM attributes as listed in the following table. However, the DIMM model #, revision #, or vendor may be different.

For warranty replacement, Intel will make every effort to ship back an exact match to the one returned. However, Intel may ship back a validated “Like” DIMM. A “Like” DIMM may be from the same vendor but may not be the same revision # or model #, or it may be an Intel validated DIMM from a different vendor. At a minimum, all “Like” DIMMs shipped from Intel will match attributes of the original part according to the definition of “Like” DIMMs in the following table.

Table 6. DDR5 DIMM Attributes Table for “Identical” and “Like” DIMMs

<table>
<thead>
<tr>
<th>Attribute</th>
<th>“Identical” DDR5 DIMM Attributes</th>
<th>“Like” DDR5 DIMM Attributes</th>
<th>Possible DDR5 Attribute Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vendor</td>
<td>Match</td>
<td>May be Different</td>
<td>Memory Vendor Name</td>
</tr>
<tr>
<td>DIMM Part #</td>
<td>Match</td>
<td>May be Different</td>
<td>Memory Vendor Part #</td>
</tr>
<tr>
<td>DIMM Revision #</td>
<td>Match</td>
<td>May be Different</td>
<td>Memory Vendor Part Revision #</td>
</tr>
<tr>
<td>SDRAM Type</td>
<td>Match</td>
<td>Match</td>
<td>DDR5</td>
</tr>
<tr>
<td>DIMM Type</td>
<td>Match</td>
<td>Match</td>
<td>RDIMM, 9x4 RDIMM</td>
</tr>
<tr>
<td>Speed (MT/s)</td>
<td>Match</td>
<td>Match</td>
<td>4000, 4400, 4800</td>
</tr>
<tr>
<td>Voltage</td>
<td>Match</td>
<td>Match</td>
<td>1.1 V</td>
</tr>
<tr>
<td>DIMM Size (GB)</td>
<td>Match</td>
<td>Match</td>
<td>16 GB, 32 GB, 64 GB, 128 GB, 256 GB</td>
</tr>
<tr>
<td>Organization</td>
<td>Match</td>
<td>Match</td>
<td>2Gx80; 4Gx80; 8Gx80; 16Gx80; 32Gx80</td>
</tr>
<tr>
<td>DIMM Rank</td>
<td>Match</td>
<td>Match</td>
<td>1R, 2R, 4R, 8R</td>
</tr>
<tr>
<td>DRAM Width</td>
<td>Match</td>
<td>Match</td>
<td>x4, x8</td>
</tr>
<tr>
<td>DRAM Density</td>
<td>Match</td>
<td>Match</td>
<td>16 Gb</td>
</tr>
</tbody>
</table>
Appendix C. System Status LED Operating States and Definition

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

When the server system is powered down (transitions to the DC-off state or S5), the BMC is still on standby power and retains the sensor and front panel status LED state established before the power-down event.

When AC power is first applied to the system, the status LED turns solid amber, and then immediately changes to blinking green to indicate that the BMC is booting. If the BMC boot process completes with no errors, the status LED changes to solid green.

Table 7. System Status LED State Definitions

<table>
<thead>
<tr>
<th>LED State</th>
<th>System State</th>
<th>BIOS Status Description</th>
</tr>
</thead>
</table>
| Off               | No AC Power to system                     | • System power is not present.  
• System is in EuP Lot6 off mode.                                                                                                                        |
| Solid green       | System is operating normally.             | • System is in S5 soft-off state.  
• System is running (in S0 State) and its status is healthy. The system is not exhibiting any errors. Source power is present, BMC has booted, and manageability functionality is operational.  
• After a BMC reset, and with the chassis ID solid on, the BMC is booting Linux*. Control has been passed from BMC uBoot to BMC Linux*. It is in this state for roughly 10–20 seconds. |
| Blinking green    | System is operating in a degraded state although still functioning, or system is operating in a redundant state but with an impending failure warning. | • Redundancy loss such as power-supply or fan. Applies only if the associated platform subsystem has redundancy capabilities.  
• Fan warning or failure when the number of fully operational fans is less than the minimum number needed to cool the system.  
• Non-critical threshold crossed temperature (including HSBP temp), voltage, input power to power supply, output current for main power rail from power supply and Processor Thermal Control (Therm Ctrl) sensors.  
• Power supply predictive failure occurred while redundant power supply configuration was present.  
• Unable to use all installed memory (more than 1 DIMM installed).  
• Correctable Errors over a threshold and migrating to a spare DIMM (memory sparing). This situation indicates that the system no longer has spared DIMMs (a redundancy lost condition). Corresponding DIMM LED lit.  
• In mirrored configuration, when memory mirroring takes place and system loses memory redundancy.  
• Battery failure.  
• BMC executing in uBoot. (Indicated by Chassis ID blinking at 3 Hz while Status blinking at 1 Hz). System in degraded state (no manageability). BMC uBoot is running but has not transferred control to BMC Linux*. Server is in this state 6–8 seconds after BMC reset while it pulls the Linux* image into flash.  
• BMC Watchdog has reset the BMC.  
• Power Unit sensor offset for configuration error is asserted.  
• SSD Hot Swap Controller is off-line or degraded. |
| Blinking green and amber alternatively | System is initializing after source power is applied | • PFR in the process of updating/authenticating/recovering when source power is connected, system firmware being updated.  
• System not ready to take power button event/signal. |
<table>
<thead>
<tr>
<th>LED State</th>
<th>System State</th>
<th>BIOS Status Description</th>
</tr>
</thead>
</table>
| Blinking amber  | System is operating in a degraded state with an impending failure warning, although still functioning. System is likely to fail. | • Critical threshold crossed—Voltage, temperature (including HSBP temp), input power to power supply, output current for main power rail from power supply and PROCHOT (Therm Ctrl) sensors.  
• VRD Hot asserted.  
• Minimum number of fans to cool the system not present or failed.  
• Hard drive fault.  
• Power Unit Redundancy sensor—Insufficient resources offset (indicates not enough power supplies present).  
• In non-sparing and non-mirroring mode, if the threshold of correctable errors is crossed within the window.  
• Invalid firmware image detected during boot up or firmware update.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Solid amber     | Critical/non-recoverable. System is halted. Fatal alarm—system has failed or shut down. | • Processor CATERR signal asserted.  
• MSID mismatch detected (CATERR also asserts for this case).  
• CPU 0 is missing.  
• Processor Thermal Trip.  
• No power good—power fault.  
• DIMM failure when there is only 1 DIMM present and hence no good memory present.  
• Runtime memory uncorrectable error in non-redundant mode.  
• DIMM Thermal Trip or equivalent.  
• SSB Thermal Trip or equivalent.  
• Processor ERR2 signal asserted.  
• BMC/Video memory test failed. (Chassis ID shows blue/solid-on for this condition.)  
• Both uBoot BMC firmware images are bad. (Chassis ID shows blue/solid-on for this condition.)  
• 240 VA fault.  
• Fatal Error in processor initialization:  
  o Processor family not identical  
  o Processor model not identical  
  o Processor core/thread counts not identical  
  o Processor cache size not identical  
  o Unable to synchronize processor frequency  
  o Unable to synchronize QPI link frequency  
• BMC fail authentication with non-recoverable condition, system hang at T-1; boot PCH only, system hang; PIT failed, system lockdown.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
Appendix D. POST Code Diagnostic LED Decoder

As an aid in troubleshooting a system hang that occurs during a system 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 several memory initialization and platform configuration routines, each of which is assigned a hex POST code number.

As each process 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 before the error occurred, helping to isolate the possible cause of the hang condition.

Each POST code is represented by eight LEDs: four green LEDs and four amber LEDs. The POST codes are divided into two nibbles: an upper nibble, and a lower nibble. The upper nibble bits are represented by amber LEDs and the lower nibble bits are represented by green LEDs. If the bit is set, the corresponding LED is lit. If the bit is clear, the corresponding LED is off. For each set of nibble bits, LED 0 represents the least significant bit (LSB) and LED 3 represents the most significant bit (MSB).

![Figure 125. Onboard POST Diagnostic LEDs](image)

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

In the following example, the BIOS sends a value of AC to the diagnostic LED decoder. The LEDs are decoded as shown in the following table.

<table>
<thead>
<tr>
<th>LEDs</th>
<th>Upper Nibble AMBER LEDs</th>
<th>Lower Nibble GREEN LEDs</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSB</td>
<td>LED #7</td>
<td>LED #6</td>
</tr>
<tr>
<td></td>
<td>8h</td>
<td>4h</td>
</tr>
<tr>
<td>Status</td>
<td>ON</td>
<td>OFF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Read Value</th>
<th>Binary</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 0 1 0</td>
<td>Ah</td>
</tr>
<tr>
<td></td>
<td>1 1 0 0</td>
<td>Ch</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Result</th>
<th>ACCh</th>
</tr>
</thead>
</table>
Upper nibble bits = 1010b = Ah; Lower nibble bits = 1100b = Ch; the two Hex Nibble values are combined to create a single ACh POST Progress Code.

## D.1 Early POST Memory Initialization MRC Diagnostic Codes

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

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

### Table 9. MRC Progress Codes

<table>
<thead>
<tr>
<th>MRC Progress Code (Hex)</th>
<th>Upper Nibble</th>
<th>Lower Nibble</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>73</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>7E</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>B0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>B1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>B2</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>B3</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>B4</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>B5</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>B6</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>B7</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>77</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>B8</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>B9</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>BA</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>BB</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>BC</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>BE</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>BF</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Should a major memory initialization error occur, preventing the system from booting with data integrity, a beep code is generated, the MRC displays a fatal error code on the diagnostic LEDs, and a system halt command is executed. Fatal MRC error halts do not change the state of the system status LED and they do not get logged as SEL events. Table 10 lists all MRC fatal errors that are displayed to the diagnostic LEDs.

**Note:** Fatal MRC errors 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 three long beeps as identified in Table 13.
### Table 10. MRC Fatal Error Codes

<table>
<thead>
<tr>
<th>Post Code (Hex)</th>
<th>Upper Nibble</th>
<th>Lower Nibble</th>
<th>Description</th>
</tr>
</thead>
</table>
| E8              | 1 1 1 0       | 1 0 0 0      | No usable memory error  
|                 |               |              | 01h = No memory was detected from SPD read, or invalid config that causes no operable memory.  
|                 |               |              | 02h = Memory DIMMs on all channels of all sockets are inactivated due to hardware memtest error.  
|                 |               |              | 03h = No memory installed. All channels are inactivated. |
| E9              | 1 1 1 0       | 1 0 0 1      | Memory is locked by Intel® TXT and is inaccessible |
| EA              | 1 1 1 0       | 1 0 1 0      | DDR5 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) |
| EB              | 1 1 1 0       | 1 0 1 1      | Memory test failure  
|                 |               |              | 01h = Software memtest failure.  
|                 |               |              | 02h = Hardware memtest failed. |
| ED              | 1 1 1 0       | 1 1 0 1      | DIMM configuration population error  
|                 |               |              | 01h = Different DIMM types (RDIMM, LRDIMM) are detected installed in the system.  
|                 |               |              | 02h = Violation of DIMM population rules.  
|                 |               |              | 03h = The 3rd DIMM slot cannot be populated when QR DIMMs are installed.  
|                 |               |              | 04h = UDIMMs are not supported.  
|                 |               |              | 05h = Unsupported DIMM Voltage. |
| EF              | 1 1 1 0       | 1 1 1 1      | Indicates a CLTT table structure error |

### D.2 BIOS POST Progress Codes

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

<table>
<thead>
<tr>
<th>Post Code (Hex)</th>
<th>Upper Nibble</th>
<th>Lower Nibble</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security (SEC) Phase</td>
<td></td>
<td></td>
<td>First POST code after CPU reset</td>
</tr>
<tr>
<td>01</td>
<td>0 0 0 0</td>
<td>0 0 0 1</td>
<td>First POST code after CPU reset</td>
</tr>
<tr>
<td>02</td>
<td>0 0 0 0</td>
<td>0 0 1 0</td>
<td>Microcode load begin</td>
</tr>
<tr>
<td>03</td>
<td>0 0 0 0</td>
<td>0 0 1 1</td>
<td>CRAM initialization begins</td>
</tr>
<tr>
<td>04</td>
<td>0 0 0 0</td>
<td>0 1 0 0</td>
<td>PEI Cache When Inactivated</td>
</tr>
<tr>
<td>05</td>
<td>0 0 0 0</td>
<td>0 1 0 1</td>
<td>SEC Core At Power On Begin.</td>
</tr>
<tr>
<td>06</td>
<td>0 0 0 0</td>
<td>0 1 1 0</td>
<td>Early CPU initialization during SEC Phase.</td>
</tr>
<tr>
<td>UPI RC (Fully leverage without platform change)</td>
<td></td>
<td></td>
<td>Collect info: SBSP, boot mode, reset type, etc.</td>
</tr>
<tr>
<td>A1</td>
<td>1 0 1 0</td>
<td>0 0 0 1</td>
<td>Collect info: SBSP, boot mode, reset type, etc.</td>
</tr>
<tr>
<td>A3</td>
<td>1 0 1 0</td>
<td>0 0 1 1</td>
<td>Setup minimum path between SBSP and other sockets</td>
</tr>
<tr>
<td>A6</td>
<td>1 0 1 0</td>
<td>0 1 1 0</td>
<td>Sync up with PBSPs</td>
</tr>
<tr>
<td>A7</td>
<td>1 0 1 0</td>
<td>0 1 1 1</td>
<td>Topology discovery and route calculation</td>
</tr>
<tr>
<td>A8</td>
<td>1 0 1 0</td>
<td>1 0 0 0</td>
<td>Program final route</td>
</tr>
<tr>
<td>Post Code (Hex)</td>
<td>Upper Nibble</td>
<td>Lower Nibble</td>
<td>Description</td>
</tr>
<tr>
<td>----------------</td>
<td>--------------</td>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td></td>
<td>8h 4h 2h 1h</td>
<td>8h 4h 2h 1h</td>
<td></td>
</tr>
<tr>
<td>A9</td>
<td>1 0 1 0</td>
<td>1 0 0 1</td>
<td>Program final IO SAD setting</td>
</tr>
<tr>
<td>AA</td>
<td>1 0 1 0</td>
<td>1 0 1 0</td>
<td>Protocol layer and other uncore settings</td>
</tr>
<tr>
<td>AB</td>
<td>1 0 1 0</td>
<td>1 0 1 1</td>
<td>Transition links to full speed operation</td>
</tr>
<tr>
<td>AE</td>
<td>1 0 1 0</td>
<td>1 1 1 0</td>
<td>Coherency settings</td>
</tr>
<tr>
<td>AF</td>
<td>1 0 1 0</td>
<td>1 1 1 1</td>
<td>KTI initialization done</td>
</tr>
</tbody>
</table>

**Pre-EFI Initialization (PEI) Phase**

| 10 | 0 0 0 1 | 0 0 0 0 | PEI Core |
| 11 | 0 0 0 1 | 0 0 0 1 | CPU PEIM |
| 15 | 0 0 0 1 | 0 1 0 1 | Platform Type Init |
| 19 | 0 0 0 1 | 1 0 0 1 | Platform PEIM Init |

**Integrated I/O Progress Codes**

| E0 | 1 1 1 0 | 0 0 0 0 | Integrated I/O Early Init Entry |
| E1 | 1 1 1 0 | 0 0 0 1 | Integrated I/O Pre-link Training |
| E2 | 1 1 1 0 | 0 1 0 0 | Integrated I/O EQ Programming |
| E3 | 1 1 1 0 | 0 0 1 1 | Integrated I/O Link Training |
| E4 | 1 1 1 0 | 0 1 0 0 | Internal Use |
| E5 | 1 1 1 0 | 0 1 0 1 | Integrated I/O Early Init Exit |
| E6 | 1 1 1 0 | 0 1 1 0 | Integrated I/O Late Init Entry |
| E7 | 1 1 1 0 | 0 1 1 1 | Integrated I/O PCIe Ports Init |
| E8 | 1 1 1 0 | 1 0 0 0 | Integrated I/O IOAPIC init |
| E9 | 1 1 1 0 | 1 0 0 1 | Integrated I/O VTD Init |
| EA | 1 1 1 0 | 1 0 1 0 | Integrated I/O IOAT Init |
| EB | 1 1 1 0 | 1 0 1 1 | Integrated I/O DXF Init |
| EC | 1 1 1 0 | 1 1 0 0 | Integrated I/O NTB Init |
| ED | 1 1 1 0 | 1 1 0 1 | Integrated I/O Security Init |
| EE | 1 1 1 0 | 1 1 1 0 | Integrated I/O Late Init Exit |
| EF | 1 1 1 0 | 1 1 1 1 | Integrated I/O ready to boot |

**MRC Progress Codes – At this point the MRC Progress Code sequence is executed.**

| 31 | 0 0 1 1 | 0 0 0 1 | Memory Installed |
| 32 | 0 0 1 1 | 0 0 1 0 | CPU PEIM (CPU Init) |
| 33 | 0 0 1 1 | 0 0 1 1 | CPU PEIM (Cache Init) |
| 34 | 0 0 1 1 | 0 1 0 0 | CPU BSP Select |
| 35 | 0 0 1 1 | 0 1 0 1 | CPU AP Init |
| 36 | 0 0 1 1 | 0 1 1 0 | CPU SMM Init |
| 4F | 0 1 0 0 | 1 1 1 1 | DXE IPL started |

**Memory Feature Progress Codes**

<p>| C1 | 1 1 0 0 | 0 0 0 1 | Memory POR check |
| C2 | 1 1 0 0 | 0 0 1 0 | Internal Use |
| C3 | 1 1 0 0 | 0 0 1 1 | Internal Use |
| C4 | 1 1 0 0 | 0 1 0 0 | Internal Use |
| C5 | 1 1 0 0 | 0 1 0 1 | Memory Early Init |
| C6 | 1 1 0 0 | 0 1 1 0 | Display DIMM info in debug mode |
| C7 | 1 1 0 0 | 0 1 1 1 | JEDEC Nvdimm training |
| C9 | 1 1 0 0 | 1 0 0 1 | Setup SVL and Scrambling |
| CA | 1 1 0 0 | 1 0 1 0 | Internal Use |</p>
<table>
<thead>
<tr>
<th>Post Code (Hex)</th>
<th>Upper Nibble</th>
<th>Lower Nibble</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8h 4h 2h 1h</td>
<td>8h 4h 2h 1h</td>
<td></td>
</tr>
<tr>
<td>CB</td>
<td>1 1 0 0</td>
<td>1 0 1 1</td>
<td>Check RAS support</td>
</tr>
<tr>
<td>CC</td>
<td>1 1 0 0</td>
<td>1 1 0 0</td>
<td>PMem ADR Init</td>
</tr>
<tr>
<td>CD</td>
<td>1 1 0 0</td>
<td>1 1 0 1</td>
<td>Internal Use</td>
</tr>
<tr>
<td>CE</td>
<td>1 1 0 0</td>
<td>1 1 1 0</td>
<td>Memory Late Init</td>
</tr>
<tr>
<td>CF</td>
<td>1 1 0 0</td>
<td>1 1 1 1</td>
<td>Determine MRC boot mode</td>
</tr>
<tr>
<td>D0</td>
<td>1 1 0 1</td>
<td>0 0 0 0</td>
<td>MKTME Early Init</td>
</tr>
<tr>
<td>D1</td>
<td>1 1 0 1</td>
<td>0 0 0 1</td>
<td>SGX Early Init</td>
</tr>
<tr>
<td>D2</td>
<td>1 1 0 1</td>
<td>0 0 1 0</td>
<td>Memory Margin Test</td>
</tr>
<tr>
<td>D3</td>
<td>1 1 0 1</td>
<td>0 0 1 1</td>
<td>Internal Use</td>
</tr>
<tr>
<td>D5</td>
<td>1 1 0 1</td>
<td>0 1 0 1</td>
<td>Internal Use</td>
</tr>
<tr>
<td>D6</td>
<td>1 1 0 1</td>
<td>0 1 1 0</td>
<td>Offset Training Result</td>
</tr>
</tbody>
</table>

**Driver Execution Environment (DXE) Phase**

<table>
<thead>
<tr>
<th>Hex</th>
<th>Upper Nibble</th>
<th>Lower Nibble</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>0 1 1 0</td>
<td>0 0 0 0</td>
<td>DXE Core started</td>
</tr>
<tr>
<td>62</td>
<td>0 1 1 0</td>
<td>0 0 1 0</td>
<td>DXE Setup Init</td>
</tr>
<tr>
<td>68</td>
<td>0 1 1 0</td>
<td>1 0 0 0</td>
<td>DXE PCI Host Bridge Init</td>
</tr>
<tr>
<td>69</td>
<td>0 1 1 0</td>
<td>1 0 0 1</td>
<td>DXE NB Init</td>
</tr>
<tr>
<td>6A</td>
<td>0 1 1 0</td>
<td>1 0 1 0</td>
<td>DXE NB SMM Init</td>
</tr>
<tr>
<td>70</td>
<td>0 1 1 1</td>
<td>0 0 0 0</td>
<td>DXE SB Init</td>
</tr>
<tr>
<td>71</td>
<td>0 1 1 1</td>
<td>0 0 0 1</td>
<td>DXE SB SMM Init</td>
</tr>
<tr>
<td>72</td>
<td>0 1 1 1</td>
<td>0 0 1 0</td>
<td>DXE SB devices Init</td>
</tr>
<tr>
<td>78</td>
<td>0 1 1 1</td>
<td>1 0 0 0</td>
<td>DXE ACPI Init</td>
</tr>
<tr>
<td>79</td>
<td>0 1 1 1</td>
<td>1 0 0 1</td>
<td>DXE CSM Init</td>
</tr>
<tr>
<td>7D</td>
<td>0 1 1 1</td>
<td>1 1 0 1</td>
<td>DXE Removable Media Detect</td>
</tr>
<tr>
<td>7E</td>
<td>0 1 1 1</td>
<td>1 1 1 0</td>
<td>DXE Removable Media Detected</td>
</tr>
<tr>
<td>90</td>
<td>1 0 0 1</td>
<td>0 0 0 0</td>
<td>DXE BDS started</td>
</tr>
<tr>
<td>91</td>
<td>1 0 0 1</td>
<td>0 0 0 1</td>
<td>DXE BDS connect drivers</td>
</tr>
<tr>
<td>92</td>
<td>1 0 0 1</td>
<td>0 0 1 0</td>
<td>DXE PCI bus begin</td>
</tr>
<tr>
<td>93</td>
<td>1 0 0 1</td>
<td>0 0 1 1</td>
<td>DXE PCI Bus HPC Init</td>
</tr>
<tr>
<td>94</td>
<td>1 0 0 1</td>
<td>0 1 0 0</td>
<td>DXE PCI Bus enumeration</td>
</tr>
<tr>
<td>95</td>
<td>1 0 0 1</td>
<td>0 1 0 1</td>
<td>DXE PCI Bus resource requested</td>
</tr>
<tr>
<td>96</td>
<td>1 0 0 1</td>
<td>0 1 1 0</td>
<td>DXE PCI Bus assign resource</td>
</tr>
<tr>
<td>97</td>
<td>1 0 0 1</td>
<td>0 1 1 1</td>
<td>DXE CON_OUT connect</td>
</tr>
<tr>
<td>98</td>
<td>1 0 0 1</td>
<td>1 0 0 0</td>
<td>DXE CON_IN connect</td>
</tr>
<tr>
<td>99</td>
<td>1 0 0 1</td>
<td>1 0 0 1</td>
<td>DXE SIO Init</td>
</tr>
<tr>
<td>9A</td>
<td>1 0 0 1</td>
<td>1 0 1 0</td>
<td>DXE USB start</td>
</tr>
<tr>
<td>9B</td>
<td>1 0 0 1</td>
<td>1 0 1 1</td>
<td>DXE USB reset</td>
</tr>
<tr>
<td>9C</td>
<td>1 0 0 1</td>
<td>1 1 0 0</td>
<td>DXE USB detect</td>
</tr>
<tr>
<td>9D</td>
<td>1 0 0 1</td>
<td>1 1 0 1</td>
<td>DXE USB enable</td>
</tr>
<tr>
<td>A1</td>
<td>1 0 1 0</td>
<td>0 0 0 1</td>
<td>DXE IDE begin</td>
</tr>
<tr>
<td>A2</td>
<td>1 0 1 0</td>
<td>0 0 1 0</td>
<td>DXE IDE reset</td>
</tr>
<tr>
<td>A3</td>
<td>1 0 1 0</td>
<td>0 0 1 1</td>
<td>DXE IDE detect</td>
</tr>
<tr>
<td>A4</td>
<td>1 0 1 0</td>
<td>0 1 0 0</td>
<td>DXE IDE enable</td>
</tr>
<tr>
<td>A5</td>
<td>1 0 1 0</td>
<td>0 1 0 1</td>
<td>DXE SCSI begin</td>
</tr>
<tr>
<td>A6</td>
<td>1 0 1 0</td>
<td>0 1 1 0</td>
<td>DXE SCSI reset</td>
</tr>
<tr>
<td>A7</td>
<td>1 0 1 0</td>
<td>0 1 1 1</td>
<td>DXE SCSI detect</td>
</tr>
<tr>
<td>Post Code (Hex)</td>
<td>Upper Nibble</td>
<td>Lower Nibble</td>
<td>Description</td>
</tr>
<tr>
<td>----------------</td>
<td>--------------</td>
<td>--------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>A8</td>
<td>1 0 1 0</td>
<td>1 0 0 0</td>
<td>DXE SCSI enable</td>
</tr>
<tr>
<td>AB</td>
<td>1 0 1 0</td>
<td>1 0 1 1</td>
<td>DXE SETUP start</td>
</tr>
<tr>
<td>AC</td>
<td>1 0 1 0</td>
<td>1 1 0 0</td>
<td>DXE SETUP input wait</td>
</tr>
<tr>
<td>AD</td>
<td>1 0 1 0</td>
<td>1 1 0 1</td>
<td>DXE Ready to Boot</td>
</tr>
<tr>
<td>AE</td>
<td>1 0 1 0</td>
<td>1 1 1 0</td>
<td>DXE Legacy Boot</td>
</tr>
<tr>
<td>AF</td>
<td>1 0 1 0</td>
<td>1 1 1 1</td>
<td>DXE Exit Boot Services</td>
</tr>
<tr>
<td>B0</td>
<td>1 0 1 1</td>
<td>0 0 0 0</td>
<td>RT Set Virtual Address Map Begin</td>
</tr>
<tr>
<td>B1</td>
<td>1 0 1 1</td>
<td>0 0 0 1</td>
<td>RT Set Virtual Address Map End</td>
</tr>
<tr>
<td>B2</td>
<td>1 0 1 1</td>
<td>0 0 1 0</td>
<td>DXE Legacy Option ROM knit</td>
</tr>
<tr>
<td>B3</td>
<td>1 0 1 1</td>
<td>0 0 1 1</td>
<td>DXE Reset system</td>
</tr>
<tr>
<td>B4</td>
<td>1 0 1 1</td>
<td>0 1 0 0</td>
<td>DXE USB Hot plug</td>
</tr>
<tr>
<td>B5</td>
<td>1 0 1 1</td>
<td>0 1 0 1</td>
<td>DXE PCI BUS Hot plug</td>
</tr>
<tr>
<td>B8</td>
<td>1 0 1 1</td>
<td>1 0 0 0</td>
<td>PWRBTN Shutdown</td>
</tr>
<tr>
<td>B9</td>
<td>1 0 1 1</td>
<td>1 0 0 1</td>
<td>SLEEP Shutdown</td>
</tr>
<tr>
<td>C0</td>
<td>1 1 0 0</td>
<td>0 0 0 0</td>
<td>End of DXE</td>
</tr>
<tr>
<td>C7</td>
<td>1 1 0 0</td>
<td>0 1 1 1</td>
<td>DXE ACPI Enable</td>
</tr>
<tr>
<td>0</td>
<td>0 0 0 0</td>
<td>0 0 0 0</td>
<td>Clear POST Code</td>
</tr>
</tbody>
</table>

**S3 Resume**

<table>
<thead>
<tr>
<th>Post Code (Hex)</th>
<th>Upper Nibble</th>
<th>Lower Nibble</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E0</td>
<td>1 1 1 0</td>
<td>0 0 0 0</td>
<td>S3 Resume PEIM (S3 started)</td>
</tr>
<tr>
<td>E1</td>
<td>1 1 1 0</td>
<td>0 0 0 1</td>
<td>S3 Resume PEIM (S3 boot script)</td>
</tr>
<tr>
<td>E2</td>
<td>1 1 1 0</td>
<td>0 0 1 0</td>
<td>S3 Resume PEIM (S3 Video Repost)</td>
</tr>
<tr>
<td>E3</td>
<td>1 1 1 0</td>
<td>0 0 1 1</td>
<td>S3 Resume PEIM (S3 OS wake)</td>
</tr>
</tbody>
</table>
Most error conditions encountered during POST are reported using POST error codes. These codes represent specific failures, warnings, or information. 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 handled by a diagnostic LED display with a system halt.

Table 12 lists the supported POST error codes. Each error code is assigned an error type that determines the action the BIOS takes when the error is encountered. Error types include minor, major, and fatal. The BIOS action for each is defined as follows:

- **Minor**: An error message may be displayed to the screen or to the BIOS Setup Error Manager and the POST error code 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 affect this error.

- **Major**: An error message is displayed to the Error Manager screen and an error is logged to the SEL. If the BIOS Setup option “Post Error Pause” is enabled, operator intervention is required to continue booting the system. If the BIOS Setup option “POST Error Pause” is inactivated, the system continues to boot.

  **Note**: For 0048 “Password check failed”, the system halts and then, after the next reset/reboot, displays the error code on the Error Manager screen.

- **Fatal**: If the system cannot boot, POST halts the system and displays the following message:
  Unrecoverable fatal error found. System will not boot until the error is resolved
  Press <F2> to enter setup

  When the <F2> key on the keyboard is pressed, the error message is displayed on the Error Manager screen and an error is logged to the System Event Log (SEL) with the POST error code. The system cannot boot until the error is resolved. The faulty component must be replaced. The “POST Error Pause” option setting in the BIOS Setup does not affect this error.

  **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 determine which of the listed error codes are supported.
<table>
<thead>
<tr>
<th>Error Code</th>
<th>Error Message</th>
<th>Action Message</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0012</td>
<td>System RTC date/time not set</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>0048</td>
<td>Password check failed</td>
<td>Put right password.</td>
<td>Major</td>
</tr>
<tr>
<td>0140</td>
<td>PCI component encountered a PERR error</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>0141</td>
<td>PCI resource conflict</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>0146</td>
<td>PCI out of resources error</td>
<td>Enable Memory Mapped I/O above 4 GB item at SETUP to use 64-bit MMIO.</td>
<td>Major</td>
</tr>
<tr>
<td>0191</td>
<td>Processor core/thread count mismatch detected</td>
<td>Use identical CPU type.</td>
<td>Fatal</td>
</tr>
<tr>
<td>0192</td>
<td>Processor cache size mismatch detected</td>
<td>Use identical CPU type.</td>
<td>Fatal</td>
</tr>
<tr>
<td>0194</td>
<td>Processor family mismatch detected</td>
<td>Use identical CPU type.</td>
<td>Fatal</td>
</tr>
<tr>
<td>0195</td>
<td>Processor Intel(R) UPI link frequencies unable to synchronize</td>
<td></td>
<td>Fatal</td>
</tr>
<tr>
<td>0196</td>
<td>Processor model mismatch detected</td>
<td>Use identical CPU type.</td>
<td>Fatal</td>
</tr>
<tr>
<td>0197</td>
<td>Processor frequencies unable to synchronize</td>
<td>Use identical CPU type.</td>
<td>Fatal</td>
</tr>
<tr>
<td>5220</td>
<td>BIOS Settings reset to default settings</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>5221</td>
<td>Passwords cleared by jumper</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>5224</td>
<td>Password clear jumper is Set</td>
<td>Recommend reminding user to install BIOS password as BIOS admin password is the primary keys for several BIOS security features.</td>
<td>Major</td>
</tr>
<tr>
<td>8130</td>
<td>CPU 0 inactivated</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8131</td>
<td>CPU 1 inactivated</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8160</td>
<td>CPU 0 unable to apply microcode update</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8161</td>
<td>CPU 1 unable to apply microcode update</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8170</td>
<td>CPU 0 failed Self-Test (BIST)</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8171</td>
<td>CPU 1 failed Self-Test (BIST)</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8180</td>
<td>CPU 0 microcode update not found</td>
<td></td>
<td>Minor</td>
</tr>
<tr>
<td>8181</td>
<td>CPU 1 microcode update not found</td>
<td></td>
<td>Minor</td>
</tr>
<tr>
<td>8190</td>
<td>Watchdog timer failed on last boot.</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8198</td>
<td>OS boot watchdog timer failure.</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8300</td>
<td>Baseboard Management Controller failed self-test.</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8305</td>
<td>Hot Swap Controller failure</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>83A0</td>
<td>Management Engine (ME) failed self-test.</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>83A1</td>
<td>Management Engine (ME) Failed to respond.</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>84F2</td>
<td>Baseboard management controller failed to respond</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>84F3</td>
<td>Baseboard Management Controller in Update Mode.</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>84F4</td>
<td>Baseboard Management Controller Sensor Data Record empty.</td>
<td>Update right SDR.</td>
<td>Major</td>
</tr>
<tr>
<td>84FF</td>
<td>System Event Log full</td>
<td>Clear SEL through EWS or SELVIEW utility.</td>
<td>Minor</td>
</tr>
<tr>
<td>85FC</td>
<td>Memory component could not be configured in the selected RAS mode</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8501</td>
<td>Memory Population Error</td>
<td>Plug DIMM at right population.</td>
<td>Major</td>
</tr>
<tr>
<td>8502</td>
<td>PMem invalid DIMM population found on the system.</td>
<td>Populate valid POR PMem DIMM population.</td>
<td>Major</td>
</tr>
<tr>
<td>8520</td>
<td>Memory failed test_INITIALIZATION CPU0_DIMM_A1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8521</td>
<td>Memory failed test_INITIALIZATION CPU0_DIMM_A2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8522</td>
<td>Memory failed test_INITIALIZATION CPU0_DIMM_A3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>Error Code</td>
<td>Error Message</td>
<td>Action Message</td>
<td>Type</td>
</tr>
<tr>
<td>------------</td>
<td>---------------</td>
<td>----------------</td>
<td>------</td>
</tr>
<tr>
<td>8523</td>
<td>Memory failed test/initialization CPU0_DIMM_B1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8524</td>
<td>Memory failed test/initialization CPU0_DIMM_B2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8525</td>
<td>Memory failed test/initialization CPU0_DIMM_B3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8526</td>
<td>Memory failed test/initialization CPU0_DIMM_C1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8527</td>
<td>Memory failed test/initialization CPU0_DIMM_C2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8528</td>
<td>Memory failed test/initialization CPU0_DIMM_C3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8529</td>
<td>Memory failed test/initialization CPU0_DIMM_D1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>852A</td>
<td>Memory failed test/initialization CPU0_DIMM_D2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>852B</td>
<td>Memory failed test/initialization CPU0_DIMM_D3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>852C</td>
<td>Memory failed test/initialization CPU0_DIMM_E1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>852D</td>
<td>Memory failed test/initialization CPU0_DIMM_E2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>852E</td>
<td>Memory failed test/initialization CPU0_DIMM_E3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>852F</td>
<td>Memory failed test/initialization CPU0_DIMM_F1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8530</td>
<td>Memory failed test/initialization CPU0_DIMM_F2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8531</td>
<td>Memory failed test/initialization CPU0_DIMM_F3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8532</td>
<td>Memory failed test/initialization CPU0_DIMM_G1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8533</td>
<td>Memory failed test/initialization CPU0_DIMM_G2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8534</td>
<td>Memory failed test/initialization CPU0_DIMM_G3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8535</td>
<td>Memory failed test/initialization CPU0_DIMM_H1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8536</td>
<td>Memory failed test/initialization CPU0_DIMM_H2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8537</td>
<td>Memory failed test/initialization CPU0_DIMM_H3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8538</td>
<td>Memory failed test/initialization CPU1_DIMM_A1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8539</td>
<td>Memory failed test/initialization CPU1_DIMM_A2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>853A</td>
<td>Memory failed test/initialization CPU1_DIMM_A3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>853B</td>
<td>Memory failed test/initialization CPU1_DIMM_B1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>853C</td>
<td>Memory failed test/initialization CPU1_DIMM_B2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>853D</td>
<td>Memory failed test/initialization CPU1_DIMM_B3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>853E</td>
<td>Memory failed test/initialization CPU1_DIMM_C1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>853F (Go to 85C0)</td>
<td>Memory failed test/initialization CPU1_DIMM_C2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8540</td>
<td>Memory inactivated.CPU0_DIMM_A1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8541</td>
<td>Memory inactivated.CPU0_DIMM_A2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8542</td>
<td>Memory inactivated.CPU0_DIMM_A3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8543</td>
<td>Memory inactivated.CPU0_DIMM_B1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8544</td>
<td>Memory inactivated.CPU0_DIMM_B2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8545</td>
<td>Memory inactivated.CPU0_DIMM_B3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8546</td>
<td>Memory inactivated.CPU0_DIMM_C1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8547</td>
<td>Memory inactivated.CPU0_DIMM_C2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8548</td>
<td>Memory inactivated.CPU0_DIMM_C3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8549</td>
<td>Memory inactivated.CPU0_DIMM_D1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>854A</td>
<td>Memory inactivated.CPU0_DIMM_D2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>854B</td>
<td>Memory inactivated.CPU0_DIMM_D3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>854C</td>
<td>Memory inactivated.CPU0_DIMM_E1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>854D</td>
<td>Memory inactivated.CPU0_DIMM_E2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>854E</td>
<td>Memory inactivated.CPU0_DIMM_E3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>854F</td>
<td>Memory inactivated.CPU0_DIMM_F1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8550</td>
<td>Memory inactivated.CPU0_DIMM_F2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>Error Code</td>
<td>Error Message</td>
<td>Action Message</td>
<td>Type</td>
</tr>
<tr>
<td>------------</td>
<td>---------------</td>
<td>----------------</td>
<td>-------</td>
</tr>
<tr>
<td>8551</td>
<td>Memory inactive.CPU0_DIMM_F3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8552</td>
<td>Memory inactive.CPU0_DIMM_G1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8553</td>
<td>Memory inactive.CPU0_DIMM_G2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8554</td>
<td>Memory inactive.CPU0_DIMM_G3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8555</td>
<td>Memory inactive.CPU0_DIMM_H1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8556</td>
<td>Memory inactive.CPU0_DIMM_H2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8557</td>
<td>Memory inactive.CPU0_DIMM_H3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8558</td>
<td>Memory inactive.CPU1_DIMM_A1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8559</td>
<td>Memory inactive.CPU1_DIMM_A2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>855A</td>
<td>Memory inactive.CPU1_DIMM_A3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>855B</td>
<td>Memory inactive.CPU1_DIMM_B1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>855C</td>
<td>Memory inactive.CPU1_DIMM_B2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>855D</td>
<td>Memory inactive.CPU1_DIMM_B3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>855E</td>
<td>Memory inactive.CPU1_DIMM_C1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>855F</td>
<td>Memory inactive.CPU1_DIMM_C2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>8560</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU0_DIMM_A1</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8561</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU0_DIMM_A2</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8562</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU0_DIMM_A3</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8563</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU0_DIMM_B1</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8564</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU0_DIMM_B2</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8565</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU0_DIMM_B3</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8566</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU0_DIMM_C1</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8567</td>
<td>Memory encountered a Serial Presence Detection (SPD) failure.CPU0_DIMM_C2</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8568</td>
<td>Memory encountered a Serial Presence Detection (SPD) failure.CPU0_DIMM_C3</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8569</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU0_DIMM_D1</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>856A</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU0_DIMM_D2</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>856B</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU0_DIMM_D3</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>856C</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU0_DIMM_E1</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>856D</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU0_DIMM_E2</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>856E</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU0_DIMM_E3</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>856F</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU0_DIMM_F1</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8570</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU0_DIMM_F2</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>Error Code</td>
<td>Error Message</td>
<td>Action Message</td>
<td>Type</td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>8571</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU0_DIMM_F3</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8572</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU0_DIMM_G1</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8573</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU0_DIMM_G2</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8574</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU0_DIMM_G3</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8575</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU0_DIMM_H1</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8576</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU0_DIMM_H2</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8577</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU0_DIMM_H3</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8578</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU1_DIMM_A1</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8579</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU1_DIMM_A2</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>857A</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU1_DIMM_A3</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>857B</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU1_DIMM_B1</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>857C</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU1_DIMM_B2</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>857D</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU1_DIMM_B3</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>857E</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU1_DIMM_C1</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>857F</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU1_DIMM_C2 [Go to 85E0]</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>85C0</td>
<td>Memory failed test/initialization CPU1_DIMM_C3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85C1</td>
<td>Memory failed test/initialization CPU1_DIMM_D1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85C2</td>
<td>Memory failed test/initialization CPU1_DIMM_D2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85C3</td>
<td>Memory failed test/initialization CPU1_DIMM_D3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85C4</td>
<td>Memory failed test/initialization CPU1_DIMM_E1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85C5</td>
<td>Memory failed test/initialization CPU1_DIMM_E2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85C6</td>
<td>Memory failed test/initialization CPU1_DIMM_E3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85C7</td>
<td>Memory failed test/initialization CPU1_DIMM_F1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85C8</td>
<td>Memory failed test/initialization CPU1_DIMM_F2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85C9</td>
<td>Memory failed test/initialization CPU1_DIMM_F3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85CA</td>
<td>Memory failed test/initialization CPU1_DIMM_G1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85CB</td>
<td>Memory failed test/initialization CPU1_DIMM_G2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85CC</td>
<td>Memory failed test/initialization CPU1_DIMM_G3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85CD</td>
<td>Memory failed test/initialization CPU1_DIMM_H1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85CE</td>
<td>Memory failed test/initialization CPU1_DIMM_H2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85CF</td>
<td>Memory failed test/initialization CPU1_DIMM_H3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85D0</td>
<td>Memory inactivated.CPU1_DIMM_C3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85D1</td>
<td>Memory inactivated.CPU1_DIMM_D1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85D2</td>
<td>Memory inactivated.CPU1_DIMM_D2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85D3</td>
<td>Memory inactivated.CPU1_DIMM_D3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>Error Code</td>
<td>Error Message</td>
<td>Action Message</td>
<td>Type</td>
</tr>
<tr>
<td>------------</td>
<td>--------------</td>
<td>----------------</td>
<td>------</td>
</tr>
<tr>
<td>85D4</td>
<td>Memory inactivated.CPU1_DIMM_E1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85D5</td>
<td>Memory inactivated.CPU1_DIMM_E2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85D6</td>
<td>Memory inactivated.CPU1_DIMM_E3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85D7</td>
<td>Memory inactivated.CPU1_DIMM_F1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85D8</td>
<td>Memory inactivated.CPU1_DIMM_F2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85D9</td>
<td>Memory inactivated.CPU1_DIMM_F3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85DA</td>
<td>Memory inactivated.CPU1_DIMM_G1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85DB</td>
<td>Memory inactivated.CPU1_DIMM_G2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85DC</td>
<td>Memory inactivated.CPU1_DIMM_G3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85DD</td>
<td>Memory inactivated.CPU1_DIMM_H1</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85DE</td>
<td>Memory inactivated.CPU1_DIMM_H2</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85DF</td>
<td>Memory inactivated.CPU1_DIMM_H3</td>
<td>Remove the inactivated DIMM.</td>
<td>Major</td>
</tr>
<tr>
<td>85E0</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU1_DIMM_C3</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>85E1</td>
<td>Memory encountered a Serial Presence Detection (SPD) failure. CPU1_DIMM_D1</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>85E2</td>
<td>Memory encountered a Serial Presence Detection (SPD) failure.CPU1_DIMM_D2</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>85E3</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU1_DIMM_D3</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>85E4</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU1_DIMM_E1</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>85E5</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU1_DIMM_E2</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>85E6</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU1_DIMM_E3</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>85E7</td>
<td>Memory encountered a Serial Presence Detection (SPD) failure.CPU1_DIMM_F1</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>85E8</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU1_DIMM_F2</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>85E9</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU1_DIMM_F3</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>85EA</td>
<td>Memory encountered a Serial Presence Detection (SPD) failure.CPU1_DIMM_G1</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>85EB</td>
<td>Memory encountered a Serial Presence Detection (SPD) failure. CPU1_DIMM_G2</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>85EC</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU1_DIMM_G3</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>85ED</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU1_DIMM_H1</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>85EE</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU1_DIMM_H2</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>85EF</td>
<td>Memory encountered a Serial Presence Detection(SPD) failure.CPU1_DIMM_H3</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8604</td>
<td>POST Reclaim of non-critical NVRAM variables</td>
<td></td>
<td>Minor</td>
</tr>
<tr>
<td>8605</td>
<td>BIOS Settings are corrupted</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>8606</td>
<td>NVRAM variable space was corrupted and has been reinitialized</td>
<td></td>
<td>Major</td>
</tr>
</tbody>
</table>
E.1 POST Error Beep Codes

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

### Table 13. POST Error Beep Codes

<table>
<thead>
<tr>
<th>Beeps</th>
<th>Error Message</th>
<th>POST Progress Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 short</td>
<td>Memory error</td>
<td>Multiple</td>
<td>System halted because a fatal error related to the memory was detected.</td>
</tr>
<tr>
<td>3 long and 1 short</td>
<td>CPU mismatch error</td>
<td>E5, E6</td>
<td>System halted because a fatal error related to the CPU family/core/cache mismatch was detected.</td>
</tr>
</tbody>
</table>

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

### Table 14. Integrated BMC Beep Codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Reason for Beep</th>
<th>Associated Sensors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5-1-2</td>
<td>VR Watchdog Timer sensor assertion.</td>
<td>VR Watchdog Timer.</td>
</tr>
<tr>
<td>1-5-1-4</td>
<td>A PSU reports a failure, or the BMC detects the presence of a PSU model that is incompatible with one or more other PSUs in the system.</td>
<td>PS Status.</td>
</tr>
<tr>
<td>1-5-2-1</td>
<td>No CPUs installed or the first CPU socket is empty.</td>
<td>CPU Missing sensor.</td>
</tr>
<tr>
<td>1-5-2-2</td>
<td>CPU CAT Error (IERR) assertion.</td>
<td>CPU Status sensor.</td>
</tr>
<tr>
<td>1-5-2-3</td>
<td>CPU ERR2 timeout assertion.</td>
<td>CPU ERR2 Timeout sensor.</td>
</tr>
<tr>
<td>1-5-2-4</td>
<td>CPU/VR mismatch.</td>
<td>CPU Status sensor (configuration error offset).</td>
</tr>
<tr>
<td>1-5-2-5</td>
<td>CPU population error.</td>
<td>CPU 0 Status sensor.</td>
</tr>
<tr>
<td>1-5-4-2</td>
<td>Power fault: DC power is unexpectedly lost (power good dropout).</td>
<td>Power Unit – Power unit failure offset.</td>
</tr>
<tr>
<td>1-5-4-4</td>
<td>Power control fault (power good assertion timeout).</td>
<td>Power Unit – Soft power control failure offset.</td>
</tr>
</tbody>
</table>
E.2 Processor Initialization Error Summary

The following table describes mixed processor conditions and actions for all Intel® server boards and Intel® server systems designed with the Intel® Xeon® Scalable processor family architecture. The errors fall into one of the following categories:

- **Fatal**: The system halts with a halt error code on the diagnostic LEDs and a corresponding sequence consisting of three long flashes and one short flash is sent to the POST Error Code LED. The system cannot boot unless the error is resolved. The faulty component must be replaced.
- **Major**: If the BIOS Setup option “POST Error Pause” is enabled, the system goes directly to the BIOS Setup Error Manager to display the error and logs the POST error code to SEL. User intervention is required to continue booting the system. If the BIOS Setup option “POST Error Pause” is disabled, the system continues to boot and no prompt for the error is given, although the POST error code is logged to the BIOS Setup Error Manager and to the SEL.
- **Minor**: An error message may be displayed to the screen or to the BIOS Setup Error Manager screen and the POST error code 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 utility does not affect this error.

<table>
<thead>
<tr>
<th>Error</th>
<th>Severity</th>
<th>System Action when BIOS Detects the Error Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor family not identical</td>
<td>Fatal</td>
<td>Halts with error code “0xE5” on the diagnostic LED. Sends three long flashes and one short flash to the POST Error LED. Does not boot until the fault condition is remediated.</td>
</tr>
<tr>
<td>Processor model not identical</td>
<td>Fatal</td>
<td>Halts with error code “0xE5” on the diagnostic LED. Sends three long flashes and one short flash to the POST Error LED. Does not boot until the fault condition is remediated.</td>
</tr>
<tr>
<td>Processor cache or home agent not identical</td>
<td>Fatal</td>
<td>Halts with error code “0xE5” on the diagnostic LED. Sends three long flashes and one short flash to the POST Error LED. Does not boot until the fault condition is remediated.</td>
</tr>
<tr>
<td>Processor frequency (speed) not identical</td>
<td>Fatal</td>
<td>Halts with error code “0xE5” on the diagnostic LED. Sends three long flashes and one short flash to the POST Error LED. Does not boot until the fault condition is remediated.</td>
</tr>
<tr>
<td>Processor Intel® UPI link frequencies not identical</td>
<td>Fatal</td>
<td>Logs the POST error code “81 6x” into the SEL. If the “POST Error Pause” is enabled in the BIOS Setup, loads the BIOS Error Manager to present error message “816x: Processor 0x unable to apply microcode update” on the screen. If the “POST Error Pause” is disabled in the BIOS Setup continues to boot in a degraded state.</td>
</tr>
<tr>
<td>Processor microcode update failed</td>
<td>Major</td>
<td>Logs the POST error code “81 6x” into the SEL. If the “POST Error Pause” is enabled in the BIOS Setup, loads the BIOS Error Manager to present error message “816x: Processor 0x unable to apply microcode update” on the screen. If the “POST Error Pause” is disabled in the BIOS Setup continues to boot in a degraded state.</td>
</tr>
<tr>
<td>Processor microcode update missing</td>
<td>Minor</td>
<td>• Logs the POST error code “81 8x” into the SEL. • The system continues to boot in a degraded state, regardless of the “POST Error Pause” setting in the BIOS setup. • The Error Manager in BIOS Setup will present the message “818x: Processor microcode update not found”</td>
</tr>
</tbody>
</table>
Appendix F. System Packaging Assembly Instructions

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

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

**Note:** The design of the inner packaging components does not prevent improper placement within the packaging assembly. Only one correct packaging assembly allows the package to meet the ISTA (International Safe Transit Association) Test Procedure 3A (2008) limits.

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

1. Open the outer box (iPN K65051-001). Fold the flap slightly to avoid cracks on the corners. Place the taped inner box (iPN K65084-001) into the outer box. See the following figure.

**Caution:** No cracks on the corners are permitted.
2. Place the front cushion (iPN K65031-001) on the left end of the inner box. Place the rear cushion (K65006-001) on the right end of the inner box. Then, place bottom foam K75566-001 in the middle. See the following figure.

3. Pack the server system with red EPE sheet (iPN K58342-001). See the following figure.

4. Pack the system wrapped with EPE sheet in the EPE bag. Then, place the system on the bottom foam (see the following figure). Place the top front foam (iPN K65046-001) on the left and the top rear foam (iPN K65037-001) on the right.
5. Place the accessory kit box (iPN H49469-001) in the center foam cushion. Place the extension rails in the two narrow foam cavities. See the following figure.

6. Close the inner box.

7. Close the outer box. Seal the entire package with tape as shown in the following figure.
WARNING: English (US)

The power supply in this product contains no user-serviceable parts. There may be more than one supply in this product. Refer servicing only to qualified personnel.

Do not attempt to modify or use the supplied AC power cord if it is not the exact type required. A product with more than one power supply will have a separate AC power cord for each supply.

The power button on the system does not turn off system AC power. To remove AC power from the system, you must unplug each AC power cord from the electrical outlet or power supply.

The power cord is considered the disconnect device to the main (AC) power. The socket outlet that the system plugs into, shall be installed near the equipment and shall be easily accessible.

SAFETY STEPS: Whenever you remove the chassis covers to access the inside of the system, follow these steps:

1. Turn off all peripheral devices connected to the system.
2. Turn off the system by pressing the power button.
3. Unplug all AC power cords from the system or from electrical outlets.
4. Label and disconnect all cables connected to I/O connectors or ports on the back of the system.
5. Provide some electrostatic discharge (ESD) protection by wearing an antistatic wrist strap attached to chassis ground of the system—any unpainted metal surface—when handling components.
6. Do not operate the system with the chassis covers removed.

After you have completed the six SAFETY steps above, you can remove the system covers. To do this:

1. Unlock and remove the padlock from the back of the system if a padlock has been installed.
2. Remove and save all screws from the covers.
3. Remove the covers.
For proper cooling and airflow, always reinstall the chassis covers before turning on the system. Operating the system without the covers in place can damage system parts. To install the covers:

1. Check first to make sure you have not left loose tools or parts inside the system.
2. Check that cables, add-in boards, and other components are properly installed.
3. Attach the covers to the chassis with the screws removed earlier and tighten them firmly.
4. Insert and lock the padlock to the system to prevent unauthorized access inside the system.
5. Connect all external cables and the AC power cords to the system.

A microprocessor and heat sink may be hot if the system has been running. Also, there may be sharp pins and edges on some board and chassis parts. Contact should be made with care. Consider wearing protective gloves.

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

The system is designed to operate in a typical office environment. Choose a site that is:

- Clean and free of airborne particles (other than normal room dust).
- Well ventilated and away from sources of heat including direct sunlight.
- Away from sources of vibration or physical shock.
- Isolated from strong electromagnetic fields produced by electrical devices.
- In regions that are susceptible to electrical storms, we recommend you plug your system into a surge suppresser and disconnect telecommunication lines to your modem during an electrical storm.
- Provided with a properly grounded electrical outlet.
- Provided with sufficient space to access the power supply cords, because they serve as the product's main power disconnect.
ОСТОРОЖНО: русский

Блок питания данного изделия не содержит деталей, подлежащих обслуживанию пользователем. В этом изделии может быть несколько блоков питания. Обслуживание должно выполняться только квалифицированным персоналом.

Не модифицируйте и не используйте прилагаемый кабель питания, если он не соответствует требуемому типу. Если в устройстве несколько блоков питания, то к каждому блоку питания прилагается отдельный кабель питания.

При нажатии кнопки питания не отключается питание системы от электросети. Чтобы отключить подачу питания переменного тока в систему, необходимо отсоединить все кабели питания от электрической розетки или блока питания.

Кабель питания считается размыкателем питания переменного тока. Электрическая розетка, к которой подключается система, должна находиться рядом с оборудованием и быть легко доступной.

ИНСТРУКЦИИ ПО ТЕХНИКЕ БЕЗОПАСНОСТИ. Каждый раз перед снятием крышек корпуса для доступа к внутренней части системы выполните следующие действия:
1. Выключите все периферийные устройства, подключенные к системе.
2. Выключите систему, нажав кнопку питания.
3. Отсоедините все кабели питания от системы или электрических розеток.
4. Промаркируйте и отсоедините все кабели, подключенные к разъемам или портам ввода/вывода на задней панели системы.
5. Для обеспечения защиты от электrostатического разряда при работе с компонентами надевайте антистатический браслет, прикрепленный к заземленной части корпуса системы (любой неокрашенной металлической поверхности).
6. Запрещается работать с системой, когда крышки корпуса сняты.

Крышки корпуса системы можно снимать, когда выполнены все шесть описанных выше мер безопасности. Для этого:
1. Откройте и снимите навесной замок (если имеется) с задней части системы.
2. Выверните все винты с крышек и сохраните их.
3. Снимите крышки.

(продолжение)
ОСТОРОЖНО: русский (продолжение)

Для обеспечения надлежащего охлаждения и воздушного потока всегда устанавливайте на место крышки корпуса перед включением системы. Работа системы без установленных крышек может привести к повреждению компонентов системы. Чтобы установить крышки, выполните следующие действия:
1. Сначала проверьте, не осталось ли в системе незакрепленных инструментов или деталей.
2. Убедитесь, что кабели, платы расширения и другие компоненты установлены правильно.
3. Закрепите крышки на корпусе, завернув и надежно затянув винты, снятые ранее.
4. Установите и закройте навесной замок для предотвращения несанкционированного доступа внутрь системы.
5. Подключите к системе все внешние кабели и кабели питания.

Микропроцессор и теплоотвод могут нагреваться во время работы системы. На некоторых деталях платы и корпуса могут быть острые выступы и кромки. Соблюдайте осторожность. Рекомендуется использовать защитные перчатки.

В случае неправильной замены аккумулятора существует опасность взрыва. При замене используйте только те же или эквивалентные модели аккумуляторов, рекомендованные производителем оборудования. Утилизируйте использованные аккумуляторы в соответствии с инструкциями производителя.

Система предназначена для работы в обычной офисной среде. Место установки системы должно соответствовать следующим требованиям:
• Помещение должно быть чистым, в воздухе не должно быть взвешенных частиц (кроме обычной пыли).
• Место установки должно хорошо вентилироваться и находиться вдали от источников тепла (включая прямой солнечный свет).
• Место установки должно находиться вдали от источников вибрации или механических ударов.
• Место установки должно быть изолировано от сильных электромагнитных полей, создаваемых электрическими устройствами.
• В регионах, где часто бывает гроза, рекомендуется подключать систему к сетевому фильтру и отключать телекоммуникационные линии от модема во время грозы.
• В помещении должна быть правильно заземленная электрическая розетка.
• Должен быть оставлен достаточный зазор для доступа к кабелям питания, которые служат размыкателем электропитания системы.
Як виріб не містить жодних частин, які користувачі могли б обслуговувати самостійно. Обслуговувати його може виключно кваліфікований персонал.

Не намагайтеся модифікувати шнур живлення змінного струму з комплекту або користуватися ним, якщо він не відповідає потрібному типу. Виріб може містити більше одного джерела живлення для кожного джерела.

Кнопка живлення на системі не вимикає живлення змінного струму системи. Щоб позбавити систему змінного струму, слід вийняти всі шнури живлення зі стінних розеток або джерел живлення.

КРОКИ БЕЗПЕКИ: Щоразу, знімаючи корпус для доступу до внутрішніх частин системи, виконуйте ці кроки:

7. Вимкніть усі периферійні пристрої, підключені до системи.
8. Вимкніть систему, натиснувши кнопку живлення.
9. Вийміть шнури живлення змінного струму зі системи чи стінних розеток.
10. Позначте і від'єднайте всі кабелі, підключені до з'єднувачів входу/виходу або портів ззаду на системі.
11. Працюючи з компонентами, захищайтеся від електростатичних розрядів (ЕР), вдягаючи антистатичний ремінець-браслет, прикріплений до елемента заземлення корпусу - будь-якої непофарбованої металевої поверхні.
12. Не використовуйте систему з відкритим корпусом.

Після виконання шести наведених вище кроків БЕЗПЕКИ можна знімати корпус (кришки) з системи. Для цього виконайте такі дії:

4. Розблокуйте і зніміть замок ззаду на системі, якщо його встановлено.
5. Зніміть і зберігіть всі гвинти з кришок.
6. Зніміть усі кришки.

продовження
УВАГА! Українська (продовження)

Для правильного охолодження та вентиляції завжди повертайте на місце кришки корпусу перед увімкненням системи. Робота системи без кришок може пошкодити деталі системи. Щоб установити кришки, виконайте такі дії:

6. Спочатку переконайтесь, що всередині системи не залишилося деталей або незакріплених інструментів.
7. Перевірте, чи правильно встановлено кабелі, розширювальні плати та інші компоненти.
8. Прикріпіть кришки до корпусу знятими раніше гвинтами та надійно їх затягніть.
9. Вставте в систему і зафіксуйте замок, щоб запобігти неавторизованому доступу до нього.
10. Підключіть усі зовнішні кабелі та шнур(и) живлення змінного струму до системи.

Під час роботи системи мікропроцесор і радіатор можуть розігрітися до гарячого. Деякі частини корпусу і плат можуть мати гострі шипи або краї. Із ними слід поводитися обережно. Можна вдягти захисні рукавички.

Загроза вибуху, якщо батарею замінено на неправильну. Замініть лише таким самим або еквівалентним типом, рекомендованим виробником. Утилізуйте використані батареї згідно з інструкціями виробника.

Систему створено для роботи в типовому офісному приміщенні. Виберіть місце, яке:
- Чисте і де немає в повітрі інших дрібних часточок, окрім звичайного побутового пилу.
- Добре провітрується, розташована далеко від джерел тепла, включаючи з прямим сонячним промінням.
- Розташована далеко від джерел вібрації і струсів.
- Ізольована від сильних електромагнітних полів, спричинених електроприладами.
- У регіонах, де часто проходять грози, натягніть пристрій захисту від викривати напругу та відключити телекомунікаційні лінії від модему під час грози.
- Осанщене правильно заземленими стінними розетками електромереж.
- Має достатньо простору для доступу до шнура(ів) живлення, оскільки вони слугують основними вимикачами виробу.
AVERTISSEMENT: Français

Le bloc d'alimentation de ce produit ne contient aucune pièce pouvant être réparée par l'utilisateur. Ce produit peut contenir plus d'un bloc d'alimentation. Veuillez contacter un technicien qualifié en cas de problème.

Ne pas essayer d'utiliser ni modifier le câble d'alimentation CA fourni, s'il ne correspond pas exactement au type requis. Le nombre de câbles d'alimentation CA fournis correspond au nombre de blocs d'alimentation du produit.

Notez que le commutateur CC de mise sous tension /hors tension du panneau avant n'éteint pas l'alimentation CA du système. Pour mettre le système hors tension, vous devez débrancher chaque câble d'alimentation de sa prise.

CONSIGNES DE SÉCURITÉ: Lorsque vous ouvrez le boîtier pour accéder à l'intérieur du système, suivez les consignes suivantes:

1. Mettez hors tension tous les périphériques connectés au système.
2. Mettez le système hors tension en mettant l'interrupteur général en position OFF (bouton-poussoir).
3. Débranchez tous les cordons d'alimentation c.a. du système et des prises murales.
4. Identifiez et débranchez tous les câbles reliés aux connecteurs d'E-S ou aux accès derrière le système.
5. Pour prévenir les décharges électrostatiques lorsque vous touchez aux composants, portez une bande antistatique pour poignet et reliez-la à la masse du système (toute surface métallique non peinte du boîtier).
6. Ne faites pas fonctionner le système tandis que le boîtier est ouvert.

Une fois TOUTES les étapes précédentes accomplies, vous pouvez retirer les panneaux du système. Procédez comme suit:

1. Si un cadenas a été installé sur à l'arrière du système, déverrouillez-le et retirez-le.
2. Retirez toutes les vis des panneaux et mettez-les dans un endroit sûr.
3. Retirez les panneaux.
Afin de permettre le refroidissement et l'aération du système, réinstallez toujours les panneaux du boîtier avant de mettre le système sous tension. Le fonctionnement du système en l'absence des panneaux risque d'endommager ses pièces. Pour installer les panneaux, procédez comme suit:

1. Assurez-vous de ne pas avoir oublié d'outils ou de pièces démontées dans le système.
2. Assurez-vous que les câbles, les cartes d'extension et les autres composants sont bien installés.
3. Revissez solidement les panneaux du boîtier avec les vis retirées plus tôt.
4. Remettez le cadenas en place et verrouillez-le afin de prévenir tout accès non autorisé à l'intérieur du système.
5. Rebranchez tous les cordons d'alimentation c. a. et câbles externes au système.

Le microprocesseur et le dissipateur de chaleur peuvent être chauds si le système a été sous tension. Faites également attention aux broches aiguës des cartes et aux bords tranchants du capot. Nous vous recommandons l'usage de gants de protection.

Danger d'explosion si la batterie n'est pas remontée correctement. Remplacer uniquement avec une batterie du même type ou d'un type équivalent recommandé par le fabricant. Disposez des piles usées selon les instructions du fabricant.

Le système a été conçu pour fonctionner dans un cadre de travail normal. L'emplacement choisi doit être:

- Propre et dépourvu de poussière en suspension (sauf la poussière normale).
- Bien aéré et loin des sources de chaleur, y compris du soleil direct.
- A l'abri des chocs et des sources de vibrations.
- Isolé de forts champs électromagnétiques générés par des appareils électriques.
- Dans les régions sujettes aux orages magnétiques il est recommandé de brancher votre système à un suppresseur de surtension, et de débrancher toutes les lignes de télécommunications de votre modem durant un orage.
- Muni d'une prise murale correctement mise à la terre.
- Suffisamment spacieux pour vous permettre d'accéder aux câbles d'alimentation (ceux-ci étant le seul moyen de mettre le système hors tension).
**WARNUNG: Deutsch**


Versuchen Sie nicht, das mitgelieferte Netzkabel zu ändern oder zu verwenden, wenn es sich nicht genau um den erforderlichen Typ handelt. Ein Produkt mit mehreren Netzgeräten hat für jedes Netzgerät ein eigenes Netzkabel.


**SICHERHEISMASNAHMEN:** Immer wenn Sie die Gehäuseabdeckung abnehmen um an das Systeminnere zu gelangen, sollten Sie folgende Schritte beachten:

1. Schalten Sie alle an Ihr System angeschlossenen Peripheriegeräte aus.
2. Schalten Sie das System mit dem Hauptschalter aus.
5. Tragen Sie ein geerdetes Antistatik Gelenkband, um elektrostatische Ladungen (ESD) über blanke Metallstellen bei der Handhabung der Komponenten zu vermeiden.

Nachdem Sie die oben erwähnten ersten sechs SICHERHEITSSCHRITTE durchgeführt haben, können Sie die Abdeckung abnehmen, indem Sie:

1. Öffnen und entfernen Sie die Verschlußeinrichtung (Padlock) auf der Rückseite des Systems, falls eine Verschlußeinrichtung installiert ist.
2. Entfernen Sie alle Schrauben der Gehäuseabdeckung.
3. Nehmen Sie die Abdeckung ab.
Zur ordnungsgemäßen Kühlung und Lüftung muß die Gehäuseabdeckung immer wieder vor dem Einschalten installiert werden. Ein Betrieb des Systems ohne angebrachte Abdeckung kann Ihrem System oder Teile darin beschädigen. Um die Abdeckung wieder anzubringen:

1. Vergewissern Sie sich, daß Sie keine Werkzeuge oder Teile im Innern des Systems zurückgelassen haben.
2. Überprüfen Sie alle Kabel, Zusatzkarten und andere Komponenten auf ordnungsgemäßen Sitz und Installation.
3. Bringen Sie die Abdeckungen wieder am Gehäuse an, indem Sie die zuvor gelösten Schrauben wieder anbringen. Ziehen Sie diese gut an.
4. Bringen Sie die Verschlußeinrichtung (Padlock) wieder an und schließen Sie diese, um ein unerlaubtes Öffnen des Systems zu verhindern.


Das System wurde für den Betrieb in einer normalen Büroumgebung entwickelt. Der Standort sollte:

- sauber und staubfrei sein (Hausstaub ausgenommen);
- gut gelüftet und keinen Heizquellen ausgesetzt sein (einschließlich direkter Sonneneinstrahlung);
- keinen Erschütterungen ausgesetzt sein;
- keine starken, von elektrischen Geräten erzeugten elektromagnetischen Felder aufweisen;
- in Regionen, in denen elektrische Stürme auftreten, mit einem Überspannungsschutzgerät verbunden sein; während eines elektrischen Sturms sollte keine Verbindung der Telekommunikationsleitungen mit dem Modem bestehen;
- mit einer geerdeten Wechselstromsteckdose ausgerüstet sein;
- über ausreichend Platz verfügen, um Zugang zu den Netzkabeln zu gewährleisten, da der Stromanschluß des Produkts hauptsächlich über die Kabel unterbrochen wird.
AVVERTENZA: Italiano

Rivolgersi ad un tecnico specializzato per la riparazione dei componenti dell'alimentazione di questo prodotto. È possibile che il prodotto disponga di più fonti di alimentazione.

Non modificare o utilizzare il cavo di alimentazione in c.a. fornito dal produttore, se non corrisponde esattamente al tipo richiesto. Ad ogni fonte di alimentazione corrisponde un cavo di alimentazione in c.a. separato.

L'interruttore attivato/disattivato nel pannello anteriore non interrompe l'alimentazione in c.a. del sistema. Per interromperla, è necessario scollegare tutti i cavi di alimentazione in c.a. dalle prese a muro o dall'alimentazione di corrente.

PASSI DI SICUREZZA: Qualora si rimuovano le coperture del telaio per accedere all'interno del sistema, seguire i seguenti passi:

1. Spegnere tutti i dispositivi periferici collegati al sistema.
2. Spegnere il sistema, usando il pulsante spento/acceso dell'interruttore del sistema.
3. Togliere tutte le spine dei cavi del sistema dalle prese elettriche.
4. Identificare e sconnettere tutti i cavi attaccati ai collegamenti I/O od alle prese installate sul retro del sistema.
5. Qualora si tocchino i componenti, proteggersi dallo scarico elettrostatico (SES), portando un cinghia anti-statica da polso che è attaccata alla presa a terra del telaio del sistema – qualsiasi superficie non dipinta –.
6. Non far operare il sistema quando il telaio è senza le coperture.

Dopo aver seguito i sei passi di SICUREZZA sopracitati, togliere le coperture del telaio del sistema come seque:

1. Aprire e rimuovere il lucchetto dal retro del sistema qualora ve ne fosse uno installato.
2. Togliere e mettere in un posto sicuro tutte le viti delle coperture.
3. Togliere le coperture.
Per il giusto flusso dell’aria e raffreddamento del sistema, rimettere sempre le coperture del telaio prima di riaccendere il sistema. Operare il sistema senza le coperture al loro proprio posto potrebbe danneggiare i componenti del sistema. Per rimettere le coperture del telaio:

1. Controllare prima che non si siano lasciati degli attrezzi o dei componenti dentro il sistema.
2. Controllare che i cavi, dei supporti aggiuntivi ed altri componenti siano stati installati appropriatamente.
3. Attaccare le coperture al telaio con le viti tolte in precedenza e avvitarle strettamente.
4. Inserire e chiudere a chiave il lucchetto sul retro del sistema per impedire l'accesso non autorizzato al sistema.
5. Ricollegare tutti i cavi esterni e le prolunghe AC del sistema.

Se il sistema è stato a lungo in funzione, il microprocessore e il dissipatore di calore potrebbero essere surriscaldati. Fare attenzione alla presenza di piedini appuntiti e parti taglienti sulle schede e sul telaio. È consigliabile l'uso di guanti di protezione.

Esiste il pericolo di un esplosione se la pila non viene sostituita in modo corretto. Utilizzare solo pile uguali o di tipo equivalente a quelle consigliate dal produttore. Per disfarsi delle pile usate, seguire le istruzioni del produttore.

Il sistema è progettato per funzionare in un ambiente di lavoro tipo. Scegliere una postazione che sia:

- Pulita e libera da particelle in sospensione (a parte la normale polvere presente nell'ambiente).
- Ben ventilata e lontana da fonti di calore, compresa la luce solare diretta.
- Al riparo da urti e lontana da fonti di vibrazione.
- Isolata dai forti campi magnetici prodotti da dispositivi elettrici.
- In aree soggette a temporali, è consigliabile collegare il sistema ad un limitatore di corrente. In caso di temporali, scollegare le linee di comunicazione dal modem.
- Dotata di una presa a muro correttamente installata.
- Dotata di spazio sufficiente ad accedere ai cavi di alimentazione, i quali rappresentano il mezzo principale di scollegamento del sistema.
ADVERTENCIAS: Español

El usuario debe abstenerse de manipular los componentes de la fuente de alimentación de este producto, cuya reparación debe dejarse exclusivamente en manos de personal técnico especializado. Puede que este producto disponga de más de una fuente de alimentación.

No intente modificar ni usar el cable de alimentación de corriente alterna, si no corresponde exactamente con el tipo requerido.

El número de cables suministrados se corresponden con el número de fuentes de alimentación de corriente alterna que tenga el producto.

Nótese que el interruptor activado/desactivado en el panel frontal no desconecta la corriente alterna del sistema. Para desconectarla, deberá desenchufar todos los cables de corriente alterna de la pared o desconectar la fuente de alimentación.

INSTRUCCIONES DE SEGURIDAD: Cuando extraiga la tapa del chasis para acceder al interior del sistema, siga las siguientes instrucciones:

1. Apague todos los dispositivos periféricos conectados al sistema.
2. Apague el sistema presionando el interruptor encendido/apagado.
3. Desconecte todos los cables de alimentación CA del sistema o de las tomas de corriente alterna.
4. Identifique y desconecte todos los cables enchufados a los conectores E/S o a los puertos situados en la parte posterior del sistema.
5. Cuando manipule los componentes, es importante protegerse contra la descarga electrostática (ESD). Puede hacerlo si utiliza una muñequera antiestática sujetada a la toma de tierra del chasis — o a cualquier tipo de superficie de metal sin pintar.
6. No ponga en marcha el sistema si se han extraído las tapas del chasis.

Después de completar las seis instrucciones de SEGURIDAD mencionadas, ya puede extraer las tapas del sistema. Para ello:

1. Desbloquee y extraiga el bloqueo de seguridad de la parte posterior del sistema, si se ha instalado uno.
2. Extraiga y guarde todos los tornillos de las tapas.
3. Extraiga las tapas.
Para obtener un enfriamiento y un flujo de aire adecuados, reinstale siempre las tapas del chasis antes de poner en marcha el sistema. Si pone en funcionamiento el sistema sin las tapas bien colocadas puede dañar los componentes del sistema. Para instalar las tapas:

1. Asegúrese primero de no haber dejado herramientas o componentes sueltos dentro del sistema.
2. Compruebe que los cables, las placas adicionales y otros componentes se hayan instalado correctamente.
3. Incorpore las tapas al chasis mediante los tornillos extraídos anteriormente, tensándolos firmemente.
4. Inserte el bloqueo de seguridad en el sistema y bloquéelo para impedir que pueda accederse al mismo sin autorización.
5. Conecte todos los cables externos y los cables de alimentación CA al sistema.

Si el sistema ha estado en funcionamiento, el microprocesador y el disipador de calor pueden estar aún calientes. También conviene tener en cuenta que en el chasis o en el tablero puede haber piezas cortantes o punzantes. Por ello, se recomienda precaución y el uso de guantes protectores.

Existe peligro de explosión si la pila no se cambia de forma adecuada. Utilice solamente pilas iguales o del mismo tipo que las recomendadas por el fabricante del equipo. Para deshacerse de las pilas usadas, siga igualmente las instrucciones del fabricante.

El sistema está diseñado para funcionar en un entorno de trabajo normal. Escoja un lugar:

- Limpio y libre de partículas en suspensión (salvo el polvo normal).
- Bien ventilado y alejado de fuentes de calor, incluida la luz solar directa.
- Alejado de fuentes de vibración.
- Aislado de campos electromagnéticos fuertes producidos por dispositivos eléctricos.
- En regiones con frecuentes tormentas eléctricas, se recomienda conectar su sistema a un eliminador de sobrevoltage y desconectar el módem de las líneas de telecomunicación durante las tormentas.
- Provisto de una toma de tierra correctamente instalada.
- Provisto de espacio suficiente como para acceder a los cables de alimentación, ya que éstos hacen de medio principal de desconexión del sistema.
אזהרה: עברה

lanmış המספקים המשטרת אל ממקב ואספקת חשמל הז"ח. למסכים וה_measurement, יש לנתק כל כבל חשמל הז"ח.

משטח חורק ואספקת החשמל.

כבלו(ים) החשמל התוצר(ים) והתקן(ים) י人たち(ים) על מכשיר חשמל הז"ח. שקע חורק לשארית המספקים והתקנים ב sistem.

ליצוג רוחק גוני בקולה.

Tpl:1. שיבר בטוחות: בחבל פספסים מאפספים ומפעלייה של ההצעה, יש לבלוע את האקורדיה הבאה: הלכחב את כל התוחמות והקידומרachers המתחברות למקב. 2. הלכחב את המתחברות על ידי דבק שדה על ממק ההתקנה. 3. לנתק את כל כבל חשמל הז"ח מה ()-> השתח ומשקע חורק. 4. להסגר את כל התוחמות המתחברות לה摘编 לעיל, פשך ושפה עם עצמאית במקב. 5. לסמך את כל הגורמים reordered אחר-purpose המתחברות לסקופ же. 6. לנתק את כל הגורמים reordered אחר-purpose המתחברות לסקופ והideshow את האפספים המתחברות בממקב. 7. לנתק את כל הגורמים reordered אחר-purpose המתחברות לסקופ וה.CreateIndexות לסקופ Phú, בפספסים ממקב ואפספים המתחברות לממקב.
1. יש לברוח את הסוללה מהמחשב לפני פיזורו. אם הסוללה מוחלפת באופן שגוי, יש להחליש אותה במקומם, עלולה להוות סיכון.
2. יש לה쉬יט את ה וכך במקומם. פיזור שגוי
3. משלוח סוללות משומשות על פי היצרן. יישלח שביתת בקרה ויכולות
4. הכרה במוצרי המים גרועים לעילית ההותעה של מערכת המים
5. סופת פיצוץ אם הסוללה מוחלפת במקומם. יש להחליש את הסוללה במקומם. יש להשבית בקרה ויכולות
6. הכרה במוצרי המים גרועים לעילית ההותעה של מערכת המים
7. סופת פיצוץ אם הסוללה מוחלפת במקומם. יש להחליש את הסוללה במקומם. יש להשבית בקרה ויכולות
8. הכרה במוצרי המים גרועים לעילית ההותעה של מערכת המים
9. סופת פיצוץ אם הסוללה מוחלפת במקומם. יש להחליש את הסוללה במקומם. יש להשבית בקרה ויכולות
10. הכרה במוצרי המים גרועים לעילית ההותעה של מערכת המים
# Appendix H. Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACPI</td>
<td>Advanced Configuration and Power Interface</td>
</tr>
<tr>
<td>ASHRAE</td>
<td>American Society of Heating, Refrigerating and Air-Conditioning Engineers</td>
</tr>
<tr>
<td>BBS</td>
<td>BIOS Boot Specification</td>
</tr>
<tr>
<td>BMC</td>
<td>Baseboard Management Controller</td>
</tr>
<tr>
<td>BIOS</td>
<td>Basic Input/Output System</td>
</tr>
<tr>
<td>CMOS</td>
<td>Complementary Metal-oxide-semiconductor</td>
</tr>
<tr>
<td>CPU</td>
<td>Central Processing Unit</td>
</tr>
<tr>
<td>DDR5</td>
<td>Double Data Rate 5th edition</td>
</tr>
<tr>
<td>DIMM</td>
<td>Dual In-line Memory Module</td>
</tr>
<tr>
<td>DPC</td>
<td>DIMMs per Channel</td>
</tr>
<tr>
<td>FP</td>
<td>Front Panel</td>
</tr>
<tr>
<td>FRB</td>
<td>Fault Resilient Boot</td>
</tr>
<tr>
<td>FRU</td>
<td>Field Replaceable Unit</td>
</tr>
<tr>
<td>GPGPU</td>
<td>General Purpose Graphic Processing Unit</td>
</tr>
<tr>
<td>GPIO</td>
<td>General Purpose Input/Output</td>
</tr>
<tr>
<td>GUI</td>
<td>Graphical User Interface</td>
</tr>
<tr>
<td>I²C</td>
<td>Inter-integrated Circuit bus</td>
</tr>
<tr>
<td>IMC</td>
<td>Integrated Memory Controller</td>
</tr>
<tr>
<td>IPC</td>
<td>Intel Product Code</td>
</tr>
<tr>
<td>IPMI</td>
<td>Intelligent Platform Management Interface</td>
</tr>
<tr>
<td>ISTA</td>
<td>International Safe Transit Association</td>
</tr>
<tr>
<td>LED</td>
<td>Light Emitting Diode</td>
</tr>
<tr>
<td>LFM</td>
<td>Linear Feet per Minute – Airflow measurement</td>
</tr>
<tr>
<td>LPC</td>
<td>Low-pin Count</td>
</tr>
<tr>
<td>LRDIMM</td>
<td>Load Reduced DIMM</td>
</tr>
<tr>
<td>LSB</td>
<td>Least Significant Bit</td>
</tr>
<tr>
<td>MSB</td>
<td>Most Significant Bit</td>
</tr>
<tr>
<td>MRC</td>
<td>Memory Reference Code</td>
</tr>
<tr>
<td>MTBF</td>
<td>Mean Time Between Failure</td>
</tr>
<tr>
<td>NAT</td>
<td>Network Address Translation</td>
</tr>
<tr>
<td>NIC</td>
<td>Network Interface Controller</td>
</tr>
<tr>
<td>NMI</td>
<td>Non-maskable Interrupt</td>
</tr>
<tr>
<td>NTB</td>
<td>Non-Transparent Bridge</td>
</tr>
<tr>
<td>OCuLink</td>
<td>Optical Copper Link</td>
</tr>
<tr>
<td>OEM</td>
<td>Original Equipment Manufacturer</td>
</tr>
<tr>
<td>OCP*</td>
<td>Open Compute Project</td>
</tr>
<tr>
<td>OR</td>
<td>Oct Rank</td>
</tr>
<tr>
<td>PCH</td>
<td>Peripheral Controller Hub</td>
</tr>
<tr>
<td>PCI</td>
<td>Peripheral Component Interconnect</td>
</tr>
<tr>
<td>PCB</td>
<td>Printed Circuit Board</td>
</tr>
<tr>
<td>PCIe*</td>
<td>Peripheral Component Interconnect Express*</td>
</tr>
<tr>
<td>PCI-X</td>
<td>Peripheral Component Interconnect Extended</td>
</tr>
<tr>
<td>PFC</td>
<td>Power Factor Correction</td>
</tr>
<tr>
<td>PHM</td>
<td>Processor Heat sink Module</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>----------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>PMBus</td>
<td>Power Management Bus</td>
</tr>
<tr>
<td>PMM</td>
<td>Persistent Memory Module</td>
</tr>
<tr>
<td>POST</td>
<td>Power-on Self-Test</td>
</tr>
<tr>
<td>PSU</td>
<td>Power Supply Unit</td>
</tr>
<tr>
<td>PWM</td>
<td>Pulse Width Modulation</td>
</tr>
<tr>
<td>QR</td>
<td>Quad Rank</td>
</tr>
<tr>
<td>RAID</td>
<td>Redundant Array of Independent Disks</td>
</tr>
<tr>
<td>RAM</td>
<td>Random Access Memory</td>
</tr>
<tr>
<td>RAS</td>
<td>Reliability, Availability, and Serviceability</td>
</tr>
<tr>
<td>RCIEP</td>
<td>Root Complex Integrated Endpoint</td>
</tr>
<tr>
<td>RDIMM</td>
<td>Registered DIMM</td>
</tr>
<tr>
<td>RMCP</td>
<td>Remote Management Control Protocol</td>
</tr>
<tr>
<td>ROC</td>
<td>RAID On Chip</td>
</tr>
<tr>
<td>SAS</td>
<td>Serial Attached SCSI</td>
</tr>
<tr>
<td>SATA</td>
<td>Serial Advanced Technology Attachment</td>
</tr>
<tr>
<td>SEL</td>
<td>System Event Log</td>
</tr>
<tr>
<td>SCA</td>
<td>Single Connector Attachment</td>
</tr>
<tr>
<td>SCSI</td>
<td>Small Computer System Interface</td>
</tr>
<tr>
<td>SDR</td>
<td>Sensor Data Record</td>
</tr>
<tr>
<td>SFF</td>
<td>Small Form Factor</td>
</tr>
<tr>
<td>SFP</td>
<td>Small Form-factor Pluggable</td>
</tr>
<tr>
<td>SMBus</td>
<td>System Management Bus</td>
</tr>
<tr>
<td>SR</td>
<td>Single Rank</td>
</tr>
<tr>
<td>SSD</td>
<td>Solid State Device</td>
</tr>
<tr>
<td>TCG</td>
<td>Trusted Computing Group</td>
</tr>
<tr>
<td>TDP</td>
<td>Thermal Design Power</td>
</tr>
<tr>
<td>Intel® UPI</td>
<td>Intel® Ultra Path Interconnect</td>
</tr>
</tbody>
</table>