Intel® Server System M70KLP Family

Configuration Guide

A reference document that provides a product overview and identifies orderable accessories and spare parts associated with the Intel® Server System M70KLP product family.

Rev 1.0

March 2021

M70KLP

Delivering Breakthrough Datacenter System Innovation – Experience What's Inside!

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Document Revision History

Date	Revision	Changes
March 2021	1.0	1st Public Release

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1. Introduction

This document provides a high-level overview of the Intel® Server System M70KLP family. It defines the features and configuration options supported by the product family and provides a catalog of orderable spare parts and supported Intel accessories.

Server systems within this product family are only orderable online directly from Intel as fully configured L9 systems. Configurable options include: processor, memory, data storage devices, and networking options. To configure and order a system from Intel, visit the following website:

https://orderconfigurator.intel.com/IntelCMS/ (Intel NDA required)

Or contact your local Intel field sales representative.

For additional product information, visit the following website:

https://www.intel.com/content/www/us/en/products/servers/server-chassis-systems.html?wapkw=server%20systems

Table 1. Intel® Server System M70KLP Reference Documents and Support Collaterals

Topic	Document Title or Support Collateral	Document Classification
For system integration instructions and service guidance	Intel® Server System M70KLP Family Service Guide	Public
For server configuration guidance and compatibility	Intel® Server System M70KLP Family Configuration Guide	Public
For in-depth technical information about this product family	Intel® Server System M70KLP Family Technical Product Specification (TPS)	Public
For information on the integrated BIOS Setup Utility	Intel® Server System M70KLP Product Family BIOS Setup User Guide	Public (Pending)
For information on the Integrated BMC Web Console	Intel® Server System M70KLP Product Family Integrated BMC Web Console User Guide	Public (Pending)
For technical information for Intel® Optane™ persistent memory 200	Intel® Optane™ Persistent Memory 200 Series Operations Guide	Intel Confidential
For setup information for Intel® Optane™ persistent memory 200	Intel® Optane™ Persistent Memory Startup Guide	Public
For latest system software updates: BIOS and Firmware	System Update Package (SUP)**	Public
To obtain full system information	Intel® SYSINFO Utility – Various operating system support**	Public
Configure, Save and Restore various system options	Intel® SYSCFG Utility – Various operating system support**	Public
To configure and manage Intel® RAID controllers	Intel® RAID Web Console 2 Utility – Various operating system support**	Public
Product Warranty Information	Warranty Terms and Conditions (https://www.intel.com/content/www/us/en/support/services/000005886.html)	Public
Safety and Regulatory Compliance Information	Intel® Server System M70KLP Product Family Technical Product Specification	Public

** Visit the following Intel websites to download the latest system software updates, utility software, and drivers for onboard devices: http://downloadcenter.intel.com/

https://www.intel.com/content/www/us/en/support/products/77593/server-products/server-systems.html.

2.   Product Family Overview

The Intel® Server System M70KLP is a purpose-built system that delivers power and performance at a peak efficiency in a 2U rack mount server form factor. It features the 3rd Gen Intel® Xeon® Scalable processor family in a four-socket configuration, delivering high core count and new hardware-enhanced security features. Previous generation Intel® Xeon® processor and Intel® Xeon® Scalable processor families are not supported.

With support for up to 48 DDR4 DIMMs, the system provides high memory bandwidth for memory intensive workloads. Increase the amount of memory or add memory persistence by adding high capacity Intel® Optane™ persistent memory 200 series modules.

Flexible I/O capabilities include support for optional high-speed networking using Intel network adapters for OCP* 3.0 (small form factor); up to twenty four (24) 2.5" hot swap capable front drive bays; and up to ten (10) PCIe* add-in cards with optional riser card options. Slim-PCIe connectors on the server board add additional flexibility by providing the option to increase the number of PCIe add-in cards to twelve (12) and/or provide NVMe* SSD support to the front drive bays.

The Intel® Server System M70KLP family includes two base system configurations; a Standard system offering many configuration options, and a system with configurations and features specifically designed to support high-power graphics processor unit (GPU) add-in cards.

Figure 1. Intel® Server System M70KLP (Standard System, 24 Drive Option Shown)

Figure 2. Intel® Server System M70KLP (GPU Support Option)

The following table provides a high-level overview of the feature set and system specifications supported by each system option.

Table 2. System Features

System Options	Standard System – No GPU Support	System with GPU Support
Chassis Form Factor	2U, Rack Mount	
Chassis Dimensions	841 mm x 435 mm x 87 mm	
Processor Support	Up to four (4) 3rd Gen Intel® Xeon® Scalable processor family: Platinum 83xx (H) (HL) Gold 63xx (H) (HL) • Four (4) Socket P+ (4189 pin) processor sockets • Up to 28 Cores per processor / Up to 112 Cores per system • Six (6) UPI links per processor • UPI Speeds up to 10.4GT/s Maximum supported processor TDP: ≤ 250W ** Supported 3rd Gen Intel® Xeon® Scalable processor SKUs must end in (H) or (HL). All other processor SKUs are not supported. ** Previous generation Intel® Xeon® processor and Intel® Xeon® Scalable processor families are not supported	
Chipset	Intel® C621 Chipset	
Memory Support	Up to 48 DIMMs – (12 DIMMs per processor socket) • 6 memory channels per processor • 2 DIMM slots per memory channel DDR4 – RDIMM, RDIMM-3DS, LRDIMM, LRDIMM-3DS Supported Memory Speeds in MT/s: DDR4 SDRAM DIMM Only Configurations • Platinum 83xx : 3200 (1 or 2 DPC); 2933 (1 or 2 DPC) (DPC – DIMMs per Channel) • Gold 63xx: 2933 (1 or 2 DPC) Intel® Optane™ persistent memory 200 Series (App Direct Mode Only) Memory Speeds in MT/s: 2666 (Intel® Optane™ PMem + DDR4 SDRAM configurations)	

PCIe* 3.0 Add-in Card Support Options	• Up to six (6) onboard (default)
	• Up to 10 with riser card options
	• Up to 12 with riser card options + Aux PCIe cabling option
		• Up to four (4) onboard
		    +
		• Up to four (4) with riser cards
		   o 2 x GPU – (FH, FL, DW)
		   o 2 x PCIe X8 – (FH, HL) with Aux PCIe cabling option

Network Support Options	OCP* 3.0 Add-in card options: • See product family Tested Hardware list for supported options.	
Front Access Drive Bay support	8, 16, or 24 Hot Swap Drive Bays • 2.5" SSDs or HDDs • SAS, SATA, NVMe*	8 Hot Swap Drive Bays • 2.5" SSDs or HDDs • SAS, SATA, NVMe
Internal M.2 SSD support	Up to two (2) internal mount M.2 SATA SSDs • 2280 and 22110 form factors supported	Up to two (2) internal mount M.2 SATA SSDs • 2280 and 22110 form factors supported
Rear Panel Features	• One (1) Rear Access OCP Add-in card bay • One (1) OCP slot power button for hot swap support – (NOT SUPPORTED) • Two (2) USB 3.0 Ports • One (1) VGA Connector • One (1) RJ45 Dedicated Management Port • One (1) 3.5mm Serial Port interface connector – (NOT SUPPORTED) • One (1) 3.5mm BMC Serial Port interface connector – (NOT SUPPORTED) • One (1) UID Button/LED • One (1) System Reset Button • One (1) Rear Access Dual Power Supply Module Bay	

System Options	Standard System – No GPU Support	System with GPU Support
Front Control and I/O Panel Features	Left Front Control Panel Features • System Power Button / LED • UID Button / LED • Various system feature/status LEDs Right Front I/O Panel Features • VGA connector • One (1) USB 3.0 connector • One (1) USB 2.0 connector	
Power Supply Options	Up to two (2) CPRS power supply modules 1+1 Redundancy (hot swappable) 2+0 Combined Power (No power redundancy) Options: • AC 2000W (80-Plus Platinum)	Up to two (2) CPRS power supply modules 1+1 Redundancy (hot swappable) 2+0 Combined Power (No power redundancy) Options: • AC 2000W (80-Plus Platinum)
System Cooling Features	• Six (6) managed 60x60x56 mm system fans with support for fan redundancy • One Fan per installed power supply • Four (4) 2U CPU heat sinks • Standard air duct	• Six (6) managed 60x60x56 mm system fans with support for fan redundancy • One Fan per installed power supply • Four (4) 1U CPU heat sinks • Low Profile air duct
Management Support	• One (1) Dedicated RJ45 1Gb Management Port (Back Panel) • IPMI 2.0 • Redfish • Integrated BMC Web Console	
Serviceability Features	Tool-less (Removal / Installation) • Top Cover • PCIe add-in cards and OCP 3.0 Add-in card • System Fans – Hot Swappable • System Fan Housing • Front Drive Bay Backplane(s) • Power Distribution Board • Power Supply Module(s) – Hot swappable in 1+1 redundant configuration • Front Mount Drives – Hot Swappable in fault tolerant RAID configurations. o Screws required to mount drive to drive carrier	
Operating Ambient Temperature Support	• 10 – 35° C ambient temperature	
Security	TPM 2.0 Option (Rest of the world) - **iPC KLPTPM** **Note:** China only TPM not supported Intel® Platform Firmware Resilience (Intel® PFR) Converged Boot Guard and Intel® Trusted Execution (Intel® TXT)	
Rack Mount Kit (Included)	Rack mount rails Tool-less attachment to chassis and rack installation Full extension from rack 38 Kg maximum supported weight	

The following illustrations identify the features found on the back panel for both the Standard and GPU enabled system options. All I/O connectors, buttons, LEDs, OCP support, and power supply bays will be common between the two system options.

The base Standard system option supports up to six (6) server board mounted PCIe* Gen3 add-in cards. Riser card options can add support for an additional six (6) PCIe Gen 3 add-in cards[1].
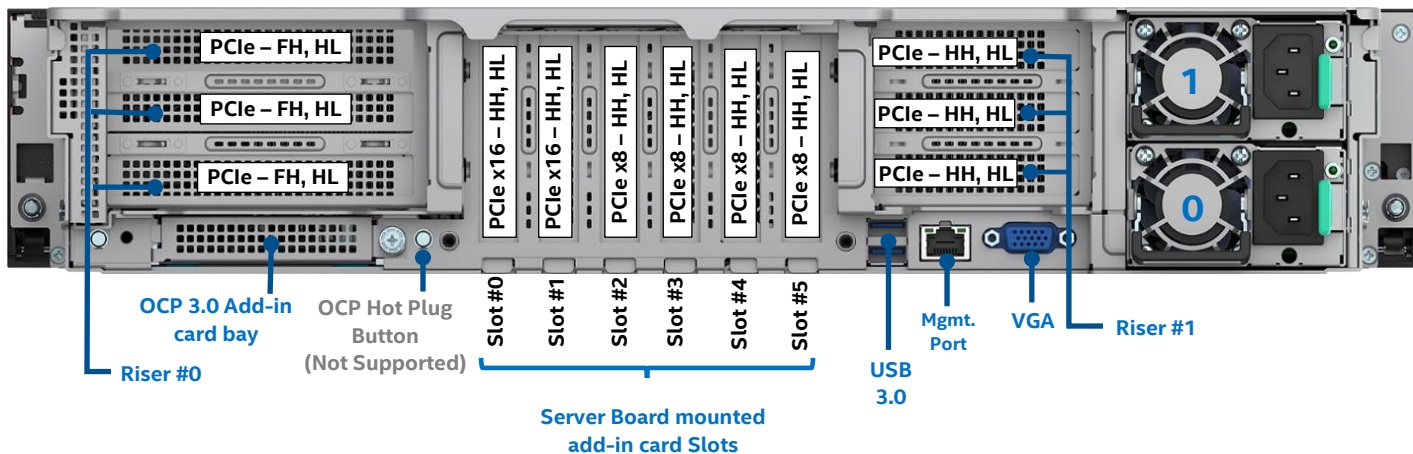
Figure 3. Standard System - Back Panel Features

The GPU enabled system option supports up to four (4) server board mounted PCIe Gen 3 add-in cards. Two PCIe riser cards add support for up to two (2) Full-Height Full-Length Double-Wide GPU add-in cards + two (2) Full-Height Half Length PCIe Gen 3 add-in cards[1].
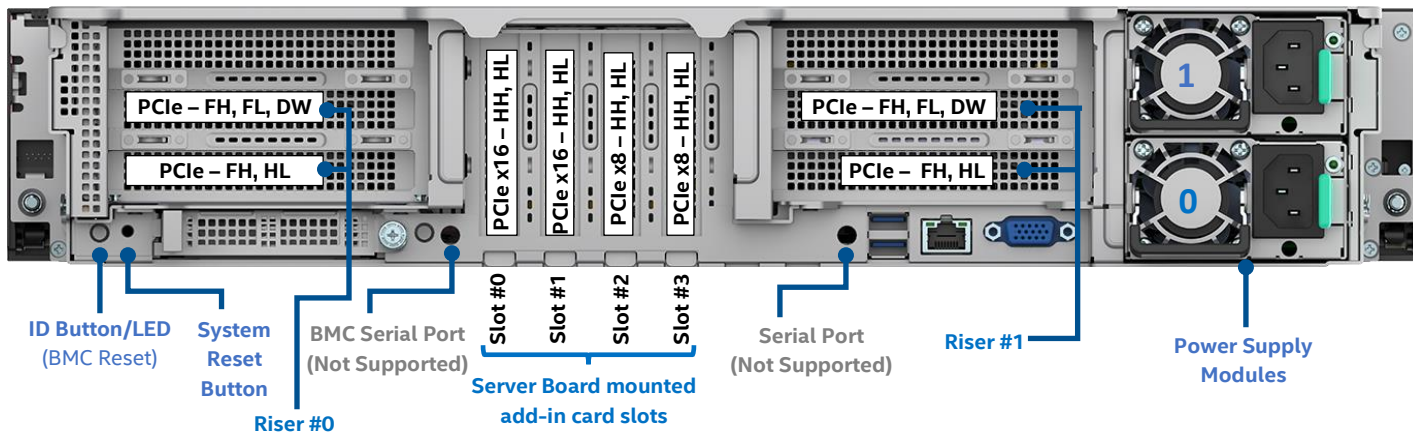
Figure 4. GPU Enabled System – Back Panel Features

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[1] Some riser card add-in slots require that PCIe bus lanes be cabled to the riser cards from one or more of the PCIe slim-line connectors on the server board.

The Intel® Server System M70KLP has support for two AC 2000 Watt (80-Plus Platinum) hot-swap capable power supply modules. Supported power supply operating modes include: 1+1 Redundant and 2+0 combined power.

Figure 5. 2000W Power Supply Module

Power Supply #1
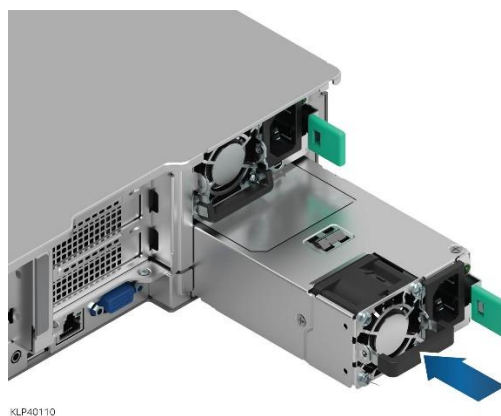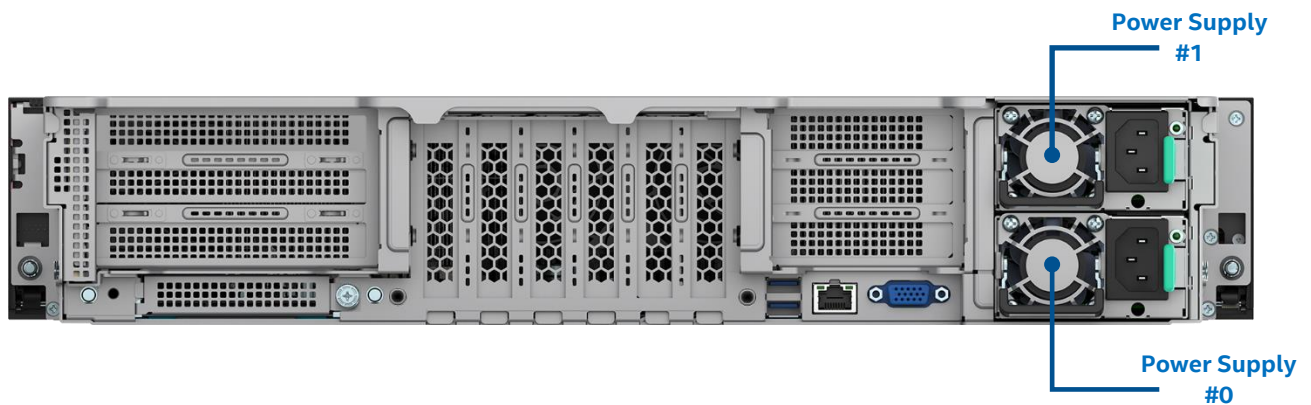
Power Supply #0

Figure 6. Power Supply Module Bay

Embedded within the front system handles are a control panel (Left) and I/O panel (Right), with features identified below.
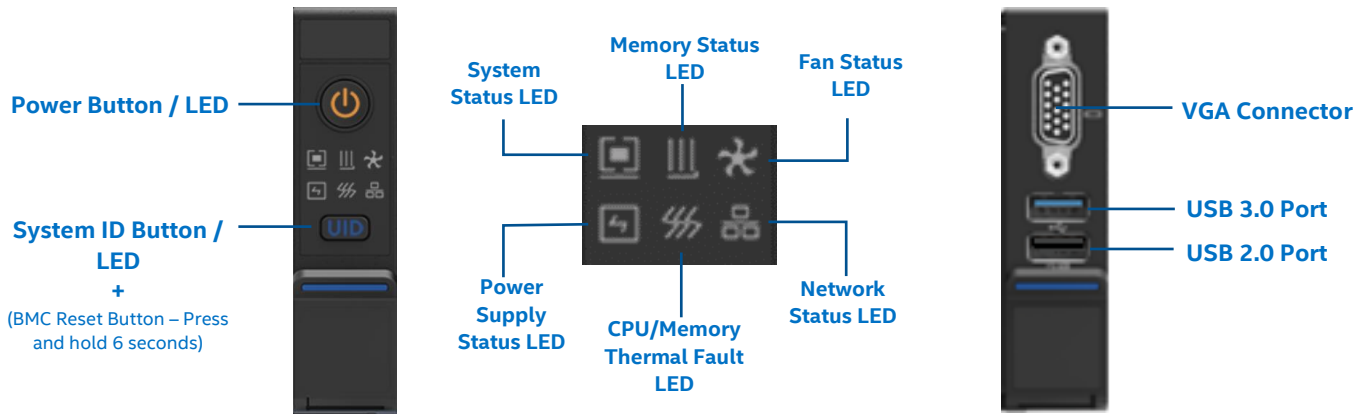
Figure 7. Front Control Panel Features

2.1 System Dimensions
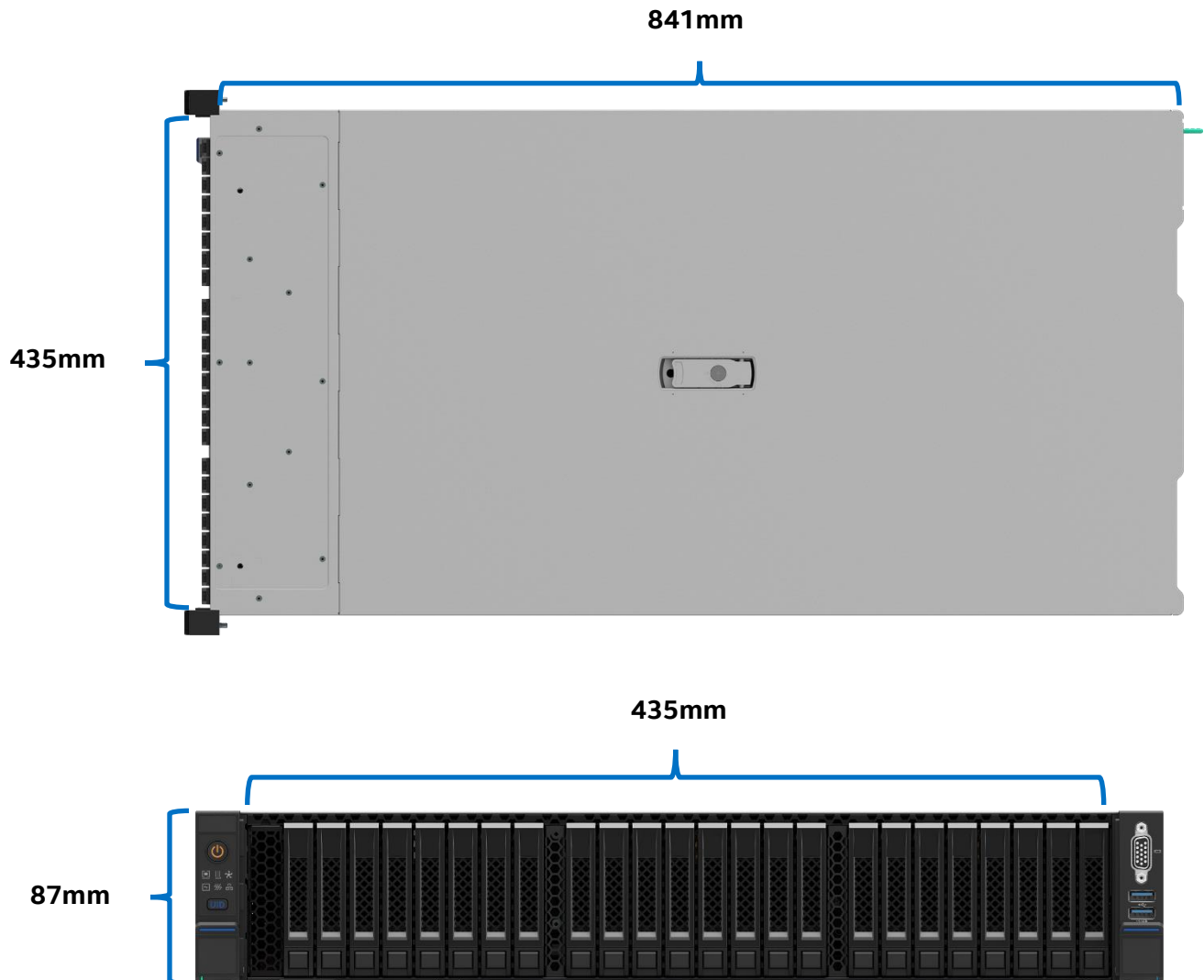
3.   System Configuration Options

Server systems within this product family are only orderable online directly from Intel as fully configured L9 systems. Configurable options include: Data storage options, I/O expansion options, processor options, and memory options. To configure and order a system from Intel, visit the following website:

https://orderconfigurator.intel.com/IntelCMS/ (Intel NDA required)

Or contact your local Intel field sales representative.

3.1   Data Storage – Front 2.5" Drive Bay options

The system has support for 8, 16, or 24 front drive bays. Each drive bay includes a drive carrier that must be populated with a 2.5" drive (SSD or HDD) or supplied drive blank. All drives attached to a common backplane must match media type (SSD or HDD). Mixing drive storage media types within a common backplane is not supported. In addition, all drives attached to a common backplane must share a common interface type (SATA/SAS or NVMe).
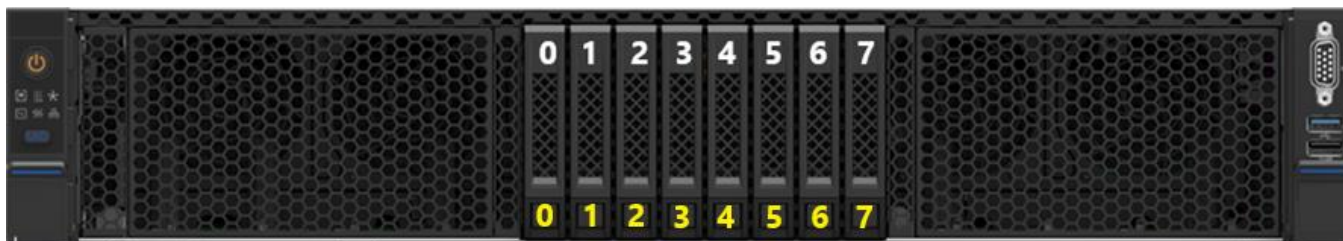
Figure 8. 8 x 2.5" Drive Configuration

Figure 9. 16 x 2.5" Drive Configuration
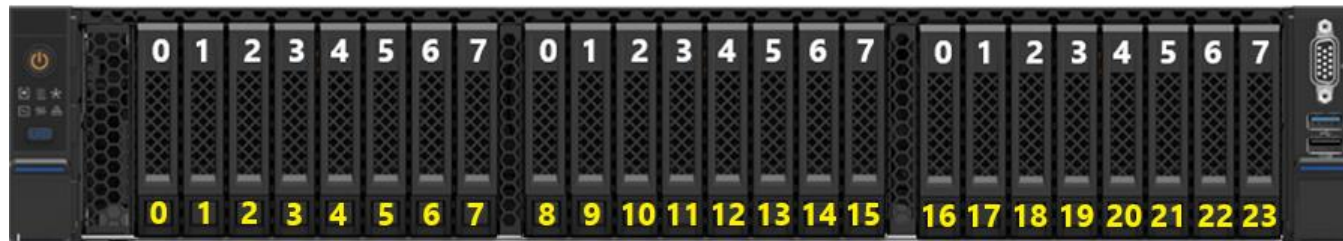
Figure 10. 24 x 2.5" Drive Configuration

3.2   Data Storage – 2.5" Storage Options

The following 2.5" drives are offered as configurable options.

Table 3. Configuration Option – 2.5" Storage

Vendor	Model Name	Size	Form Factor	Description
Intel	Intel® SSD D3 S4510 Series	240 GB	2.5	SATA 6Gb/s, 3D2, TLC 128 KB Sequential read/write – up to 560/510 MB/s 4 KB Random read/write – up to 97,000/36,000 IOPS
		480 GB	2.5	
		960 GB	2.5	
		1.92 TB	2.5	
		3.84 TB	2.5	
Intel	Intel® SSD D3 S4610 Series	240 GB	2.5"	SATA, 6Gb/s, 3D2, TLC 128 KB Sequential read/write – up to 560/510 MB/s 4 KB Random read/write – up to 97,000/51,000 IOPS
		480 GB	2.5"	
		960 GB	2.5"	
		1.92 TB	2.5"	
		3.84 TB	2.5"	
Intel	Intel® SSD DC P4510 Series	1.0 TB	2.5"	PCIe 3.1 x4, 3D2, TLC 128 KB Sequential read/write: up to 3200/3000 MB/s Random 4 KB R/W: Up to 641.8K/134.5K IOPs
		2.0 TB	2.5"	
		4.0 TB	2.5"	
		8.0 TB	2.5"	
Intel	Intel® SSD DC P4610 Series	1.6 TB	2.5"	PCIe 3.1 x4, 3D2, TLC 128 KB Sequential read/write: up to 3200/3200 MB/s Random 4 KB R/W: Up to 654K/220K IOPs
		3.2 TB	2.5"	
		6.4 TB	2.5"	

3.3   Data Storage – M.2 SATA SSD Options

On the system air duct is an M.2 SSD interface board with support for up to two SATA M.2 SSDs. Each connector can support SSDs that conform to a 22110 (110 mm) or 2280 (80 mm) form factor.
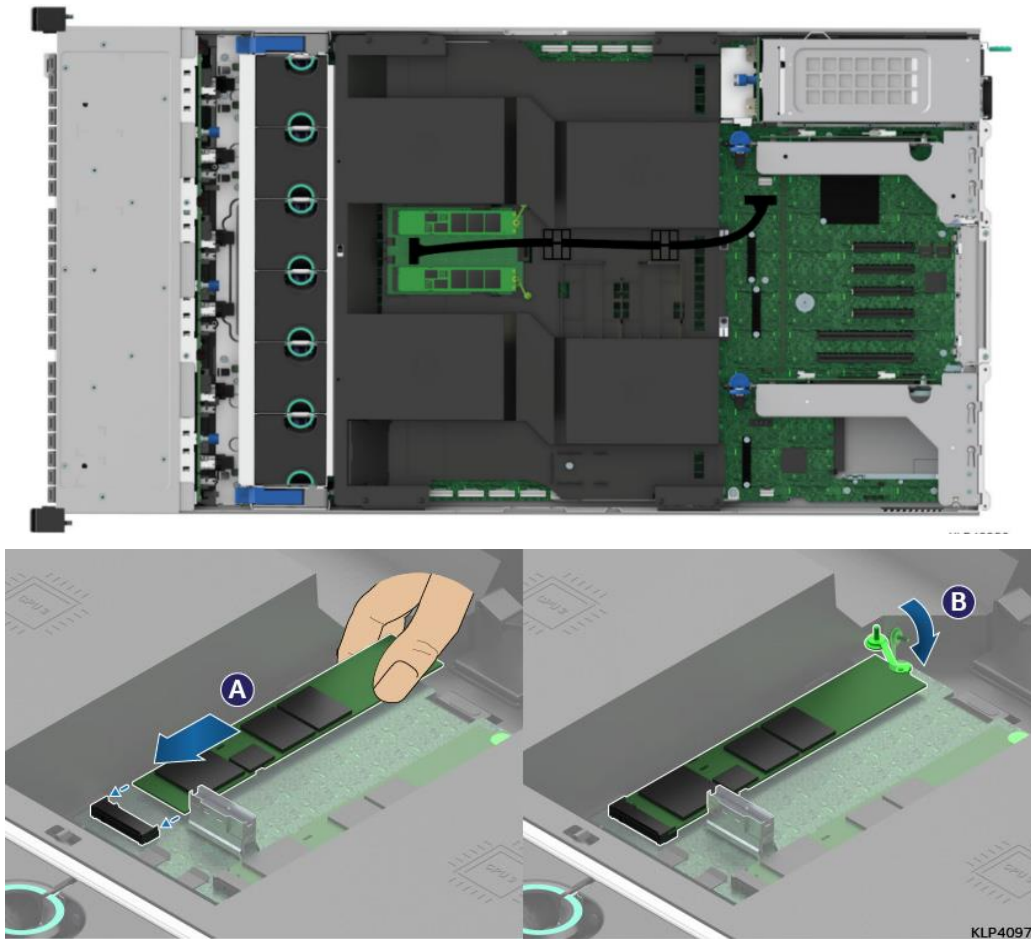
Figure 11. M.2 SATA SSD Support

Available SATA M.2 SSD options include the following:

Table 4. Configuration Option – Intel® M.2 SATA SSD
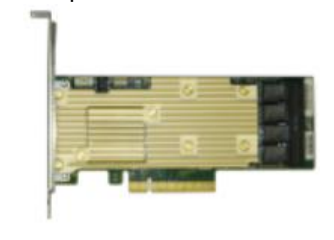
Vendor	Model Name	Size	Form Factor	Description
Intel	Intel® SSD D3–S4510 Series	240 GB	M.2	80 mm, SATA, 6Gb/s, 3D2, TLC
		480 GB	M.2	
		960 GB	M.2	

3.4   Storage Interface – RAID Adapter Options

To provide the Intel® Server System with SAS/SATA RAID support, Intel offers the following Intel® RAID adapters as configurable options.

Note: Each of the RAID adapters listed in the following table is considered a Tri-Mode RAID adapter. Thus, each card can provide RAID support using SAS, SATA, or PCIe NVMe drives. When configured within the Intel® Server System M70KLP, only SAS and SATA RAID are supported.

Table 5. Configuration Option – PCIe* RAID Adapters

Intel® RAID Adapter options	Description
Intel® RAID Adapter RSP3DD080F	8 internal port full featured RAID adapter • Supports RAID levels 0/1/10/5/50/6/60 • Supports NVMe* over PCIe* 3.0, 12 Gb/s SAS over PCIe* 3.0, and 6 Gb/s SATA • Uses Avago* SAS3508 ROC I/O processor • 4 GB 2133 MT/s DDR4 cache memory • Two mini-SAS-HD (SFF8643) connectors Optional Support: • RMFBU Super Capacitor kit enables maintenance-free cache backup, reducing maintenance costs due to regular battery replacement
Intel® RAID Adapter RSP3MD088F	8 internal + 8 external port full featured RAID adapter • Supports RAID levels 0/1/10/5/50/6/60 • Supports NVMe* over PCIe* 3.0, 12 Gb/s SAS over PCIe* 3.0, and 6 Gb/s SATA • Uses Avago* SAS3508 ROC I/O processor • 4 GB 2133 MT/s DDR4 cache memory • Two mini-SAS-HD (SFF8643) connectors Optional Support: • RMFBU Super Capacitor kit enables maintenance-free cache backup, reducing maintenance costs due to regular battery replacement
Intel® RAID Adapter RSP3TD160F - **TBD**	16 internal port full featured RAID adapter • Supports RAID levels 0/1/10/5/50/6/60 • Supports NVMe* over PCIe* 3.0, 12Gb/s SAS over PCIe 3.0, and 6Gb/s SATA • Uses Avago* SAS3516 ROC I/O processor • 4 GB 2133MT/s DDR4 cache memory • Two internal mini-SAS-HD (SFF8643) connectors Optional Support: • RMFBU Super Capacitor kit enables maintenance-free cache backup, reducing maintenance costs due to regular battery replacement
Broadcom* MegaRAID 9460-8i	8 internal port full featured RAID adapter • Supports RAID levels 0/1/10/5/50/6/60 • Supports NVMe* over PCIe* 3.0, 12 Gb/s SAS over PCIe* 3.0, and 6 Gb/s SATA • Uses Avago* SAS3508 ROC I/O processor • 2 GB 2133 MT/s DDR4 cache memory • Two mini-SAS-HD (SFF8643) connectors

Intel® RAID Adapter options	Description
Intel® RAID Maintenance Free Backup Kit (RMFBU) AXXRMFBU7 Mounting Bracket (Not Used)	Kit enables maintenance-free cache backup for Intel RAID Adapters, reducing maintenance costs due to regular battery replacement

3.5 Storage Interface – Intel® Virtual RAID on CPU (Intel® VROC) for NVMe* RAID Key options

All front drive bays of the Intel® Server System M70KLP have support for PCIe NVMe drives using PCIe signals cabled from several available Slim-PCIe connectors on the server board. RAID support for these drives is optionally enabled using an Intel® VROC for NVMe RAID key that is installed onto the server board.

Ref #: KLPI0070
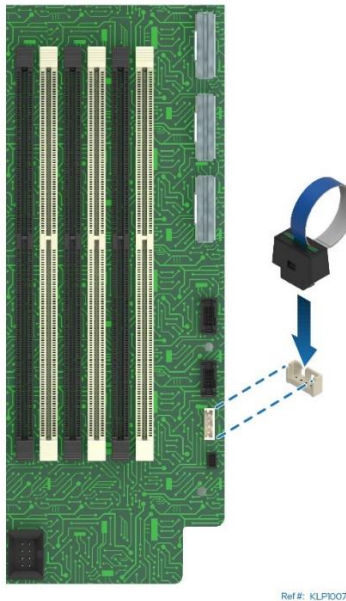
Figure 12. Intel® VROC NVMe* RAID Key Installation

Intel® Virtual RAID on CPU (Intel® VROC) is an enterprise, hybrid RAID solution, specifically designed for NVMe* SSDs connected directly to the CPU. Intel® VROC is made possible by the CPU feature Intel® Volume Management Device, Intel® VMD, a hardware architecture on Intel® Xeon® Scalable Processors. Intel® VMD enhances the PCIe* lanes for dependable NVMe connections. Intel® VROC capitalizes on Intel® VMD for a simpler RAID solution that requires no additional hardware. It provides compelling RAID performance that unleashes the full potential of NVMe drives.

Available Intel® VROC key options include the following:

Table 6. Configuration Option – Intel® VROC NVMe* RAID Key

Intel® VROC for NVMe* RAID Key options	Description
Intel® VROC Standard Hardware Key	RAID 0, 1, 10
Intel® VROC Premium Hardware Key	RAID 0, 1, 10, 5

3.6   I/O Expansion – Riser Card Options

The server board within the Intel® M70KLP includes up to six PCIe add-in card slots mounted directly to the server board. These slots support half-height, half-length add-in cards. For system configurations that require additional PCIe add-in card support or need support for full-height add-in cards, or support for GPU cards, the server board also includes two PCIe X16 riser card slots supporting either of the two following 3-slot riser card options:

3-Slot Riser (3 x PCIe X8)

Front Side

Slot 2 – PCIe X8 (PCIe lanes from AUX PCIe)

Slot 1 – PCIe x8 (PCIe lanes from riser slot)

Slot 0 – PCIe x8 (PCIe lanes from riser slot)

KLP40160
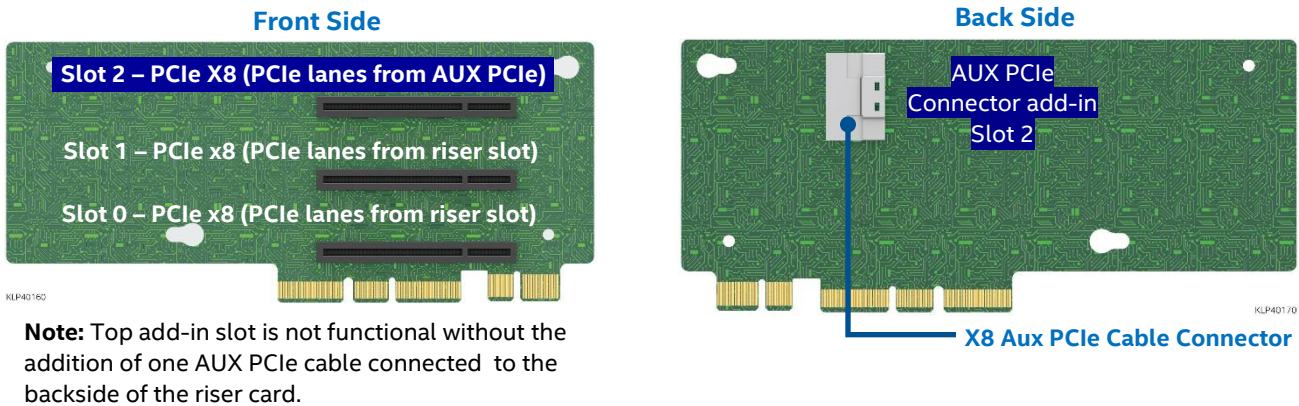
Note: Top add-in slot is not functional without the addition of one AUX PCIe cable connected to the backside of the riser card.

Back Side

AUX PCIe Connector add-in Slot 2

KLP40170

X8 Aux PCIe Cable Connector

3-Slot Riser (2 x PCIe X16 + 1 x PCIe X8)

Front Side

Slot 2 – PCIe X16 (PCIe lanes from AUX PCIe)

Slot 1 – PCIe x16 (lanes from riser slot)

Slot 0 – PCIe X8 (PCIe lanes from AUX PCIe)

KLP40040
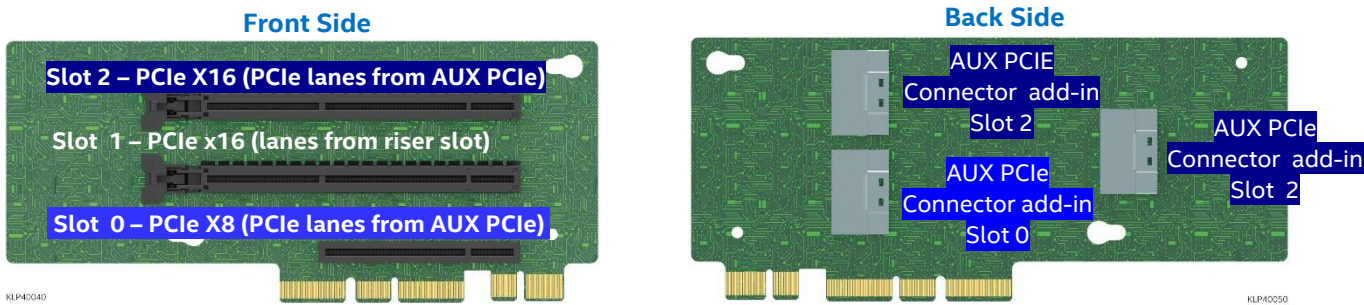
Note: Top and bottom add-in slots are not functional without the addition of three AUX PCIe cables connected to the backside of the riser card.

Back Side

AUX PCIE Connector add-in Slot 2

AUX PCIe Connector add-in Slot 0

AUX PCIe Connector add-in Slot 2

KLP40050

Figure 13. Riser Card Options

In the standard base system option, riser cards are a configurable option. See Figure 3 for possible add-in card support configurations.

In the base system option providing GPU support, two 3-slot (2 x PCIe X16 + 1 x PCIe X8) riser cards are included by default. See Figure 4 for possible add-in card support configurations.

Note: Depending on the riser card installed, the X16 PCIe lanes of the riser slot will either be bifurcated to support two PCIe X8 add-in slots or one PCIe X16 add-in slot. To support all three PCIe add-in slots of a given riser card, PCIe X8 bus lanes from one or more of the Slim-PCIe connectors on the server board must be cabled to the riser card using Aux PCIe cables. See system TPS for additional information.

3.7   I/O Expansion – PCIe* Network Adapter Options

Table 7. Configuration Option – PCIe* Networking Options

Name	Description
Intel® Ethernet Network Adapter E810-CQDA2	Dual Port, PCIe X16, 100 GbE, QSFP28 ports - DAC, Optics, and AOC's
Intel® Ethernet Network Adapter E810-CQDA1	Single Port, PCIe X16, 100 GbE, QSFP28 port - DAC, Optics, and AOC's
Intel® Ethernet Converged Network Adapter X710-DA2	Dual Port PCIe X8, 10GbE, Copper, SFP+
Intel® Ethernet Server Adapter I350-T4V2	Quad Port PCIe X8, 1Gbase-T
Intel® Ethernet Server Adapter I350-T2V2	Dual Port, PCIe X8, 1Gbase-T
Intel® Ethernet Network Adapter XXV710-DA2	Dual Port, PCIe X8, 25GbE, SFP28 Direct Attach twinaxial cabling up to 5m / SFP28 SR and LR Optics also supported
Intel® Ethernet Network Adapter	Single Port, PCIe X8, 25GbE, SFP28 Direct Attach twinaxial cabling up to 5m / SFP28 SR and LR Optics also supported
Intel® Ethernet Converged Network Adapter XL710-QDA1	Single Port PCIe X8, 40GbE, Copper, QSFP+ Direct Attach Twinaxial Cabling up to 10m
Intel® Ethernet Converged Network Adapter XL710-QDA2	Dual Port, PCIe X8, 40GbE, Copper, QSFP+ Direct Attach Cabling up to 10m
NVIDIA* MCX653105A-ECAT-SP ConnectX-6 VPI Adapter Card	HDR100 EDR InfiniBand and 100GbE Single-Port QSFP56 PCIe 3.0/4.0 x16
NVIDIA MCX556A-ECAT ConnectX-5 VPI Adapter Card	EDR InfiniBand and 100GbE Dual-Port QSFP28 PCIe 3.0 x16

3.8   I/O Expansion – Network Adapter for OCP* 3.0 (Small Form Factor) Options

The system has support for one (1) OCP 3.0 (Small for factor) add-in card. An OCP 3.0 card is installed/extracted from an externally accessible OCP card bay. The card bay is on the system back panel directly below the add-in slots for Riser 0. Supported OCP 3.0 cards have a pull-tab to remove the card from the system and a thumbscrew to secure it to the system. Other OCP 3.0 small form factor cards that use a latch or internal lock to secure and remove a card from the system are not supported.
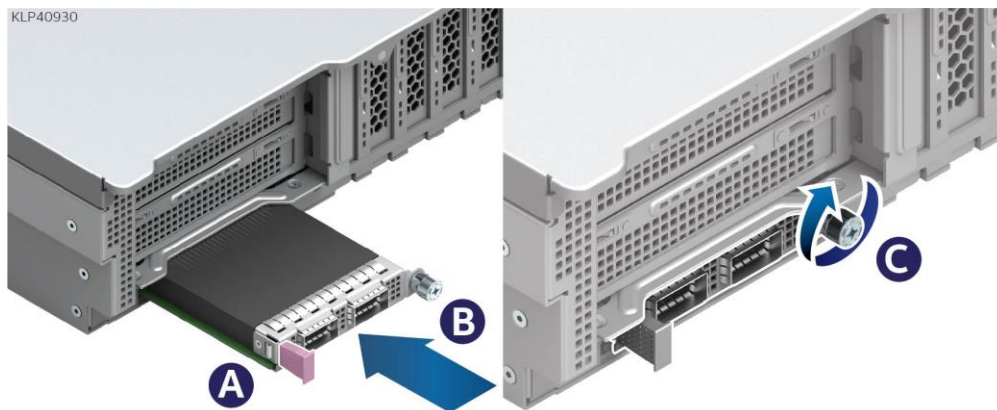
Figure 14. Network Adapter for OCP* 3.0 Support

Note: The system includes an OCP Hot-Plug button located next to the OCP Card bay on the system back-panel. The functionality of this OCP Hot Plug feature has been disabled and is **NOT SUPPORTED.**

Available Network Adapters for OCP 3.0 Small Form Factor (SFF) options include the following:

Table 8. Network Adapter for OCP* 3.0 Small Form Factor (SFF) Options

Intel® Ethernet Adapter for OCP* 3.0 (Small form factor) options	Description
Intel® Ethernet Network Adapter X710-DA2 for OCP3.0 - SFF	Dual Port, 10 GbE, SFP+ Direct Attach Copper 10GBASE-SR and 10GBASE-LR Physical Media
Intel® Ethernet Network Adapter X710-DA4 for OCP3.0 - SFF	Quad Port, 10 GbE, SFP+ Direct Attach Copper 10GBASE-SR and 10GBASE-LR Physical Media
Intel® Ethernet Network Adapter X710-T4L for OCP 3.0 - SFF	Quad Port, 10 GbE, RJ45 Category 6, Category 6A, Category 5e up to 100m
Intel® Ethernet Network Adapter E810-XXVDA4 for OCP 3.0 - SFF	Quad Port, 25 GbE, SFP28 ports - DAC, Optics, And AOC's
Intel® Ethernet Network Adapter E810-XXVDA2 for OCP 3.0 – SFF	Dual Port, 25 GbE, SFP28 ports - DAC, Optics, And AOC's
Intel® Ethernet Network Adapter E810-CQDA2 for OCP 3.0 – SFF	Dual Port, 100GbE, QSFP28 ports - DAC, Optics, AOC's

3.9 Processor Options

The Intel® Server System M70KLP family supports the 3rd Gen Intel® Xeon® Scalable processor family. Within this processor family, only Platinum and Gold processor SKUs that end in H or HL with a TDP of ≤ 250W are supported. Other processor SKUs within the 3rd Gen Intel® Xeon® Scalable processor family and all previous generation Intel® Xeon® processors are not supported.
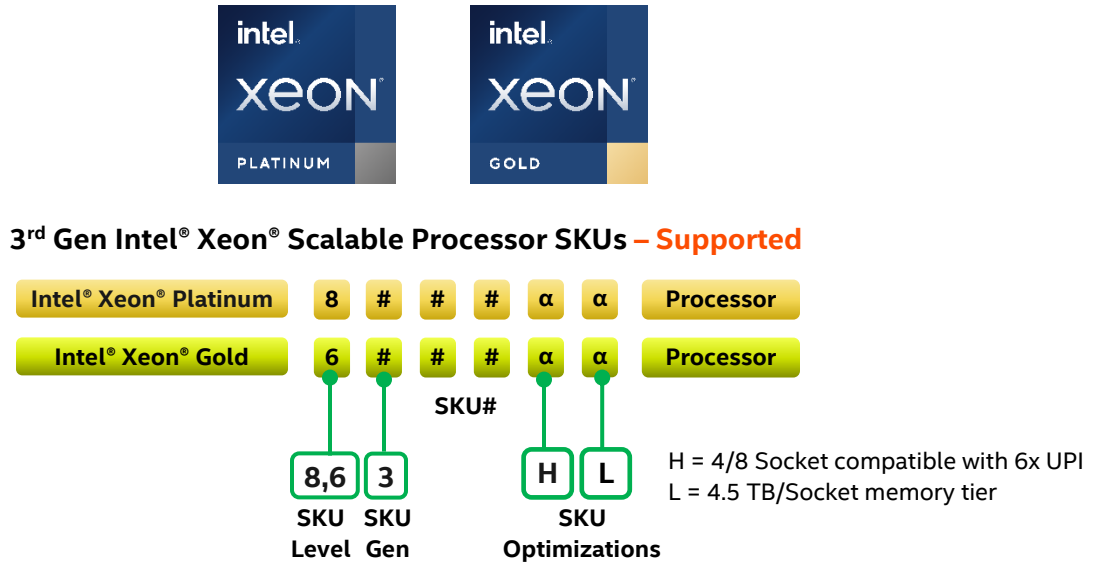
Figure 15. 3rd Gen Intel® Xeon® Scalable Processor Identification

Available processor options include the following:

Table 9. Configuration Option – 3rd Gen Intel® Xeon® Scalable Processors

Processor	# of Cores	Frequency (GHz)	Max. Turbo Frequency (GHz)	Cache (MB)	Max. TDP (W)
Intel® Xeon® Platinum 8380HL processor	28	2.9	4.3	38.5	250
Intel® Xeon® Platinum 8380H processor	28	2.9	4.3	38.5	250
Intel® Xeon® Platinum 8376HL processor	28	2.6	4.3	38.5	205
Intel® Xeon® Platinum 8376H processor	28	2.6	4.3	38.5	205
Intel® Xeon® Platinum 8360H processor	24	3.0	4.2	33	225
Intel® Xeon® Platinum 8360HL processor	24	3.0	4.2	33	225
Intel® Xeon® Platinum 8356H processor	8	3.9	4.4	35.75	190
Intel® Xeon® Platinum 8354H processor	18	3.1	4.3	24.75	205
Intel® Xeon® Platinum 8353H processor	18	2.5	3.8	24.75	150
Intel® Xeon® Gold 6348H processor	24	2.3	4.2	33	165
Intel® Xeon® Gold 6330H processor	24	2.0	3.7	33	150
Intel® Xeon® Gold 6328HL processor	16	2.8	4.3	22	165
Intel® Xeon® Gold 6328H processor	16	2.8	4.3	22	165

3.10 Memory Support Options

The Intel® Server System M70KLP has 48 memory slots (12 slots per processor) and supports memory configurations that consist of only DDR4 SDRAM DIMMs or configurations consisting of both DDR4 SDRAM DIMMs and Intel® Optane™ persistent memory 200 series.

Each processor supports six memory channels identified as 0 through 5. Each memory channel supports two DIMM slots identified as Slot 0 (White slots) and Slot 1 (Black slots).

DIMM slots adjacent to their respective processor have the following layout on the server board.

IMC = Integrated Memory Controller
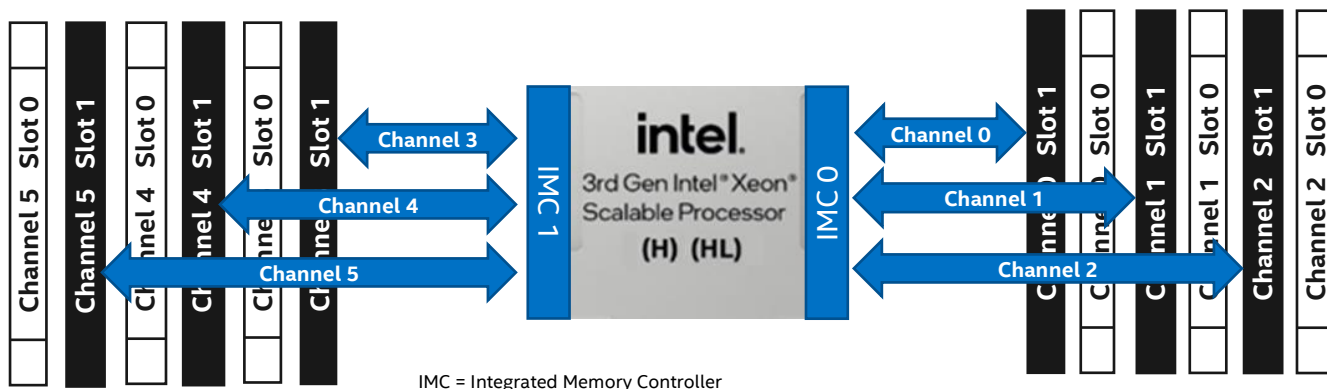
3.10.1   DDR4 SDRAM DIMM Support
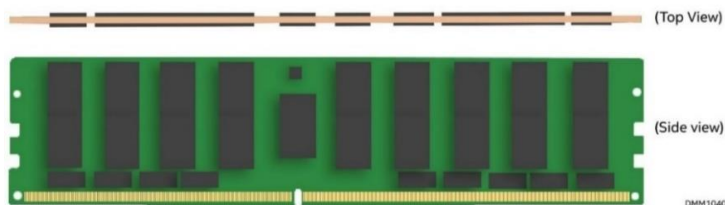
Figure 16. Standard SDRAM DDR4 DIMM Module

The Intel® Server System M70KLP supports the following:

- DIMMs are DDR4 and must support ECC
- Registered DDR4 (RDIMM), 3DS-RDIMM, Load Reduced DDR4 (LRDIMM), 3DS-LRDIMM
  Note: 3DS = 3-Dimensional Stacking
- RDIMMs and LRDIMMs with thermal sensor On DIMM (TSOD)
- DIMM speeds of up to 3200 MT/s
- DIMM capacities of 8 GB, 16 GB, 32 GB, 64 GB, and 128 GB
- RDIMMs organized as Single Rank (SR), Dual Rank (DR
- 3DS-RDIMM organized as Quad Rank (QR), or Oct Rank (OR)

Table 10. Configuration Option – DDR4 DRAM

DDR4 DRAM options	Speed	Description
32 GB	3200 MHz	1x32 GB, RDIMM, DDR4, 2 Rank
64 GB	3200 MHz	1x64 GB, RDIMM, DDR4, 2 Rank
16 GB	2933 MHz	1x16 GB, RDIMM, DDR4, 2 Rank
32 GB	2933 MHz	1x32 GB, RDIMM, DDR4, 2 Rank
64 GB	2933 MHz	1x64 GB, RDIMM, DDR4, 2 Rank

3.10.2   Intel® Optane™ Persistent Memory 200 Series Support

The system supports Intel® Optane™ persistent memory (PMem) 200 series.
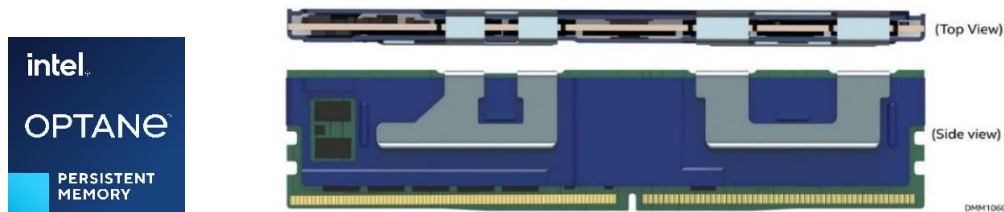
Figure 17. Intel® Optane™ Persistent Memory 200 Series

Intel® Optane™ PMem 200 series supports the following features:

- DDR4 Pin Compatible
- Available PMem Capacities – 128, 256, 512 GB
- Up to 3 TB per processor socket
- Up to 2666 MT/sec
- TDP = 15W
- AES256 Bit Encryption
- Secure Erase
- Data persistence in power failure event – ADR, eADR (optional)

This server family supports the following Intel® Optane™ PMem operating modes:

- App Direct (AD) mode

Table 11. Configuration Option – Intel® Optane™ Persistent Memory 200 Series

Intel® Optane™ Persistent Memory 200 Series options	Description	Speed (MT/sec)
Intel® Optane™ persistent memory 200 series	512 GB PMEM Module	2666
Intel® Optane™ persistent memory 200 series	256 GB PMEM Module	2666
Intel® Optane™ persistent memory 200 series	128 GB PMEM Module	2666

3.10.3   Memory Population Rules

The following DDR4 SDRAM population rules apply for most reliable operation.

- Mixed DDR4 DIMM rules:
  - Mixing DDR4 DIMMs of different speeds and latencies is not supported within or across processors. If a mixed configuration is encountered, the BIOS attempts to operate at the highest common speed and the lowest latency possible.
  - x4 and x8 DDR4 DIMMs may be mixed in the same channel.
  - Mixing of DDR4 DIMM types (RDIMM, LRDIMM, 3DS-RDIMM, 3DS-LRDIMM) within or across processors is not supported. This condition is a Fatal Error Halt in Memory Initialization.

- For a single DDR4 DIMM in a dual-slot channel, populate slot 0 (white slot).

Chan 5		Chan4		Chan 3		IMC 1	CPU	IMC 0			Chan 1		Chan 2	
Slot 0	Slot 1	Slot 0	Slot 1	Slot 0	Slot 1				Slot 1	Slot 0	Slot 1	Slot 0	Slot 1	Slot 0
DDR4		DDR4		DDR4						DDR4		DDR4		DDR4

- For multiple DDR4 DIMMs per channel:
  - For RDIMM, LRDIMM, 3DS-RDIMM, and 3DS-LRDIMM, always populate DIMMs with higher electrical loading in slot 0 (white slot).
  - When populating a quad-rank DDR4 DIMM with a single- or dual-rank DDR4 DIMM in the same channel, the quad-rank DDR4 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.
- Memory slots associated with a given processor socket cannot be used if no processor is installed within the socket.
- 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 six channels for each installed processor.
- For best performance, when NOT populating all memory channels, DDR4 DIMMs must be populated symmetrically between IMCs into memory slots on both sides of the CPU for each installed CPU
  - Example: when populating 4 DDR4 DIMMs to a given CPU, the DIMMs must be installed to memory channels 0, 1, 3, and 4 as shown below.

Chan 5		Chan4		Chan 3		IMC 1	CPU	IMC 0			Chan 1		Chan 2	
Slot 0	Slot 1	Slot 0	Slot 1	Slot 0	Slot 1				Slot 1	Slot 0	Slot 1	Slot 0	Slot 1	Slot 0
		DDR4		DDR4					DDR4		DDR4			

- For best system performance in a multi-processor configuration, the installed DDR4 DIMM population must be the same for each installed processor.

Intel® Optane™ Persistent Memory 200 Series Population Rules

<u>**All operating modes:**</u>

- Platform requires a maximum of 1 PMem module per memory channel and at least one PMem module per populated CPU.
- All installed CPUs within a platform must have an identical PMem population.
- Mixing PMem modules of different capacities anywhere on the platform, across or within same CPU socket, is NOT supported.
- When populating a memory channel with both a DDR4 DRAM DIMM and a PMem module, populate the PMem module into the Slot 1 (Black) memory slot.

Chan 5		Chan4		Chan 3		IMC 1	CPU	IMC 0			Chan 1		Chan 2	
Slot 0	Slot 1	Slot 0	Slot 1	Slot 0	Slot 1				Slot 1	Slot 0	Slot 1	Slot 0	Slot 1	Slot 0
DDR4	PMem	DDR4	PMem	DDR4	PMem				PMem	DDR4	PMem	DDR4	PMem	DDR4

- When populating a memory channel with only a PMem module, populate the Slot 0 (White) memory slot.
- When populating a single PMem module for each installed CPU, the PMem module must be installed into memory channel 0.

- Mixing of different DDR4 DRAM DIMM types on the platform is not supported nor validated. Ensure all DDR4 and PMem capacity size and types across all CPUs on the platform are the same.

Memory mode:

- Not Supported

App direct mode:

- A minimum of one DDR4 DRAM DIMM per memory channel for each installed CPU.
- A minimum of one PMem module per system.
- When populating DDR4 DRAM + PMem, Intel recommends devices have a DDR4 DIMM capacity to PMem module capacity ratio of 1:1, 1:2, or 1:4
  Examples)

  - 1:1 = 128 GB DRAM DIMM: 128 GB PMem Module
  - 1:2 = 64 GB DRAM DIMM: 128 GB PMem Module
  - 1:4 = 32 GB DRAM DIMM: 128 GB PMem Module

- PMem modules must be populated symmetrically into memory slots on both sides of the CPU
  - Example: when populating 2 PMem modules to a given CPU, the PMem modules must be installed to memory channels 0 and 3 as shown below.

Chan 5		Chan4		Chan 3		IMC 1	CPU	IMC 0			Chan 1		Chan 2	
Slot 0	Slot 1	Slot 0	Slot 1	Slot 0	Slot 1				Slot 1	Slot 0	Slot 1	Slot 0	Slot 1	Slot 0
				DDR4	PMem				PMem	DDR4				

3.11 Security and Server Management

3.11.1   Trusted Platform Module (TPM)

The Trusted Platform Module (TPM) option is a hardware-based security device that docks to a connector on the server board and is retained by a tamper resistant screw. The TPM addresses the growing concern regarding boot process integrity and offers enhanced data protection.

The TPM protects the system startup process by ensuring it is tamper-free before releasing system control to the operating system. A TPM device provides secured data storage for security keys and passwords. In addition, a TPM device has encryption and hash functions. The Intel® Server System M70KLP family implements TPM as per the *TPM PC Client Specifications, Revision 2.0*, published by the Trusted Computing Group (TCG).

Note: The TPM option supported on the Intel® Server System M70KLP is not supported in China.
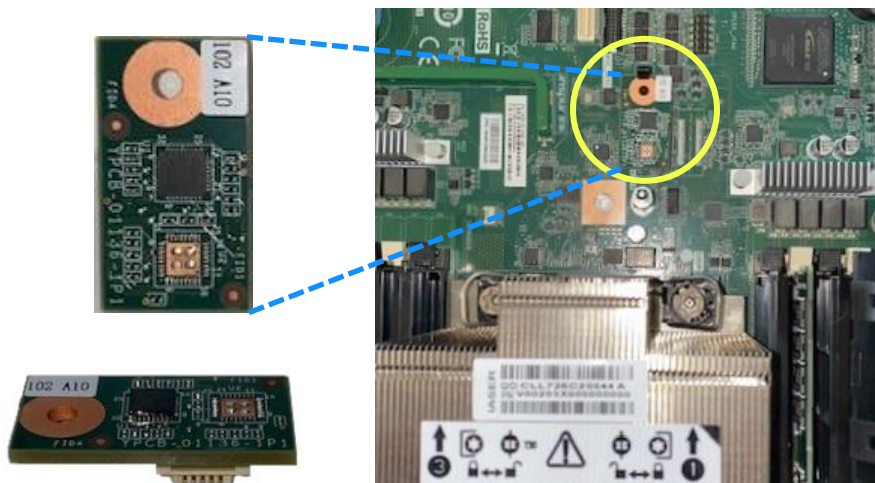
Figure 18. Trusted Platform Module (TPM)

3.11.2   Software License Key for Advanced Management Features

TBD

4. Spare Replacement Parts (FRUs)

Data center managers, system integrators, and distributors may choose to hold an additional stock of individual system components to hold as on-site spares should one of these components fail. Intel makes available the following spare replacement parts (FRUs) compatible with the Intel® Server System M70KLP family.

Table 12. Spare and Replacement Parts

Image	Order Details	Description
	iPC: KLP2000CRPS MM#: 99AF7A UPC#: 00735858483674 EAN#: 5032037220521 MOQ: 1	**AC 2000W CRPS Power Supply spare kit** **Kit includes**: (1) – AC 2000W CRPS power supply module
	iPC: KLP2UFAN MM#: 99AHHG UPC#: 00735858483667 EAN#: 5032037220514 MOQ: 1	**System Fan spare kit** **Kit includes**: (1) – 60 x 60 x 56 mm system fan

For all other system components that may encounter a failure during system integration or after system deployment into the datacenter, follow standard Intel warranty replacement processes.

Warranty Information

To obtain warranty information, visit http://www.intel.com/p/en_US/support/warranty.

Appendix A. Tested Hardware and Operating Systems

The following tables list the memory, peripheral hardware, and operating systems tested and validated by Intel for use on the Intel® Server System M70KLP.

Table 13. Tested Memory

Type	Vendor	Model Number	Size (GB)	Speed (MT/s)	RDIMM/LRDIMM
DDR4	Samsung*	M393A4K40DB3-CWE	32	3200	RDIMM
DDR4	Micron*	MTA36ASF4G72PZ-3G2E7	32	3200	RDIMM
DDR4	Hynix*	HMA84GR7CJR4N-XN	32	3200	RDIMM
DDR4	Samsung	M393A8G40AB2-CWE	64	3200	RDIMM
DDR4	Micron	MTA36ASF8G72PZ-3G2	64	3200	RDIMM
DDR4	Hynix	HMAA8GR7AJR4N-XN	64	3200	RDIMM
DDR4	Samsung	M393A4K40CB2-CVF	32	2933	RDIMM
DDR4	Micron	MTA36ASF4G72PZ-2G9E2	32	2933	RDIMM
DDR4	Hynix	HMA84GR7CJR4N-WMTG	32	2933	RDIMM
DDR4	Samsung	M393A8G40MB2-CVF	64	2933	RDIMM
DDR4	Micron	Pending	64	2933	RDIMM
DDR4	Hynix	Pending	64	2933	RDIMM

Table 14. Tested Adapters and Peripherals

Type	Vendor	Name	Part Number	Description
Networking				
Network Adapter	Intel	Intel® Ethernet Network Adapter E810-CQDA2	E810CQDA2	Dual Port, PCIe X16, 100 GbE, QSFP28 ports - DAC, Optics, and AOC's
Network Adapter	Intel	Intel® Ethernet Network Adapter E810-CQDA1	E810CQDA1	Single Port, PCIe X16, 100 GbE, QSFP28 port - DAC, Optics, and AOC's
Network Adapter	Intel	Intel® Ethernet Converged Network Adapter X710-DA2	X710DA2	Dual Port PCIe X8, 10GbE, Copper, SFP+
Network Adapter	Intel	Intel® Ethernet Server Adapter I350-T4V2	I350T4V2	Quad Port PCIe X8, 1Gbase-T
Network Adapter	Intel	Intel® Ethernet Server Adapter I350-T2V2	I350T2V2	Dual Port, PCIe X8, 1Gbase-T
Network Adapter	Intel	Intel® Ethernet Network Adapter XXV710-DA2	XXV710DA2	Dual Port, PCIe X8, 25GbE, SFP28 Direct Attach twinaxial cabling up to 5m / SFP28 SR and LR Optics also supported
Network Adapter	Intel	Intel® Ethernet Network Adapter	XXV710DA1	Single Port, PCIe X8, 25GbE, SFP28 Direct Attach twinaxial cabling up to 5m / SFP28 SR and LR Optics also supported
Network Adapter	Intel	Intel® Ethernet Converged Network Adapter XL710-QDA1	XL710QDA1	Single Port PCIe X8, 40GbE, Copper, QSFP+ Direct Attach Twinaxial Cabling up to 10m
Network Adapter	Intel	Intel® Ethernet Converged Network Adapter XL710-QDA2	XL710QDA2	Dual Port, PCIe X8, 40GbE, Copper, QSFP+ Direct Attach Cabling up to 10m
Network Adapter	Intel	Intel® Ethernet Network Adapter X710-DA2 for OCP3.0 - SFF	X710DA2OCPV3	Dual Port, 10 GbE, SFP+ Direct Attach Copper 10GBASE-SR and 10GBASE-LR Physical Media
Network Adapter	Intel	Intel® Ethernet Network Adapter X710-DA4 for OCP3.0 - SFF	X710DA4OCPV3	Quad Port, 10 GbE, SFP+ Direct Attach Copper 10GBASE-SR and 10GBASE-LR Physical Media
Network Adapter	Intel	Intel® Ethernet Network Adapter X710-T4L for OCP 3.0 - SFF	X710T4LOCPV3	Quad Port, 10 GbE, RJ45 Category 6, Category 6A, Category 5e up to 100m
Network Adapter	Intel	Intel® Ethernet Network Adapter E810-XXVDA4 for OCP 3.0 - SFF	E810XXVDA4OCPV3	Quad Port, 25 GbE, SFP28 ports - DAC, Optics, And AOC's
Network Adapter	Intel	Intel® Ethernet Network Adapter E810-XXVDA2 for OCP 3.0 – SFF	E810XXVDA2OCPV3	Dual Port, 25 GbE, SFP28 ports - DAC, Optics, And AOC's
Network Adapter	Intel	Intel® Ethernet Network Adapter E810-CQDA2 for OCP 3.0 – SFF	E810CQDA2OCPV3	Dual Port, 100GbE, QSFP28 ports - DAC, Optics, AOC's
Network Adapter	Nvidia/Mellanox*	NVIDIA MCX653105A-ECAT-SP ConnectX-6 VPI Adapter Card	MCX653105A-ECAT	HDR100 EDR InfiniBand and 100GbE Single-Port QSFP56 PCIe 3.0/4.0 x16
Network Adapter	Nvidia/Mellanox	NVIDIA MCX556A-ECAT ConnectX-5 VPI Adapter Card	MCX556A-ECAT	EDR InfiniBand and 100GbE Dual-Port QSFP28 PCIe 3.0 x16
RAID				
RAID Adapter	Intel	Intel® RAID Adapter	RSP3DD080F	Tri-mode RAID Adapter, 8 internal port full featured RAID adapter

Type	Vendor	Name	Part Number	Description
RAID Adapter	Intel	Intel® RAID Adapter	RSP3MD088F	Tri-mode RAID Adapter, 8 internal + 8 external port full featured RAID adapter
RAID Adapter	Intel	Intel® RAID Adapter	RSP3TD160F	Tri-mode RAID Adapter, 16 internal port full featured RAID adapter
RAID Adapter	Broadcom*	MegaRAID 9460-8i	05-50011-02	Tri-Mode Storage Adapter, 12Gb/s SAS/SATA/PCIe (NVMe),
VROC RAID Key	Intel		VROCSTANDMOD	VROC for NVMe RAID Key Standard – RAID 0, 1, 10
VROC RAID Key	Intel		VROCPREMMOD	VROC for NVMe RAID Key Premium – RAID 0, 1, 5, 10
RAID Backup	Intel	Intel® RAID Maintenance Free Backup Kit (RMFBU)	AXXRMFBU7	Maintenance-free cache backup for Intel RAID Adapters
Other				
TPM	Infineon*	TPM 2.0		TPM 2.0 Rest of World – Not supported in China

Table 15. Tested Data Storage Devices

Type	Vendor	Model Name	Part Number	Size	Form Factor	Description
SATA						
SSD	Intel	Intel® SSD D3 S4510 Series	SSDSC2KB240G801	240 GB	2.5	SATA 6Gb/s, 3D2, TLC
SSD	Intel	Intel® SSD D3 S4510 Series	SSDSC2KB480G801	480 GB	2.5	SATA 6Gb/s, 3D2, TLC
SSD	Intel	Intel® SSD D3 S4510 Series	SSDSC2KB960G801	960 GB	2.5	SATA 6Gb/s, 3D2, TLC
SSD	Intel	Intel® SSD D3 S4510 Series	SSDSC2KB019T801	1.92 TB	2.5	SATA 6Gb/s, 3D2, TLC
SSD	Intel	Intel® SSD D3 S4510 Series	SSDSC2KB038T801	3.84 TB	2.5	SATA 6Gb/s, 3D2, TLC
SSD	Intel	Intel® SSD D3 S4610 Series	SSDSC2KG240G801	240 GB	2.5"	SATA, 6Gb/s, 3D2, TLC
SSD	Intel	Intel® SSD D3 S4610 Series	SSDSC2KG480G801	480 GB	2.5"	SATA, 6Gb/s, 3D2, TLC
SSD	Intel	Intel® SSD D3 S4610 Series	SSDSC2KG960G801	960 GB	2.5"	SATA, 6Gb/s, 3D2, TLC
SSD	Intel	Intel® SSD D3 S4610 Series	SSDSC2KG019T801	1.92 TB	2.5"	SATA, 6Gb/s, 3D2, TLC
SSD	Intel	Intel® SSD D3 S4610 Series	SSDSC2KG038T801	3.84 TB	2.5"	SATA, 6Gb/s, 3D2, TLC
PCIe NVMe						
SSD	Intel	Intel® SSD DC P4510 Series	SSDPE2KX010T801	1.0 TB	2.5"	PCIe 3.1 x4, 3D2, TLC
SSD	Intel	Intel® SSD DC P4510 Series	SSDPE2KX020T801	2.0 TB	2.5"	PCIe 3.1 x4, 3D2, TLC
SSD	Intel	Intel® SSD DC P4510 Series	SSDPE2KX040T801	4.0 TB	2.5"	PCIe 3.1 x4, 3D2, TLC
SSD	Intel	Intel® SSD DC P4510 Series	SSDPE2KX080T801	8.0 TB	2.5"	PCIe 3.1 x4, 3D2, TLC
SSD	Intel	Intel® SSD DC P4610 Series	SSDPE2KE016T801	1.6 TB	2.5"	PCIe 3.1 x4, 3D2, TLC
SSD	Intel	Intel® SSD DC P4610 Series	SSDPE2KE032T801	3.2 TB	2.5"	PCIe 3.1 x4, 3D2, TLC
SSD	Intel	Intel® SSD DC P4610 Series	SSDPE2KE064T801	6.4 TB	2.5"	PCIe 3.1 x4, 3D2, TLC
M.2 SATA						
SSD	Intel	Intel® SSD D3-S4510 Series	SSDSCKKB240G801	240 GB	M.2	80mm, SATA, 6Gb/s, 3D2, TLC
SSD	Intel	Intel® SSD D3-S4510 Series	SSDSCKKB480G801	480 GB	M.2	80mm, SATA, 6Gb/s, 3D2, TLC
SSD	Intel	Intel® SSD D3-S4510 Series	SSDSCKKB960G801	960 GB	M.2	80mm, SATA, 6Gb/s, 3D2, TLC

Table 16. Tested Operating Systems – Pending

Operating System	Type of Testing – Stress, Compatibility, Basic Install
Windows Server* 2019	Pending
SLES 15.1	Pending
SLES 12.5	Pending
RHEL 8.3	Pending
VMWare ESXi 7.0 U1	Pending

Appendix B. Glossary

Term	Definition
Intel® AVX-512	Intel® Advanced Vector Extensions 512
BOM	Bill of Materials
CRPS	Common Redundant Power Supply
DDR4	Double-Data Rate 4
DIMM	Dual Inline Memory Module
DPC	DIMM per Channel
DR	Double Rank
EAN	International Article Number (Barcode)
ECC	Error Correcting Code
EMP	Ethernet Management Port
FRU	Field Replaceable Unit
GPU	Graphics Processor Unit
HDD	Hard Disk Drive
iPC	Intel Product Code
iPN	Intel Product Number
KVM	Keyboard, Video, Mouse
LRDIMM	Load-Reduced DIMM
MM#	Master Material order number
MOQ	Minimum Order Quantity
NMI	Non-Maskable Interrupt
NVMe*	NVM Express* – based on Non-Volatile Memory Host Controller Interface Specification (NVMHCI)
Intel® OP HFI	Intel® Omni-Path Host Fabric Interface
OR	Oct Rank
PCIe*	PCI Express*
QR	Quad Rank
RDIMM	Registered DIMM
Intel® RMM4 Lite	Intel® Remote Management Module 4 Lite activation key
SFF	Small Form Factor
SSD	Solid State Drive
SR	Single Rank
Intel® UPI	Intel® Ultra Path Interconnect
UPC	Universal Product Code (Barcode)
VNNI	Vector Neural Network Instructions
Intel® VROC	Intel® Virtual RAID on CPU