Intel® Server D40AMP Family

Intel® Server Board D40AMP

Intel® Compute Module D40AMP

Intel® Server System D40AMP Family

Configuration Guide

A reference document to identify available Intel® Server building blocks, integrated systems, accessories and spare parts associated with the Intel® Server D40AMP family.

Rev. 1.1

April 2022

Delivering Breakthrough Data Center System Innovation – Experience What's Inside!

D40AMP

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Document Revision History

Date	Revision	Changes
November 2021	1.0	Initial release.
April 2022	1.1	• Stylistic changes across the document. • Added PSUs as required items for the systems. • Table 12: corrected links to the documents. • Section 1.1.3 & Tables 15 and 16: added requirement to fill all black DIMM slots with either Pmem or DIMM blank module.

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1. Product Family Overview

This document provides a catalog of available Intel® boards, modules, chassis, accessories, and spares in the Intel® Server D40AMP Family.

Important: This document is a guide to the systems and components available in the Intel® Server D40AMP Family. To order fully configured systems, go to orderconfigurator.intel.com (Intel NDA required) or contact your Intel field sales representative.

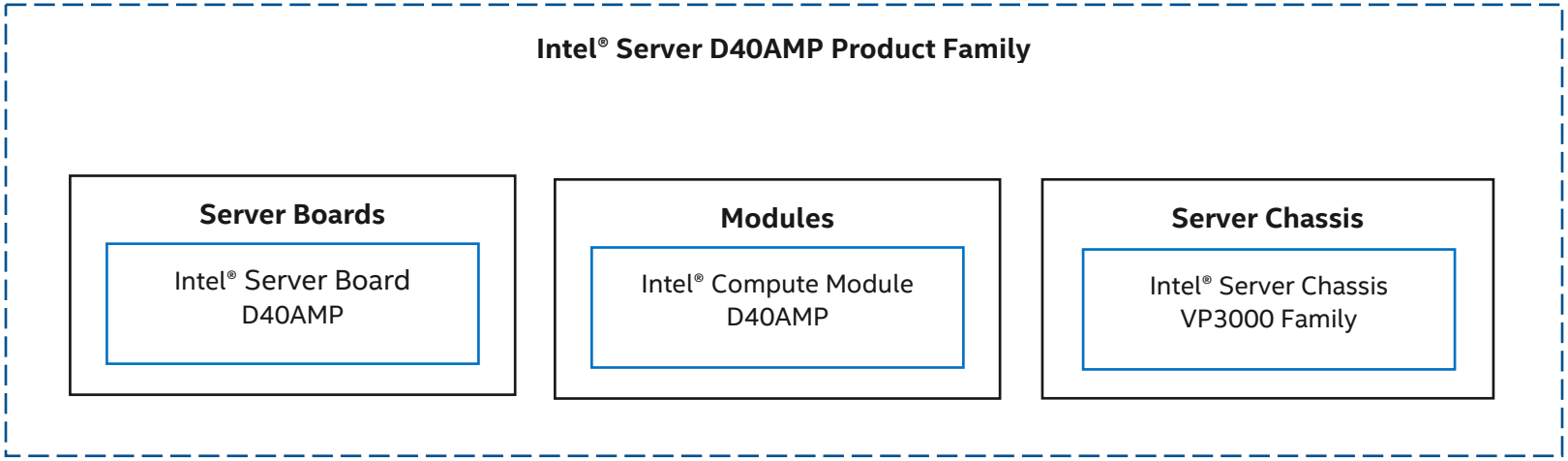


Figure 1. Intel® Server D40AMP Family Overview

1.1 Configuration Overview

The Intel® Server D40AMP Family offers options to support up to 24 2.5" NVMe* drives or 32 E1.L (EDSFF) NVMe* drives. All systems within the Intel® Server D40AMP Family support up to four 1U compute modules.

The high-performance, density-optimized Intel® Server D40AMP Family is offered as building block options:

- **Intel® Server Board D40AMP** – A standalone server board and spare FRU.
- **Intel® Compute Module D40AMP** – A density optimized 1U compute module integrated with an Intel® server board D40AMP.
- **Intel® Server Chassis VP3000 family** – A family of 3U rack mount server chassis designed to support the Intel® Compute Module D40AMP.

1.1.1 Processor Support

The Intel® Server D40AMP Family supports the 3rd Gen Intel® Xeon® Scalable processor family. Processor shelves within the product family are identified as shown in the following figure.

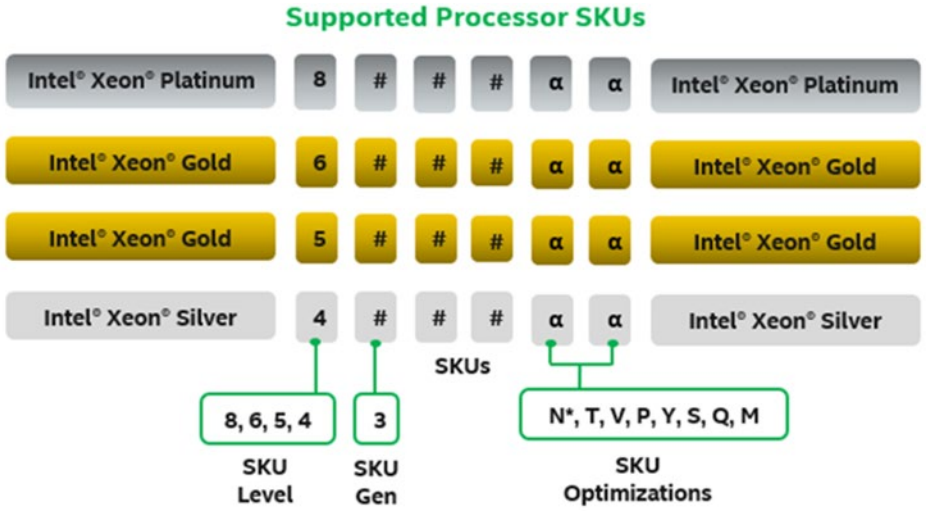


Figure 2. 3rd Gen Intel® Xeon® Scalable Processor Identification

Note: Supported 3rd Gen Intel® Xeon® Scalable processor SKUs must **not** end in (H), (L), or (U). All other 3rd Gen Intel® Xeon® Scalable processor SKUs are supported.

Note: The 8351N SKU is a 1-socket optimized SKU and is not supported on the Intel® Server D40AMP family.

Table 1. 3rd Gen Intel® Xeon® Scalable Processor Family Feature Comparison

Feature	Platinum 8300 Processors	Gold 6300 Processors	Gold 5300 Processors	Silver 4300 Processor
# of Intel® Ultra Path Interconnect (Intel® UPI) Links	3	3	3	2
Intel® UPI Speed	11.2 GT/s	11.2 GT/s	11.2 GT/s	10.4 GT/s
Supported Topologies	2S-2UPI 2S-3UPI	2S-2UPI 2S-3UPI	2S-2UPI 2S-3UPI	2S-2UPI
Node Controller Support	No	No	No	No
Processor RAS Capability	Advanced	Advanced	Advanced	Standard
# of DDR4 Integrated Memory Controllers (IMC)	4	4	4	4

Feature	Platinum 8300 Processors	Gold 6300 Processors	Gold 5300 Processors	Silver 4300 Processor
# DDR4 Channels	8	8	8	8
Intel® Turbo Boost Technology	Yes	Yes	Yes	Yes
Intel® HT Technology	Yes	Yes	Yes	Yes
Intel® AVX-512 ISA Support	Yes	Yes	Yes	Yes
Intel® AVX-512 - # of 512b FMA Units	2	2	2	2
# of PCIe* Lanes	64	64	64	64
Intel® VMD 2.0	Yes	Yes	Yes	Yes

Note: The number of available PCIe* lanes for use with PCIe* add-in cards and storage may be different.

1.1.2 Memory Support

The Intel® Server D40AMP family supports standard DDR4 RDIMMs and LDRIMMs and Intel® Optane™ persistent memory 200 series modules.

Note: Previous generation Intel® Optane™ persistent memory modules are not supported.

Standard DDR4 DIMM Support

The Intel® ServerD40AMP family supports DDR4 DIMMs with the following features:

- All DDR4 DIMMs 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 (for Memory configurations with 2 DIMMs per channel)
- DIMM capacities of 8 GB, 16 GB, 32 GB, 64 GB, and 128 GB
- RDIMMs organized as Single Rank (SR), Dual Rank (DR)
- 3DS-RDIMMs organized as Quad Rank (QR), or Oct Rank (OR)
- LRDIMMs organized as Quad Rank (QR)
- 3DS-LRDIMMs organized as Quad Rank (QR), or Oct Rank (OR)

The following tables list the DDR4 DIMM support guidelines.

Table 2. Supported DDR4 Memory

Type	Ranks per DIMM and Data Width	DIMM Capacity (GB)		Maximum Speed (MT/s) at 1.2 V
		8 Gb DDR4 Density	16 Gb DDR4 Density	1 DPC
RDIMM	SR x8	8	16	3200
	SR x4	16	32	3200
	DR x8	16	32	3200
	DR x4	32	64	3200
3DS-RDIMM	QR/OR x4	64 (2H) 128 (4H)	128 (2H)	3200
LRDIMM	QR x4	64	128	3200
3DS-LRDIMM	QR/OR x4	128 (4H)	128 (2H)	3200

Note: Specification applies only to memory chips mounted by the surface mounted technology (SMT) method. For the plated through hole (PTH) mounted method, the maximum speed is 2933 MT/s.

Note: SR = Single Rank, DR = Dual Rank, QR = Quad Rank, OR = Oct Rank, H = Stack Height, DPC = DIMMs Per Channel

The maximum supported DRAM DIMM speed depends on the processor tier as shown in the following table.

Table 3. Maximum Supported Standard DRAM DIMM Speed by Processor Shelf

Processor Family	Maximum DIMM Speed (MT/s) by processor Shelf			
	Platinum 8300 Processors	Gold 6300 Processors	Gold 5300 Processors	Silver 4300 Processors
3rd Gen Intel® Xeon® Scalable processors	3200	3200	2933	2666

Intel DDR4 DIMM Support Disclaimer:

Intel validates and will only provide support for system configurations where all installed DDR4 DIMMs have matching "Identical" or "Like" attributes. See Table 4. A system configured concurrently with DDR4 DIMMs from different vendors will be supported by Intel if all other DDR4 "Like" DIMM attributes match.

Intel does not perform system validation testing nor will it provide support for system configurations where all populated DDR4 DIMMs do not have matching "Like" DIMM attributes as listed in Table 4.

Intel will only provide support for Intel server systems configured with DDR4 DIMMs that have been validated by Intel and are listed on Intel's Tested Memory list for the given Intel server product family.

Intel configures and ships pre-integrated L9 server systems. All DDR4 DIMMs within a given L9 server system as shipped by Intel will be identical. All installed DIMMs will have matching attributes as those listed in the *"Identical" DDR4 DIMM4 Attributes* column in Table 4.

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 table below. 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 4. DDR4 DIMM Attributes Table for "Identical" and "Like" DIMMs

- DDR4 DIMMs are considered "Identical" when ALL listed attributes between the DIMMs match
- Two or more DDR4 DIMMs are considered "Like" DIMMs when all attributes minus the Vendor, and/or DIMM Part # and/or DIMM Revision#, are the same.

Attribute	"Identical" DDR4 DIMM Attributes	"Like" DDR4 DIMM Attributes	Possible DDR4 Attribute Values
Vendor	Match	Maybe Different	Memory Vendor Name
DIMM Part #	Match	Maybe Different	Memory Vendor Part #
DIMM Revision #	Match	Maybe Different	Memory Vendor Part Revision #
SDRAM Type	**Match**	**Match**	DDR4
DIMM Type	**Match**	**Match**	RDIMM, LRDIMM
Speed (MHz)	**Match**	**Match**	2666, 2933, 3200
Voltage	**Match**	**Match**	1.2V
DIMM Size (GB)	**Match**	**Match**	8GB, 16GB, 32GB, 64GB, 128GB, 256GB
Organization	**Match**	**Match**	1Gx72; 2Gx72; 4Gx72; 8Gx72; 16Gx72; 32Gx72
DIMM Rank	**Match**	**Match**	1R, 2R, 4R, 8R
DRAM Width	**Match**	**Match**	x4, x8
DRAM Density	**Match**	**Match**	8Gb, 16Gb

Intel® Optane™ Persistent Memory 200 Series Support

Intel® Optane™ PMem is an innovative technology that delivers a unique combination of affordable large memory capacity and data persistence (non-volatility). It represents a new class of memory and storage technology architected specifically for data center usage. Intel® Optane™ PMem 200 series enables higher density (capacity per DIMM) DDR4-compatible memory modules with near-DRAM performance and advanced features not found in standard DRAM.

Intel® Optane™ PMem 200 Series modules support the following features:

- DDR4 Pin Compatible
- Available PMem Capacities – 128, 256, 512 GB
- Up to 2 TB per processor socket
- Up to 3200 MT/sec
- TDP = 15 W
- AES256 Bit Encryption
- Secure Erase
- Data persistence in power failure event – – ADR, eADR (optional)

See Section 1.1.4 for memory RAS features and Intel® Optane™ PMem 200 series compatibility with security features Intel® Software Guard Extensions (Intel® SGX), Intel® Total Memory Encryption (Intel® TME), and Intel® Total Memory Encryption – Multi-Tenant (Intel® TME-MT).

Supported operating modes:

- Memory mode (MM)
- App Direct (AD) mode

1.1.2.1 Intel® Optane™ Persistent Memory 200 Series – Memory Mode (MM)

In Memory mode, the standard DDR4 DRAM acts as a cache for the most frequently accessed data, while Intel® Optane™ persistent memory 200 series modules provide large memory capacity by acting as direct load/store memory. In this mode, applications and operating system are explicitly aware that the Intel® Optane™ persistent memory 200 series is the only type of direct load/store memory in the system. Cache management operations are handled by the integrated memory controller in the Intel® Xeon® Scalable processor.

When data is requested from memory, the memory controller first checks the DRAM cache. If the data is present, the response latency is identical to DRAM. If the data is not in the DRAM cache, it is read from the Intel® Optane™ persistent memory 200 series modules with slightly longer latency. The applications with consistent data retrieval patterns that the memory controller can predict, will have a higher cache hit rate. Data is volatile in Memory mode. It will not be saved in the event of a power loss. Persistence is enabled in App Direct mode.

1.1.2.2 Intel® Optane™ Persistent Memory 200 Series – App Direct (AD) Mode

In App Direct mode, the operating system sees Intel® Optane™ persistent memory and DDR4 DRAM DIMMs as two separate pools of memory. App Direct mode can direct which type of data read or write is suitable for DRAM or Intel® Optane™ PMem. Operations that require the lowest latency and do not need permanent data storage can be executed on DRAM DIMMs, such as database “scratch pads”. Data that needs to be made persistent or structures that are very large can be routed to Intel® Optane™ persistent memory. The App Direct mode must be used to make data persistent in memory. This mode requires an operating system or virtualization environment enabled with a persistent memory-aware file system.

App Direct mode requires both driver and explicit software support. To ensure operating system compatibility, visit: https://www.intel.com/content/www/us/en/products/details/memory-storage/optane-dc-persistent-memory.html.

1.1.2.3 Intel® Optane™ PMem configuration using the BIOS Setup Utility

Following the installation of Intel® Optane™ PMem devices into the system, they need to be configured using the BIOS Setup utility. From the home BIOS Setup page, navigate to Advanced > PCI Configuration > UEFI Option ROM Control > Intel® Optane™ Persistent Memory Configuration.

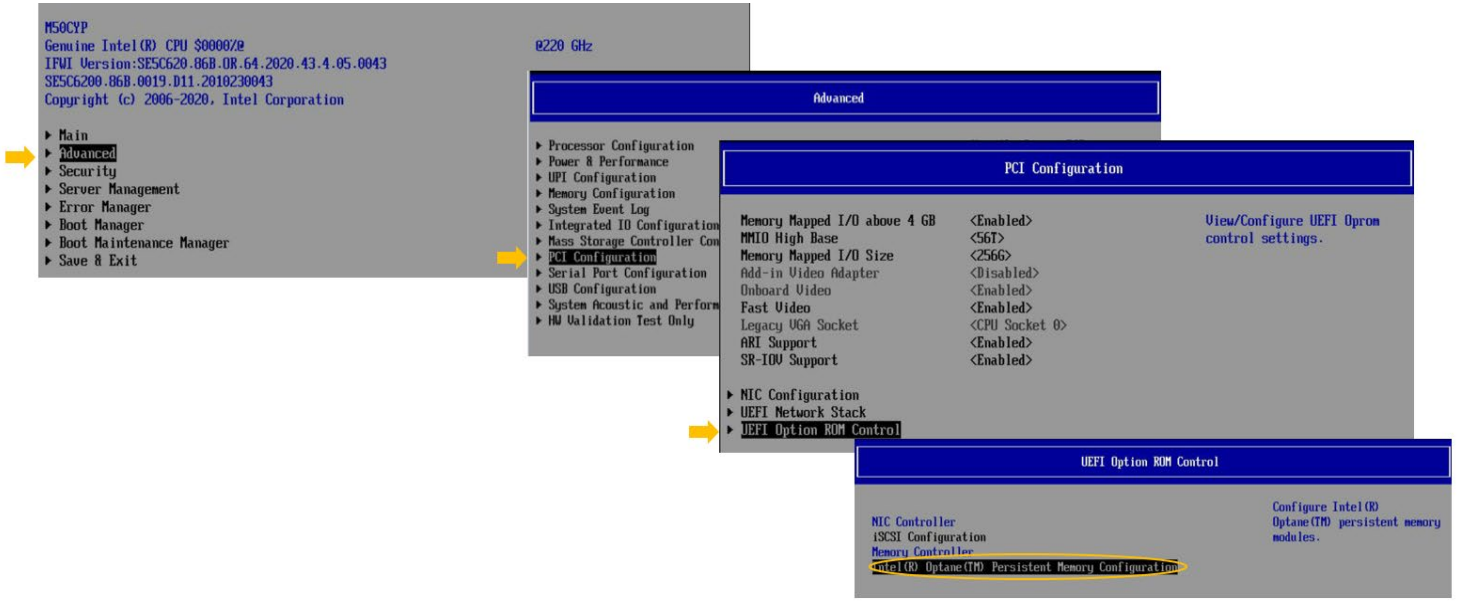


Figure 3. BIOS Setup Screen Navigation for Intel® Optane™ PMem Setup Options

The main Intel® Optane™ PMem Configuration screen provides links to the various device information and setup screens.

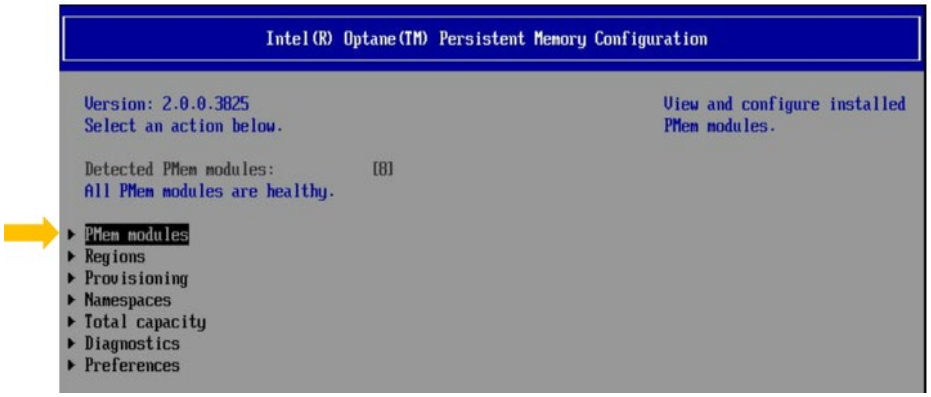


Figure 4. Intel® Optane™ PMem Configuration Menu in BIOS Setup

Refer to the *Intel® Optane™ Persistent Memory Start Up Guide* for details on how to configure Intel® Optane™ PMem on the Intel® Server D40AMP family.

1.1.3 Memory Population

The Intel® Server Board D40AMP, as well as the Intel® Compute Module D40AMP support memory configurations that consist of both standard DDR4 DIMMs and Intel® Optane™ persistent memory 200 series modules. With two processors installed, 8 memory slots are available for Intel® Optane™ persistent memory 200 series and 16 memory slots are available for DDR4 DIMMs. To maintain proper system cooling, it is necessary to have all black DIMM slots populated with either Intel® Optane™ persistent memory 200 series modules or DIMM blanks.

This section provides memory population rules and recommendations for standard DIMMs and Intel® Optane™ persistent memory 200 series modules. The following figure shows the full board layout for all memory slots on both processor sockets.

Figure 5. Intel® Server Board D40AMP Memory Slot Layout

1.1.3.1 Standard DDR4 DIMM Population Rules

The following DDR4 DIMM population rules apply for best operation. However, see the *Intel DDR4 DIMM Support Disclaimer* in Section 1.1.2 for Intel support guidelines.

- DDR4 DIMMs can only be installed in blue slots
- 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 will lead to a Fatal Error Halt during memory initialization.
- When channels A, C, E, and G are populated, they must be populated with same total DDR4 DIMM capacity per channel for a balanced performance.
- When channels B, F, D, and H are populated, they must be populated with same total DDR4 DIMM capacity per channel for a balanced performance.
- 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 DDR4 DIMM type and population for DDR4 DIMMs configured to CPU1 must match DDR4 DIMM type and population configured to CPU0. For additional information, refer to Section 1.1.3.3.

1.1.3.2 Intel® Optane™ Persistent Memory 200 Series Module Rules

All operating modes:

- Only Intel® Optane™ persistent memory 200 series modules are supported.
- Intel® Optane™ persistent memory 200 series modules are only supported in DIMM slot 2 (black slot), and DIMM slot 1 (blue slot) in the same memory channel must be populated with one DDR4 DIMM.
- Mixing of different DDR4 DIMM types on the system is not supported nor validated.
  - Intel® Optane™ persistent memory 200 series modules must have the same capacity and type across or within all sockets.
  - DDR DIMMs must have the same capacity and type across or within all sockets.

Memory mode:

- Populate each memory channel with at least one DDR4 to maximize bandwidth.
- Intel® Optane™ persistent memory 200 series modules must be populated symmetrically for each installed processor (corresponding slots populated on either side of each processor) and across both processors.

App Direct mode:

- Minimum of one Intel® Optane™ persistent memory 200 series module for the board.
- Intel® Optane™ persistent memory 200 series modules must be populated symmetrically for each installed processor (corresponding slots populated on either side of each processor) and across both processors.

Table 5. Intel® Optane™ Persistent Memory 200 Series Module Support

Processor SKU Level	PMem Capacity (GB)	Maximum Supported Speed (MT/s)
Silver 4300 processors	128 256 512	2666
Gold 5300 processors	128 256 512	2933
Gold 6300 processors	128 256 512	3200
Platinum 8300 processors	128 256 512	3200

Table 6. Standard DDR4 DIMMs Compatible with Intel® Optane™ Persistent Memory 200 Series Modules

Type	Ranks per DIMM and Data Width	DIMM Size (GB)	
		8 Gb DRAM Density	16 Gb DRAM Density
RDIMM (PTH – up to 2933 MT/s) (SMT – up to 3200 MT/s)	SR x8	N/A	N/A
	SR x4	16	32
	DR x8	16	32
	DR x4	32	64
3DS-RDIMM (PTH – up to 2933 MT/s) (SMT – up to 3200 MT/s)	QR x4 (2H)	N/A	128
	OR x4 (4H)	N/A	N/A
LRDIMM (PTH/SMT – up to 3200 MT/s)	QR x4	64	128
3DS-LRDIMM (PTH/SMT – up to 3200 MT/s)	QR x4 (2H)	N/A	128
	OR x4 (4H)	128	N/A

Note: SR = Single Rank, DR = Dual Rank, QR = Quad Rank, OR = Oct Rank, H = Stack Height, PTH = Plated Through Hole, SMT = Surface-Mount Technology

1.1.3.3 Recommended Memory Configurations

This section provides the recommended memory population configurations for the Intel® Server D40AMP family. For best system performance in dual-processor configurations, installed memory type and population should be the same for both processors.

See the following figures and tables to identify the memory slot locations and recommended population configurations.

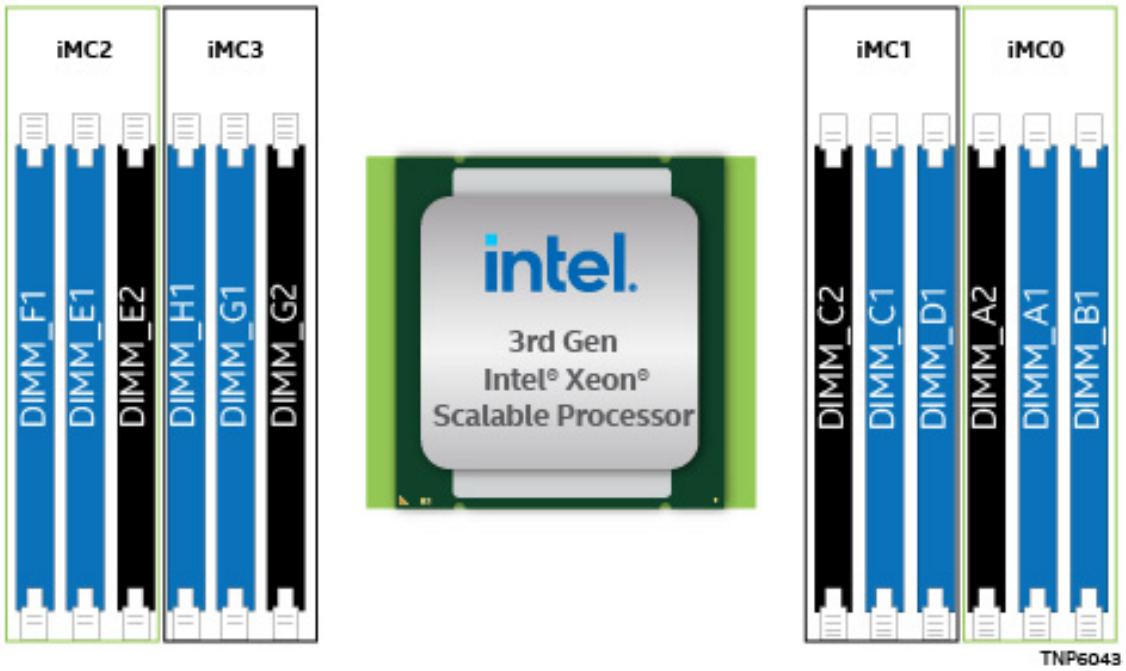


Figure 6. Intel® Server Board D40AMP Memory Slot Identification

Table 7. Standard DDR4 DIMM-only per Socket Population Configurations

# of DIMMs	IMC 2			IMC 3			IMC 1			IMC 0		
	CH F	CH E		CH H	CH G		CH C		CH D	CH A		CH B
	Slot 1	Slot 1	Slot 2	Slot 1	Slot 1	Slot 2	Slot 2	Slot 1	Slot 1	Slot 2	Slot 1	Slot 1
1	-	-	-	-	-	-	-	-	-	-	DDR4 [1]	-
2	-	DDR4	-	-	-	-	-	-	-	-	DDR4	-
2	-	-	-	-	DDR4	-	-	DDR4	-	-	-	-
2	-	-	-	-	-	-	-	DDR4	-	-	DDR4	-
2	-	DDR4	-	-	DDR4	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	DDR4	-	DDR4	-

# of DIMMs	IMC 2			IMC 3			IMC 1			IMC 0		
	CH F	CH E		CH H	CH G		CH C		CH D	CH A		CH B
	Slot 1	Slot 1	Slot 2	Slot 1	Slot 1	Slot 2	Slot 2	Slot 1	Slot 1	Slot 2	Slot 1	Slot 1
4	-	DDR4	-	-	DDR4	-	-	DDR4	-	-	DDR4	-
6	DDR4	DDR4	-	-	DDR4	-	-	DDR4	-	-	DDR4	DDR4
8	DDR4	DDR4	-	DDR4	DDR4	-	-	DDR4	DDR4	-	DDR4	DDR4

[1] Recommended location. DDR4 may be populated in slot 1 on any channel.

Table 8. Standard DDR4 DIMM and Intel® Optane™ Persistent Memory 200 Series Module (PMem) per Socket Population Configurations

# of DIMMs	Mode	IMC 2			IMC 3			IMC 1			IMC 0		
		CH F	CH E		CH H	CH G		CH C		CH D	CH A		CH B
		Slot 1	Slot 1	Slot 2	Slot 1	Slot 1	Slot 2	Slot 2	Slot 1	Slot 1	Slot 2	Slot 1	Slot 1
8 DDR4 / 1 PMem	AD	DDR4	DDR4	-	DDR4	DDR4	-	-	DDR4	DDR4	PMem	DDR4	DDR4
	AD	DDR4	DDR4	-	DDR4	DDR4	-	PMem	DDR4	DDR4	-	DDR4	DDR4
	AD	DDR4	DDR4	PMem	DDR4	DDR4	-	-	DDR4	DDR4	-	DDR4	DDR4
	AD	DDR4	DDR4	-	DDR4	DDR4	PMem	-	DDR4	DDR4	-	DDR4	DDR4
8 DDR4 / 4 PMem	AD or MM	DDR4	DDR4	PMem	DDR4	DDR4	PMem	PMem	DDR4	DDR4	PMem	DDR4	DDR4

Note: AD = App Direct mode, MM = Memory Mode, PMem = Persistent Memory

Notes for Intel® Optane™ persistent memory 200 series module population:

- For MM, standard DDR4 / Intel® Optane™ persistent memory 200 series module capacity recommended ratio is 1: 8.
- For each individual population, rearrangements between channels are allowed as long as the resulting population is consistent with defined memory population rules.
- For each individual population, the same type and capacity of DDR4 DIMM must be used in all slots, as specified by the defined memory population rules.

1.1.4 Memory RAS Support

Processors within the 3rd Gen Intel® Xeon® Scalable processor family support standard or advanced memory RAS features, depending on processor SKU, defined in Table 9. This table lists the RAS features pertaining to system memory that consists of standard DDR4 DIMMs or a combination of standard DDR4 DIMMs and Intel® Optane™ persistent memory 200 series modules. These features are managed by the processor's IMC.

Table 9. Memory RAS Features

Memory RAS Feature	Description	Standard	Advanced
Partial Cache-Line Sparing (PCLS)	Allows replacing failed single bit within a device using spare capacity available within the processor's integrated memory controller (IMC). Up to 16 failures allowed per memory channel and no more than one failure per cache line. After failure is detected, replacement is performed at a nibble level. Supported with x4 DIMMs only.	√	√
Device Data Correction	Single Device Data Correction (SDDC) via static virtual lockstep. Supported with x4 DIMMs only.	√	√
	Adaptive Data Correction – Single Region (ADC-SR) via adaptive virtual lockstep (applicable to x4 DDR4 DIMMs). Cannot be enabled with "Memory Multi-Rank Sparing" or "Write Data CRC Check and Retry."	√	√
	Adaptive Double Data Correction – Multiple Regions (ADDDC-MR, + 1) Supported with x4 DIMMs only.	–	√
DDR4 Command/Address (CMD/ADDR) Parity Check and Retry	DDR4 technology based CMD/ADDR parity check and retry with CMD/ADDR parity error "address" logging and CMD/ADDR retry.	√	√
DDR4 Write Data CRC Check and Retry	Checks for CRC mismatch and sends a signal back to the processor for retry. Cannot be enabled with "ADC-SR" or "ADDDC-MR, +1."	√	√
Memory Data Scrambling with Command and Address	Scrambles the data with address and command in "write cycle" and unscrambles the data in "read cycle". Addresses reliability by improving signal integrity at the physical layer. Additionally, assists with detection of an address bit error.	√	√
Memory Demand and Patrol Scrubbing	Demand scrubbing is the ability to write corrected data back to the memory once a correctable error is detected on a read transaction. Patrol scrubbing proactively searches the system memory, repairing correctable errors. Prevents accumulation of single-bit errors.	√	√
Memory Mirroring	Full memory mirroring: An intra-IMC method of keeping a duplicate (secondary or mirrored) copy of the contents of memory as a redundant backup for use if the primary memory fails. The mirrored copy of the memory is stored in memory of the same processor socket's IMC. Dynamic (without reboot) failover to the mirrored DIMMs is transparent to the OS and applications.	√	√
	Address range/partial memory mirroring: Provides further intra socket granularity to mirroring of memory. It does this by allowing the firmware or OS to determine a range of memory addresses to be mirrored, leaving the rest of the memory in the socket in non-mirror mode.	–	√
DDR Memory Multi-Rank Memory Sparing	Up to two ranks out of a maximum of eight ranks can be assigned as spare ranks. Cannot be enabled with "ADC-SR", "ADDDC-MR, +1", and "Memory Mirroring".	√	√
Memory SMBus* Hang Recovery	Allows system recovery if the SMBus* fails to respond during runtime thus preventing system crash.	√	√
Memory Disable and Map Out for Fault Resilient Boot (FRB)	Allows memory initialization and booting to OS even when memory fault occurs.	√	√

Memory RAS Feature	Description	Standard	Advanced
Post Package Repair (PPR)	PPR offers additional spare capacity within the DDR4 that can be used to replace faulty cell areas detected during system boot time.	√	√
Memory Thermal Throttling	Management controller monitors the memory DIMM temperature and can temporarily slow down the memory access rates to reduce the DIMM temperature if needed.	√	√
MEMHOT Pin Support for Error Reporting	MEMHOT pin can be configured as an output and used to notify if DIMM is operating within the target temperature range. Used to implement “Memory Thermal Throttling”.	√	√

Notes: Population Rules and BIOS Setup for Memory RAS

- Memory sparing and memory mirroring options are enabled in BIOS Setup.
- Memory sparing and memory mirroring options are mutually exclusive in this product. Only one operating mode at a time may be selected in BIOS Setup.
- If a RAS mode has been enabled and the memory configuration is not able to support it during boot, the system will fall back to independent channel mode and log and display errors.
- Rank sparing mode is only possible when all channels that are populated with memory have at least two single-rank or double-rank DIMMs installed, or at least one quad-rank DIMM installed, on each populated channel.
- Memory mirroring mode requires that for any channel pair that is populated with memory, the memory population on both channels of the pair must be identically sized.
- The Intel® Optane™ persistent memory 200 series RAS features listed in the following table are integrated into the system memory RAS features.

The following table lists additional memory RAS features specific to the Intel® Optane™ persistent memory 200 series memory. These features are managed by the processor’s IMC.

Table 10. Intel® Optane™ Persistent Memory 200 Series RAS Features

Memory RAS Feature	Description
DIMM Error Detection and Correction	Protects against random bit failures across media devices.
DIMM Device Failure Recovery (Single Device Data Correction (SDDC)	Corrects errors resulting from the failure of a single media device.
DIMM Package Sparing (Double Device Data Correction (DDDC)	Achieved by a spare device on the DIMM and erasure decoding.
DIMM Patrol Scrubbing	Proactively searches the DIMM memory, repairing correctable errors. This can prevent correctable errors from becoming uncorrectable due to accumulation of failed bits.
DIMM Address Error Detection	Ensures the correctness of addresses when data is read from media devices.
DIMM Data Poisoning	Mechanism to contain, and possibly recover from, uncorrectable data errors. Depending on the mode used, poisoning has different reset behavior: • In memory mode, poison is cleared after reset. • In App Direct, poison is not cleared with reset.

Memory RAS Feature	Description
DIMM Viral	Ensures that potentially corrupted data is not committed to persistent memory in App Direct and is supported only in tandem with poison. Viral mode does not apply to memory mode.
DIMM Address Range Scrub (ARS)	Obtains the healthy memory media range before assigning it to a persistent memory region.
DDR-T Command and Address Parity Check and Retry	Host retries a CMD/ADDR transaction if the DIMM controller detects a parity error and initiates an error flow.
DDR-T Read Write Data ECC Check and Retry	Host continuously retries a data transaction as long as the DIMM controller detects an ECC error and initiates an error flow.
Faulty DIMM Isolation	Identifies a specific failing DIMM enabling replacement of only the DIMM that has failed.

The Intel® Server D40AMP family supports security technologies like Intel® Software Guard Extensions (Intel® SGX), Intel® Total Memory Encryption (Intel® TME), and Intel® Total Memory Encryption – Multi-Tenant (Intel® TME-MT). When any of these security technologies are enabled, Intel® Optane™ PMem 200 series will be disabled. In addition, some of the memory RAS features will be disabled as indicated in the following table.

Table 11. Compatibility of RAS features and Intel® SGX, Intel® TME, and Intel® TME-MT

Feature/Technology	Intel® SGX	Intel® TME, Intel® TME-MT
Intel® Optane™ persistent memory 200 series	No	No
ADC(SR)/ADDDC(MR)	No	Yes
MCA Recovery – Execution Path	No	Yes
MCA Recovery – Non-execution Path	Yes	Yes
Address Range Mirroring	No	Yes
Dynamic Capacity change: CPU/Memory/IIO, Physical CPU Board Hot Add/Remove, OS CPU/Memory/IIO On-lining (Capacity change), OS CPU off-lining (Capacity change), Intel® UPI link Hot pluggability, and Intel® UPI System Quiescence.	No	Yes
Static/Hard Partitioning, Electronically Isolated (Static/Hard) Partitioning, Dynamic Partitioning (Via Resource/Capacity Addition), Multiple South Bridge (PCH) Presence for supporting system partitioning	No	Yes

1.2 Additional Information and Software

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

Table 12. Product family reference collaterals

Topic	Document Title or Support Collateral	Document Classification
Technical information about this product family	Intel® Server D40AMP Family Technical Product Specification	Public
System integration instructions and service guidance	*Intel® Server D40AMP Family Integration and Service Guide*	Public
Server configuration guidance	*Intel® Server D40AMP Family Configuration Guide*	Public
For a complete list of supported processors, memory, add-in cards, and peripheral	*https://serverconfigurator.intel.com/exodus/page?eventType=11&targetPageId=120224*	Public
Information for the Integrated BMC Web Console	*Intel® Integrated Baseboard Management Controller Web Console (Integrated BMC Web Console) User Guide for the Intel® Server Board D50TNP, M50CYP, and D40AMP Families*	Public
BIOS technical information for Intel® Server *D40AMP* Family	*BIOS Firmware External Product Specification (EPS) For the Intel® Server Board D50TNP, M50CYP, and D40AMP Families. Document ID: 630789*	Intel Confidential
BIOS setup information for Intel® Server *D40AMP* Family	*BIOS Setup Utility User Guide for the Intel® Server Board D50TNP, M50CYP,* and D40AMP *Families*	Public
BMC technical information for Intel® Server *D40AMP* Family	*Integrated Baseboard Management Controller Firmware External Product Specification (EPS) For the Intel® Server Board D50TNP, M50CYP, and D40AMP Families. Document ID: 713600*	Intel Confidential
Base specifications for the IPMI architecture and interfaces	*Intelligent Platform Management Interface Specification Second Generation v2.0*	Intel Confidential
Specifications for the PCIe* 3.0 architecture and interfaces	*PCIe* Base Specification, Revision 3.0*	Public
Specifications for the PCIe* 4.0 architecture and interfaces	*PCIe* Base Specification, Revision 4.0*	Public
TPM for PC Client specifications	*TCG PC Client Platform TPM Profile Specifications revision 2.0*	Public
Functional specifications of 3rd Gen Intel® Xeon® Scalable processor family	*3rd Generation Intel® Xeon® Scalable Processors, Codename Ice Lake-SP External Design Specification (EDS): Document IDs: 574451, 574942, 575291*	Intel Confidential
Processor thermal design specifications and recommendations	*3rd Generation Intel® Xeon® Scalable Processor, Codename Ice Lake-SP and Cooper Lake-SP - Thermal and Mechanical Specifications and Design Guide (TMSDG): Document ID 574080*	Intel Confidential
BIOS and BMC Security Best Practices	*Intel® Server Systems Baseboard Management Controller (BMC) and BIOS Security Best Practices White Paper*	Public
Managing an Intel Server Overview	*Managing an Intel Server System 2020*	Public

Topic	Document Title or Support Collateral	Document Classification
Technical information for Intel® Optane™ persistent memory 200	*Intel® Optane™ Persistent Memory 200 Series Operations Guide. Document ID: 619462*	Intel Confidential
Setup information for Intel® Optane™ persistent memory 200	*Intel® Optane™ Persistent Memory Startup Guide*	Public
Latest system software updates: BIOS and Firmware	*Intel® System Update Package (SUP) for Intel® Server D40AMP Family*	Public
	Intel® System Firmware Update Utility (SYSFWUPDT) – Various operating system support	
	Intel® System Firmware Update Utility User Guide	
To obtain full system information	*Intel® System Information Retrieval Utility (SYSINFO) for Intel® Server Boards*	Public
	Intel® System Information Retrieval Utility User Guide	
To configure, save, and restore various system options	*Intel® System Configuration Utility (SYSCFG) for Intel® Server D40AMP Family – Various operating system support*	Public
	Intel® System Configuration Utility User Guide	
Product Warranty Information	*Warranty Terms and Conditions*	Public
Safety and Regulatory Compliance Information	Intel® Server D40AMP Family Technical Product Specification	Public
Intel® Data Center Manager (Intel® DCM) information	*Intel® Data Center Manager (Intel® DCM) Product Brief*	Public
	Intel® Data Center Manager (Intel® DCM) Console User Guide	Public

1.3 Intel® Server Board D40AMP Overview

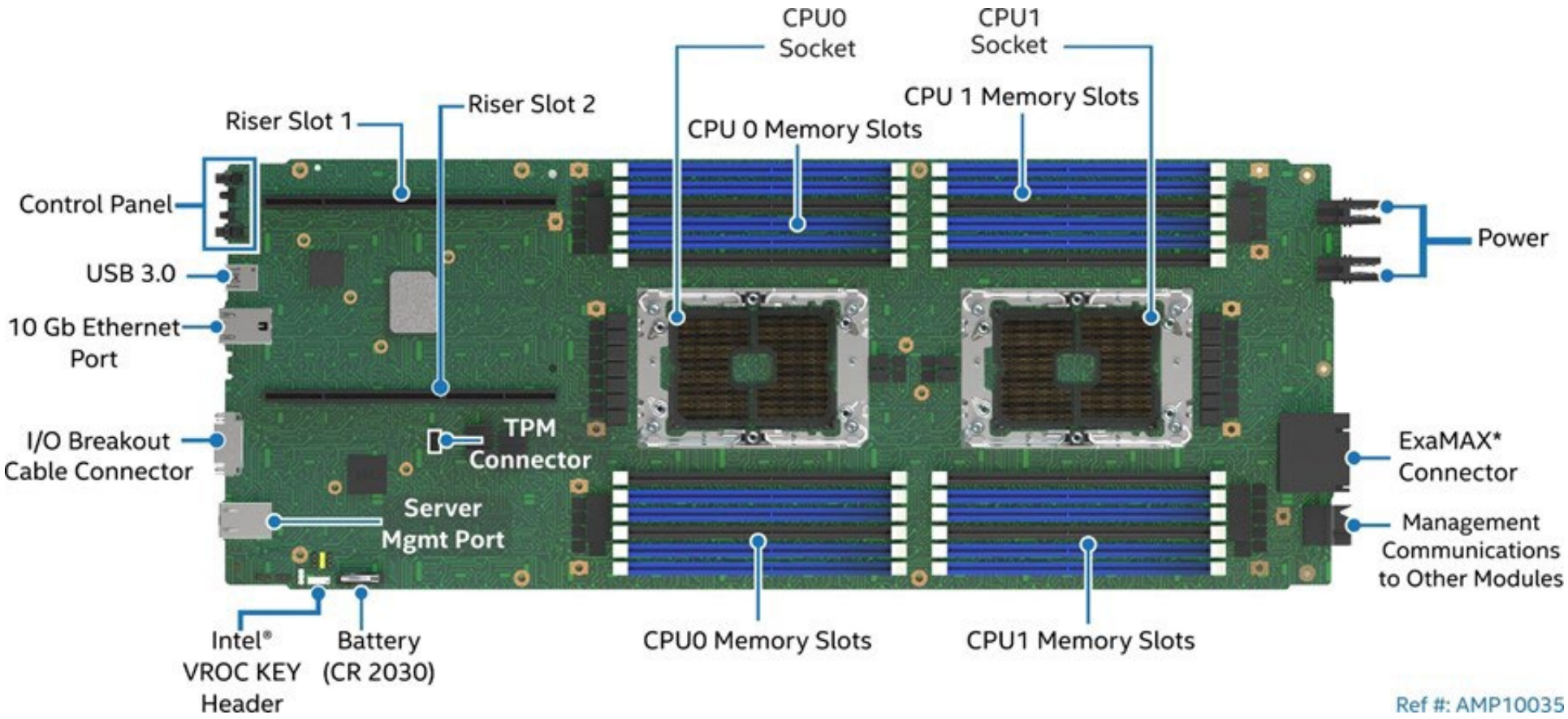


Figure 7. Intel® Server Board D40AMP1SB

Table 13. Intel® Server Board D40AMP family features

Feature	Description

Processor Support	• Supported 3rd Gen Intel® Xeon® Scalable processor family SKUs:
	  ○ Intel® Xeon® Platinum 8300 processor
	  ○ Intel® Xeon® Gold 6300 processor
	  ○ Intel® Xeon® Gold 5300 processor
	  ○ Intel® Xeon® Silver 4300 processor
	• UPI links: three at 11.2 GT/s (Platinum and Gold SKUs) or two at 10.4 GT/s (Silver SKU)
	• Previous generation Intel® Xeon® processor and Intel® Xeon® processor Scalable families are not supported.
	
	Note: Supported 3rd Gen Intel® Xeon® Scalable processor SKUs must Not end in (H), (L), or (U). All other processor SKUs are supported.
	
	Note: The 8351N SKU is a 1-socket optimized SKU and is not supported on the Intel® Server D40AMP family.

Maximum Processor Thermal Design Power (TDP)	• 3rd Gen Intel® Xeon® Scalable processors up to 205 W **Disclaimer:** Intel server boards contain and support several high-density VLSI and power delivery components that need adequate airflow to cool and remain within their thermal operating limits. Intel ensures through its own chassis development and testing that when an Intel server board and Intel chassis are used together, the fully integrated system meets the thermal requirements of these components. It is the responsibility of the system architect or system integrator who chooses to develop their own server system using an Intel server board and a non-Intel chassis, to consult relevant specifications and datasheets to determine thermal operating limits and necessary air flow to support intended system configurations and workloads when the system is operating within target ambient temperature limits. It is also their responsibility to perform adequate environmental validation testing to ensure reliable system operation. Intel cannot be held responsible if components fail or the server board does not operate correctly when published operating and non-operating limits are exceeded.
Processor Socket	Dual Socket-P4 4189
Chipset	Intel® C621A Chipset

Feature	Description
Memory Support	• Up to 16 DDR4 SDRAM DIMMs + up to 8 Intel® Optane™ persistent memory 200 series modules. See Section 1.1.2 for details. • All DDR4 DIMMs must support ECC • Registered DDR4 (RDIMM), 3DS-RDIMM, Load Reduced DDR4 (LRDIMM), 3DS-LRDIMM **Note**: 3DS = 3-dimensional Stacking • Up to 3200 MT/s memory data transfer rates • Up to 2 TB DDR4 memory capacity (1 TB per processor) for all processor SKUs • Up to 6 TB DDR4 and Intel® Optane™ PMem combined memory capacity (3 TB per processor), dependent on processor SKU • DDR4 standard voltage of 1.2 V **Note:** The maximum memory speed supported depends on the installed processor and population configuration. See Section 1.1.2 for details.
Video Support	• Integrated 2D video controller • 16 MB of DDR4 Memory • One VGA DB-15 external connector through I/O breakout cable
USB Support	• One external USB 3.0 • Two external USB 3.0 ports (dual-stack) through I/O breakout cable
Serial Support	One external serial port connector through I/O breakout cable. The port follows Advanced Technology (AT) pinout specifications.
Networking	• One external 10GBASE-T Ethernet port (RJ45) • One external 1000BASE-T Ethernet port (RJ45) dedicated to server management
Riser Support	Two riser slots on the server board: **Riser Slot 1** • PCIe* x20 (x16 PCIe* 4.0 from CPU0, x4 PCIe* 3.0 from Chipset) - 1U single-PCIe* slot riser card supporting one low profile PCIe* add-in card and one 80/110mm M.2 SSD **Riser Slot 2** • PCIe* x20 (x16 PCIe* 4.0 from CPU0, x4 PCIe* 3.0 from Chipset) - 1U single-PCIe* slot riser card supporting one low profile PCIe* add-in card and one 80/110mm M.2 SSD **Note:** PCIe* lanes routed from processor/chipset support Intel® VROC 7.5 (VMD NVMe* RAID) when an Intel VROC key (accessory option) is installed.
Dedicated Connectors	One dedicated ExaMax* connector in the back of the server board supporting: • x16 PCIe* 4.0 from CPU0 • x16 PCIe* 4.0 from CPU1 • Hotplug signals for CPU0/1 • Up to 32 clock signals with presence indicator for CPU0/1 • ID signals for Hot-swap backplane

Feature	Description
Security Features	• Intel® Platform Firmware Resilience (Intel® PFR) technology • Intel® Software Guard Extensions (Intel® SGX) • Intel® Total Memory Encryption (Intel® TME) • Intel® Trusted Execution Technology (Intel® TXT) • Trusted platform module 2.0 (Rest of World) – iPC AXXTPMENC8 (accessory option) • Trusted platform module 2.0 (China Version) – iPC AXXTPMCHNE8 (accessory option)
Serviceability	
Server Management	• Integrated Baseboard Management Controller (BMC) • Intelligent Platform Management Interface (IPMI) 2.0 compliant • Redfish* compliant • Support for Intel® Data Center Manager (DCM) • Support for Intel® Server Debug and Provisioning Tool (SDPTool) • One external 1000BASE-T Ethernet port (RJ45) dedicated for server management • Onboard LEDs for Light Guided Diagnostics
Onboard Configuration and Service Jumpers	• BIOS defaults • BIOS Password clear • Intel® Management Engine (Intel® ME) firmware force update • BMC force update • BIOS Security Version Number (SVN) Downgrade • BMC SVN Downgrade
BIOS	• Unified Extensible Firmware Interface (UEFI)-based BIOS (legacy boot not supported)

1.4 Intel® Compute Module D40AMP Overview

The Intel® Compute Module D40AMP is a 1U half-width compute module. With the Intel® Server Board D40AMP at its heart and supporting the 3rd Gen Intel® Xeon® Scalable processors, it builds upon its features to provide support for internal storage, and PCIe* 4.0 expansion options. A multi-module system within the Intel® Server D40AMP family supports up to four compute modules, that operate independently from each other. The installed modules within a system chassis share resources like power, storage, and cooling.

The Compute Module includes the Intel® Server Board D40AMP with support for dual 3rd Gen Intel® Xeon® Scalable processors, and up to 24 DIMMs (depending on configuration). Each module includes two riser card assemblies. Each riser card assembly includes a single, x16 PCIe* 4.0 slot compatible with low-profile PCIe* add-in cards. The riser assembly also supports a single 80/110 mm PCIe* or SATA M.2 SSD storage device.

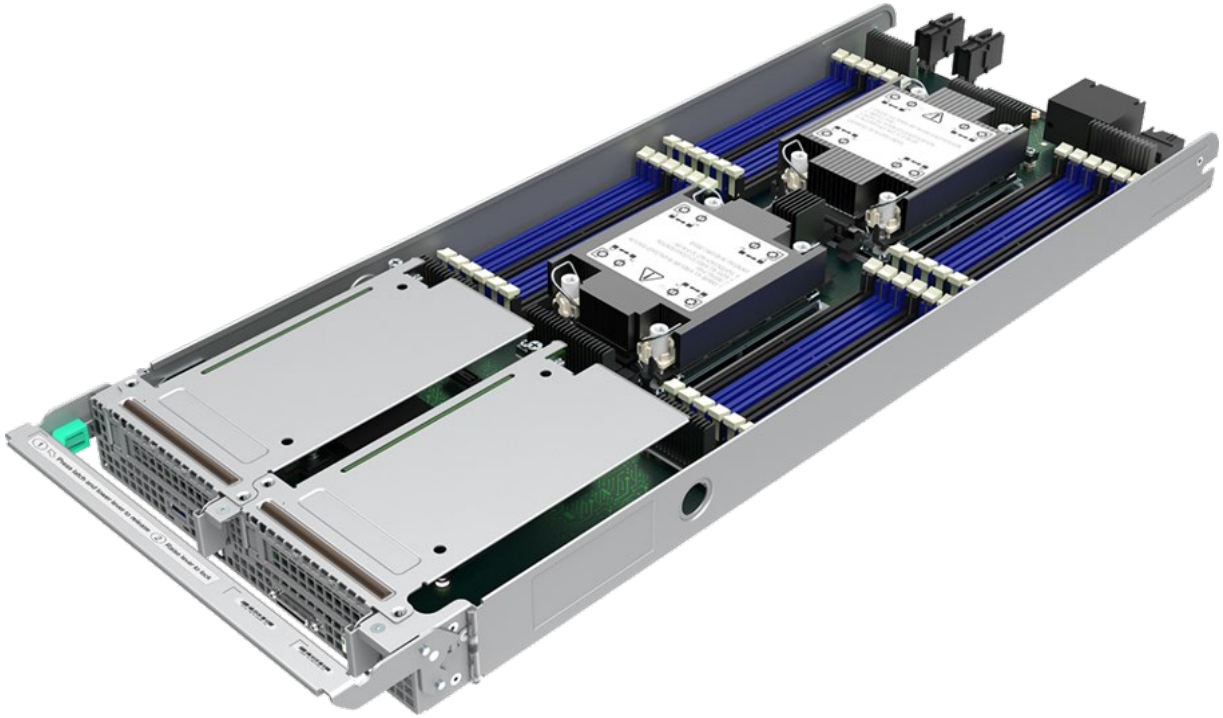


Figure 8. Intel® Compute Module D40AMP

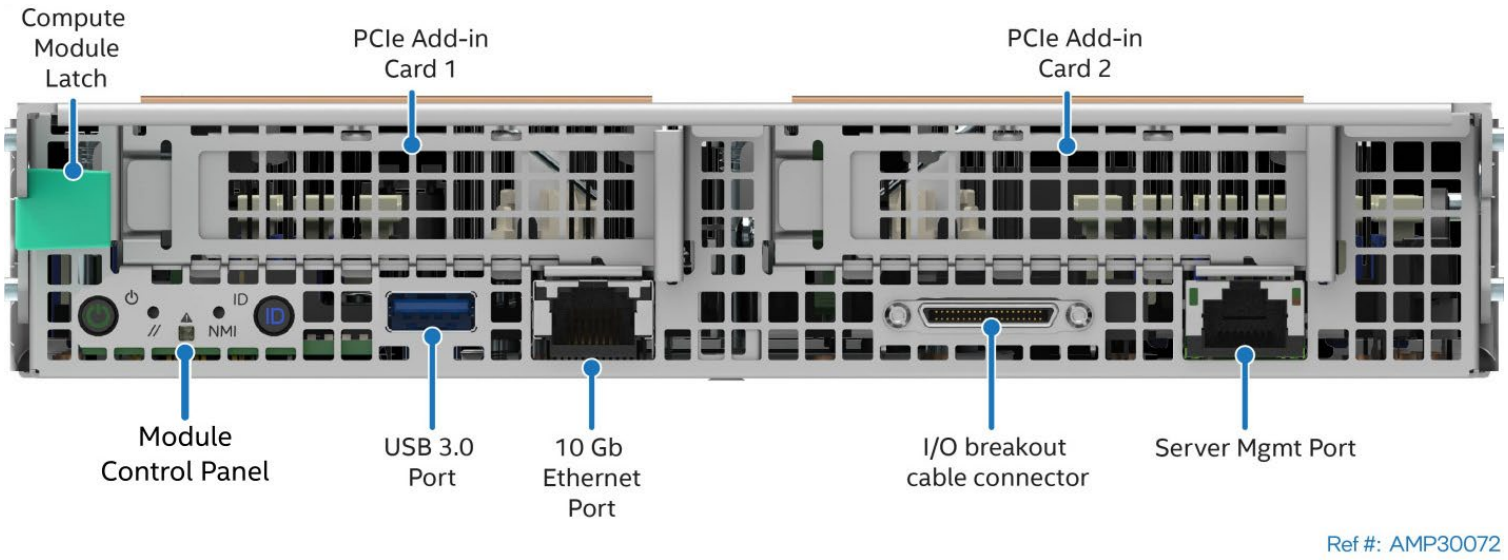


Figure 9. Compute Module External Features

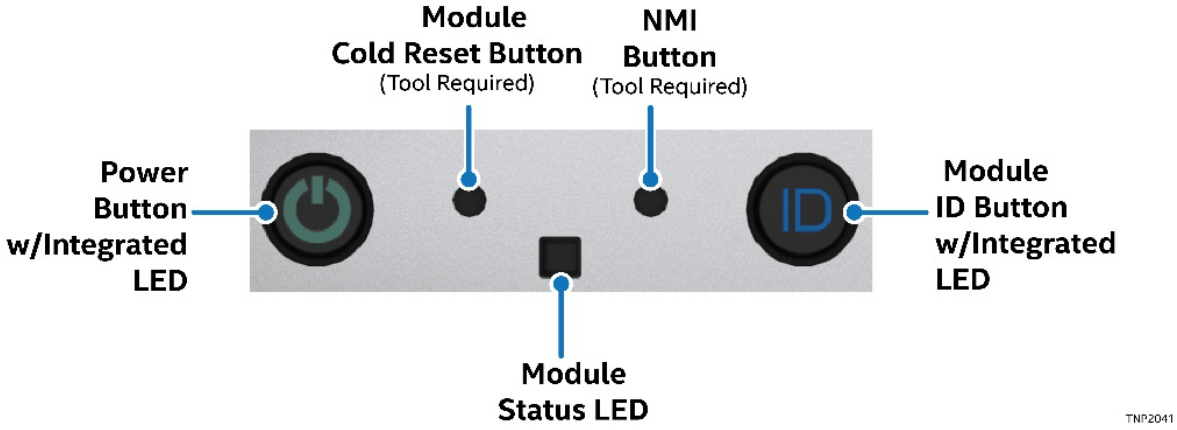


Figure 10. Compute Module Control Panel Features

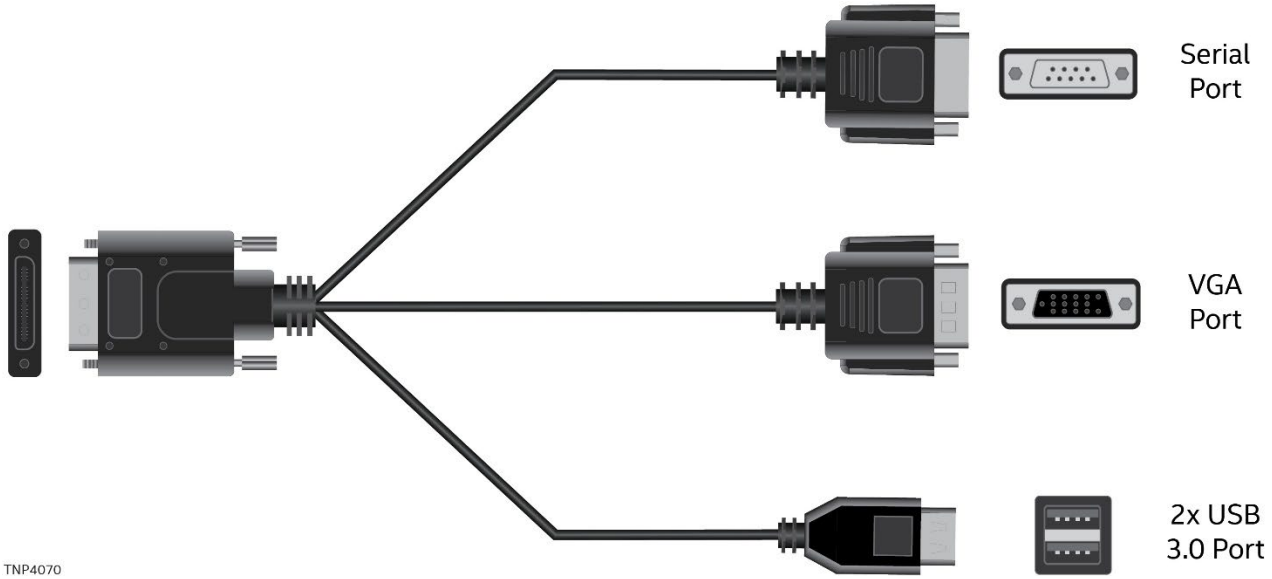


Figure 11. I/O breakout cable connector identification

1.5 Intel® Server System D40AMP / Chassis Overview

As a building block, the Intel® Server D40AMP family includes two chassis-only products that belong to the Intel® Server chassis VP3000 family. These chassis-only products are listed below.

- 3U air cooled, 2100 W PSU chassis supporting U.2 SSDs – iPC **VP3U2HAC21W0**
  - Supports up to four 1U compute modules
  - Supports up to 24x U.2 PCIe* 4.0 NVMe* SSDs
- 3U air cooled, 2100 W PSU chassis supporting E1.L SSDs – iPC **VP3E1HAC21W0**
  - Supports up to four 1U compute modules
  - Supports up to 32x E1.L (EDSFF) PCIe* 4.0 NVMe* SSDs

Refer to Table 14 for a feature list of system and chassis-only features.

Figure 12. Intel Server Chassis VP3U2HAC21W0

Figure 13. Intel® Server Chassis VP3E1HAC21W0

Table 14. Intel® Server Chassis / System D40AMP Feature Set

Feature	Description	
	Chassis SKU iPC VP3U2HAC21W0	**Chassis SKU iPC VP3E1HAC21W0**
Chassis Type	VP3000, 3U rack-mount, multi-module, air cooled, for 2.5" SSD drives	VP3000, 3U rack-mount, multi-module, air cooled, for E1.L SSD drives
Chassis Dimensions	736.6 mm x 440 mm x 130.8 mm (L x W x H)	
Packaging Dimensions	990 mm x 594 mm x 407 mm (L x W x H)	
Cooling	• Four dual-rotor 80 mm hot-swap fans with support for fan redundancy • Six dual-rotor 40 mm fans with support for fan redundancy • One fan per installed power supply unit (PSU)	
Power	Up to four 2100-watt AC power supplies with power redundancy support (dependent on system configuration).	
Rack Mount Kit (VPXXRAILKIT)	• Tool-less installation • Travel distance: 536mm • Max supported weight: 60kg **Note:** Rack mount kit is included with chassis.	
Serviceability	• Modular chassis features for simplified serviceability: • Fully independent warm-swappable Intel® D40AMP modules • Hot-swappable power supplies • Hot-swappable system fans • Hot-swappable U.2 solid state drive (SSD) storage (dependent on system configuration) • Hot-swappable full-length PCIe* NVMe* EDSFF SSDs (dependent on system configuration)	
Operating Temperature	10–35 °C ambient temperature	

1.6 System Feature Identification

All systems within the Intel® Server D40AMP Family are designed for loading compute modules from the back. The following illustrations provide an overview of the rear features.

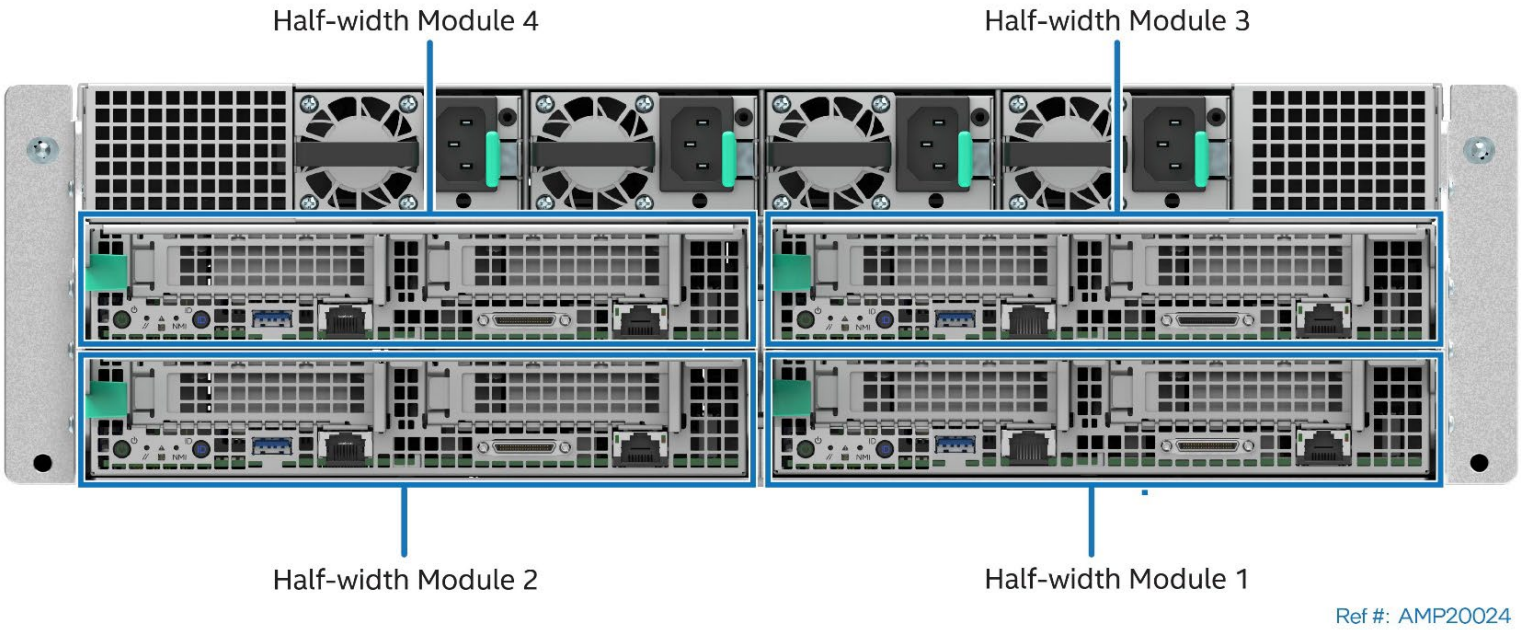


Figure 14. System Rear View - Module Identification

Chassis are offered with support for U.2 NVMe* SSDs or E1.L SSDs. The following illustrations identify key system features for both chassis options.

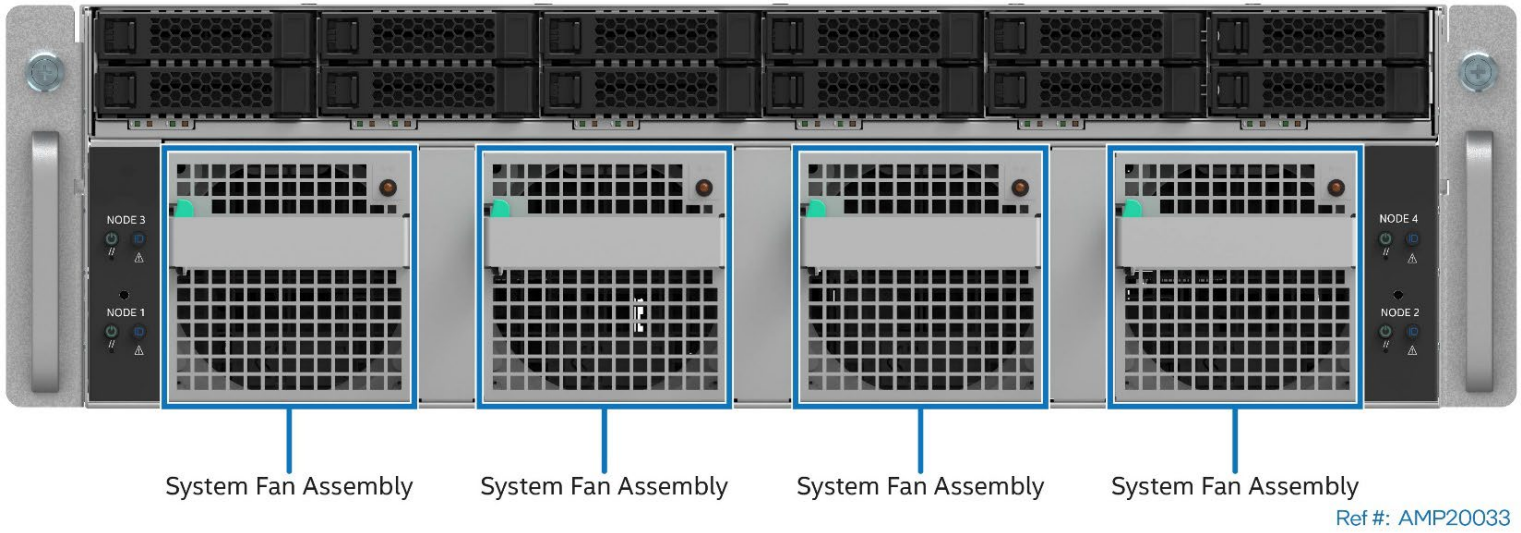


Figure 15. System Front View – Chassis VP3U2HAC21W0

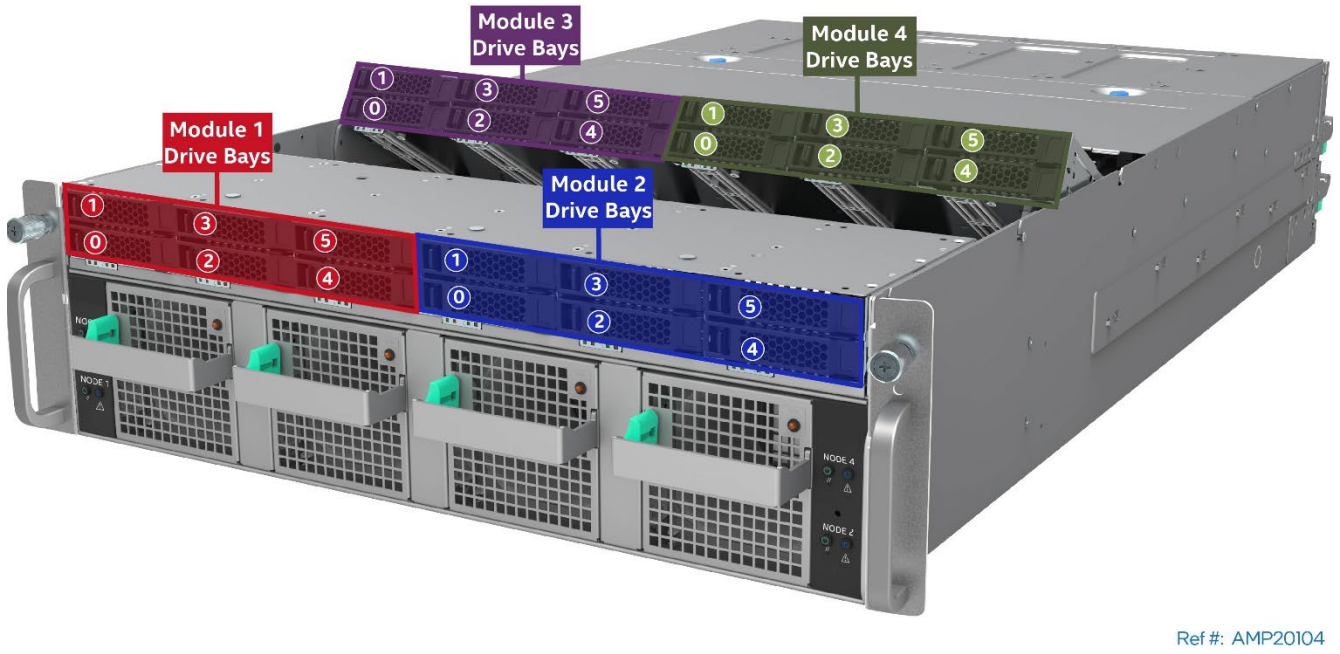


Figure 16. Drive Bay identification – Chassis VP3U2HAC21W0

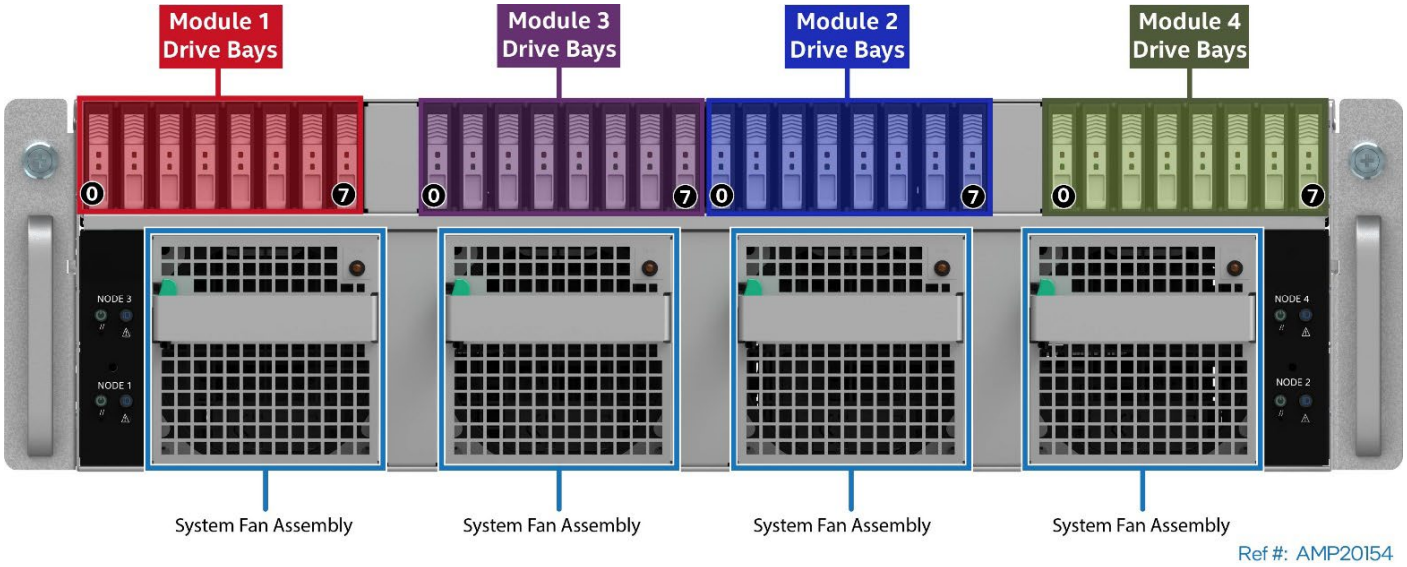


Figure 17. System Front View – Chassis VP3E1HAC21W0

1.7 Rack and Cabinet Mounting Kit

The Intel® Server System D40AMP supports a rail kit for installation into a four-post rack or cabinet. The following installation guidelines should be observed.

- For proper system ventilation, leave a minimum of 15 cm clearance in the front and rear of the system.
- Servers are high-power electrical appliances. They should be installed into dedicated cabinets with vents or professional water-cooled cabinets to prevent system failures caused by overheating.
- If installing more than one server or component into a given rack or cabinet, begin installing them from the bottom and load the heaviest items first.
- Note the cabinet's load-bearing capacity, power source capacity, and heat dissipation capacity. Be sure not to install devices that go beyond the cabinet's capacity thresholds.
- For the convenience of using the external I/O ports of the system and to allow for cabling, leave a minimum clearance of 15 cm between the back of the system and the inner side of the cabinet's back door.
- If your system has rack handles installed, do not lift, or carry the system solely by the rack handles. These handles are intended for the sole purpose of pulling a system from or pushing it into a rack.
- When lifting or moving a system, it is best to grasp and lift it by all four corners using two or more people. Do not grasp and lift the system by two opposing diagonal corners. Doing so will flex the chassis that may damage the internal system components.
- With no other option available but to lift the system using only two points of contact, grasp and lift the system at the mid-point of each side of the system.

Features and specifications for the rail kit are listed below:

- iPC **VPXXRAILKIT– Spare/Accessory** Rail Kit
  - Tool-less installation
  - Travel distance: 536mm
  - Max supported weight: 60kg

Safety Note: Due to the weight of a fully configured system, Intel recommends the following: Use a mechanical lift to aid with the installation of the system into the rack, and/or use at least two people to install the system into the rack. Alternatively, remove all installed modules from the system before attempting to install the system into a rack or cabinet.

2. Server Building Block Options

Server building blocks are offered to provide the option of choosing from available Intel® Server D40AMP Family components to create a custom system configuration from the chassis up. Each building block component and optional accessory is purchased separately and assembled by a system integrator. At a minimum, a base functional server system using building blocks requires the following:

- 3U Intel® Server Chassis from the VP3000 chassis family
- Up to four Intel® D40AMP Compute Modules
- Two processors per module
- Memory
- Storage devices

Optional Intel accessories include the following:

- Intel® Virtual RAID on Chip (Intel® VROC) activation key
- I/O breakout cable with support for serial port, video port, and USB 2.0 ports

See Chapter 3 for all available accessory options.

2.1 Intel® Server D40AMP Board Options

The product tables found in this section provide order code information and detailed descriptions for each available board option. The lower sections of each table identify:

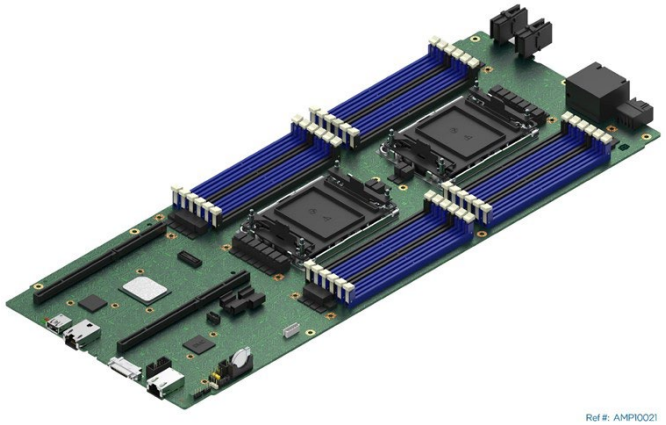
- **Included** – The ship along components of the specified product code (product BOM).
- **Required items** – Hardware required to be installed to the base system to achieve basic functionality using the default system feature set. Required items are sold separately.
- **Optional accessories** – Some of the available accessories that can be installed to enhance the basic feature set of the server board/chassis. Optional accessories are sold separately.

For optional accessories, see Chapter 3.

Note: Items identified with an iPC (Intel Product Code) are orderable building block options, accessories, or spare FRUs. In an effort to provide the complete product bill of materials, the ship along components list in each product table include items identified by description and by iPN (Intel Part Number). The iPN information is provided for reference only. These components are not orderable as spares or accessories.

Table 15. Intel® Server Board D40AMP1SB Product Specifications

Intel® Server Board D40AMP1SB
Intel® Server Board D40AMP



iPC	D40AMP1SB
MM#	99AH9K
UPC	735858497800
EAN	5032037232869
MOQ	1

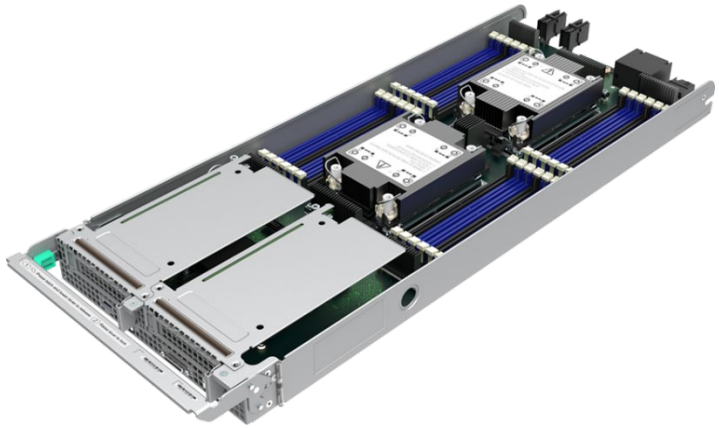
Product type	Server board only
Form factor	Half-width
Packaged gross wt.	6.83 lbs. (3.1 kg)
Un-packaged net wt.	3.82 lbs. (1.731 kg)
Dimensions	543.56 x 211.58 x 2.23 mm (L x W x H)

Included	Required Items (sold separately)	Optional Accessories (sold separately)
(2) - Socket-P4 4189 supporting the 3rd Gen Intel® Xeon® Scalable processor (2) - Processor carrier clip, for 3rd Gen Intel® Xeon® Scalable processor – iPN J98484-xxx (24) - DIMM slots with supports for SDRAM DDR4 DIMMs and Intel® Optane™ persistent memory 200 series modules (1) - PCIe* ExaMax* connector See Table 13 for the complete board feature set.	(2) – 3rd Gen Intel® Xeon® Scalable processor family See Section 1.1.1 for processors supported. Up to (16) SDRAM DDR4 DIMMs and up to (8) Intel® Optane™ persistent memory 200 series modules Up to (8) DIMM blanks – iPC **TNPDMMBLNK** See Section 1.1.2 and 1.1.3 for supported memory and population rules.	(1) – Intel® Virtual RAID on CPU (Intel® VROC) - Standard Model Key – iPC VROCSTANMOD **OR** (1) – Intel® Virtual RAID on CPU (Intel® VROC) - Premium Model Key – iPC VROCPREMMOD (1) – Intel® Trusted Platform Module (TPM) 2.0 – iPC AXXTPMENC8 **OR** (1) – Intel® Trusted Platform Module (TPM) 2.0 China version – iPC AXXTPMCHNE8 See Chapter 3 for all available accessory options.

2.2 Intel® Server D40AMP Compute Module Options

The product tables found in this section provide order code information and detailed descriptions for compute module building block.

Table 16. Intel® Compute Module D40AMP1MHCPAC Product Specifications

Intel® Compute Module D40AMP1MHCPAC Intel® Compute Module D40AMP 1U half-width		
	**iPC** D40AMP1MHCPAC **MM#** 99AH9L **UPC** 735858494830 **EAN** 5032037230261 **MOQ** 1	**Product type** Compute module spare **Form factor** Density-optimized 1U **Packaged gross wt.** 12.76 lbs. (5.79 kg) **Un-packaged net wt.** 9.45 lbs. (4.29kg) **Dimensions** 591.4 x 216 x 40.6 mm (L x W x H)
Included	**Required Items (sold separately)**	**Optional Accessories (sold separately)**
(1) – 1U half-width module tray – iPN M28502-xxx (1) – Intel® Server Board D40AMP – iPN M48857-xxx (1) – 1U compute module air duct – iPN K61940-xxx (2) – 1U low-profile PCIe* riser card – iPN M13291-xxx (2) – 1U riser bracket – iPN K25206-xxx (1) – 1U air cooled heat sink for CPU 0 – iPN K56681-xxx (1) – 1U air cooled heat sink for CPU 1 – iPN K40672-xxx (2) – M.2 Heat Sink air cooled – iPN K61922-xxx	(2) – 3rd Gen Intel® Xeon® Scalable processor family See Section 1.1.1 for processors supported. Up to (16) SDRAM DDR4 DIMMs and up to (8) Intel® Optane™ persistent memory 200 series modules Up to (8) DIMM blanks– iPC **TNPDMMBLNK** See Section 1.1.2 and 1.1.3 for supported memory and population rules.	(1) – I/O breakout cable – iPC AXXCONNTDBG (1) – Intel® Virtual RAID on CPU (Intel® VROC) - Standard Model Key – iPC VROCSTANMOD OR (1) – Intel® Virtual RAID on CPU (Intel® VROC) - Premium Model Key – iPC VROCPREMMOD (1) – Intel® Trusted Platform Module (TPM) 2.0 – iPC AXXTPMENC8 OR (1) – Intel® Trusted Platform Module (TPM) 2.0 China version – iPC AXXTPMCHNE8 Up to two M.2 SSD Drives (SATA/NVMe*) See Chapter 3 for all available accessory options

2.3 Intel® Server Chassis VP3000 Family Options

The product tables found in this section provide order code information and detailed descriptions for each available chassis option. The parts listed as included are ship along components in the product BOM.

For optional accessories, see Chapter 3.

Table 17. Intel® Server Chassis VP3U2HAC21W0 Product Specifications

Intel® Server Chassis VP3U2HAC21W0 3U, rack mount, air cooled server chassis supporting up to 24 U.2 NVMe* SSDs		
	**iPC** VP3U2HAC21W0 **MM#** 99AJLT **UPC** 735858494847 **EAN** 5032037230278 **MOQ** 1	**Product type** Chassis spare **Chassis form factor** 3U rack mount **Packaged gross wt.** 81.7 lbs. (37.06 kg) **Un-packaged net wt.** 66.07 lbs. (29.97 kg) **Chassis dimensions** 736.6 x 440 x 130.8 mm (L x W x H) **Package dimensions** 990 x 594 x 407 mm (L x W x H)
Included	**Required Items (sold separately)**	**Optional Accessories (sold separately)**
(1) – 3U rack mount chassis (4) – Fan assembly with integrated dual rotor 80mm fan – iPC **VPXX80MMFAN** (6) – Dual rotor 40mm fan – iPC **CYPFAN1UKIT** (24) – 2.5” Drive Blank (1) – Primary power distribution board – iPC **VP3MPDBASSMBL** (1) – Secondary power distribution board – iPC **VP3DPDBASSMBL** (1) – Rack rail mount kit – iPC **VPXXRAILKIT**	Up to four compute modules from the Intel® Server D40AMP family – iPC **D40AMP1MHCPAC** Two 2100W common redundant power supplies (CRPS) – iPC **FCXX2100CRPS**	Up to 24 U.2 SSDs Up to two M.2 SSDs 80/110mm (SATA/NVMe*) per compute module Up to four 2100W common redundant power supplies (CRPS) can be installed into the chassis for power redundant configuration – iPC **FCXX2100CRPS**

Table 18. Intel® Server Chassis VP3E1HAC21W0 Product Specifications

Intel® Server Chassis VP3E1HAC21W0
3U, rack mount, air cooled server chassis supporting up to 32 EDSFF NVMe* SSDs

iPC	VP3E1HAC21W0
MM#	99AJLN
UPC	735858494854
EAN	5032037230285
MOQ	1

Product type	Chassis spare
Chassis form factor	3U rack mount
Packaged gross wt.	77.84 lbs. (35.31 kg)
Un-packaged net wt.	62.14 lbs. (28.19 kg)
Chassis dimensions	736.6 x 440 x 130.8 mm (L x W x H)
Package dimensions	990 x 594 x 407 mm (L x W x H)

Included	Required Items (sold separately)	Optional Accessories (sold separately)
(1) – 3U rack mount chassis (4) – Fan assembly with integrated dual rotor 80mm fan – iPC **VPXX80MMFAN** (6) – Dual rotor 40mm fan – iPC **CYPFAN1UKIT** (32) – EDSFF Blank – iPC **TNPRLRBLNK** (1) – Primary power distribution board – iPC **VP3MPDBASSMBL** (1) – Secondary power distribution board – iPC **VP3DPDBASSMBL** (1) – Rack rail mount kit – iPC **VPXXRAILKIT**	Up to four compute modules from the Intel® Server D40AMP family – iPC **D40AMP1MHCPAC** Two 2100W common redundant power supplies (CRPS) – iPC **FCXX2100CRPS**	Up to 32 E1.L SSDs Up to two M.2 SSDs 80/110mm (SATA/NVMe*) per compute module Up to four 2100W common redundant power supplies (CRPS) can be installed into the chassis for power redundant configuration – iPC **FCXX2100CRPS**

3. Accessory Options

The following sections identify available accessories supported within the Intel® Server D40AMP Family.

Table 19. Miscellaneous Accessory Options

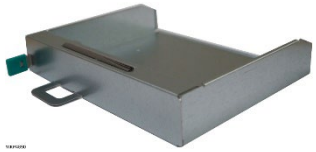
Image	Details	Description
	**I/O breakout cable** **iPC** AXXCONNTDBG **MM#** 999D47 **UPC** 00735858424349 **EAN** 5032037166638 **MOQ** 1 **Product type** Accessory kit	I/O breakout cable connector kit, compatible with Intel® D40AMP compute modules. Supports the following ports: • (1) serial port • (1) video port • (2) USB 2.0 ports
	**1U Compute Module Blank** **iPC** AXXFC1UBLANK **MM#** 999D49 **UPC** 00735858425995 **EAN** 5032037168199 **MOQ** 1 **Product type** Accessory kit	1U module blank, compatible with the Intel® Server Chassis VP3000 family.
	**Intel® Virtual RAID on CPU (Intel® VROC) - Standard Model Key** **iPC** VROCSTANMOD **MM#** 951605 **UPC** 00735858337243 **EAN** 5032037100007 **MOQ** 5 **Product type** Accessory kit	Activation key to support Intel and non-Intel® NVMe* SSDs and enable RAID (0, 1, 10) functionality.

Image	Details	Description
	**Intel® Virtual RAID on CPU (Intel® VROC) - Premium Model Key** **iPC** VROCPREMMOD **MM#** 951606 **UPC** 00735858337267 **EAN** 5032037100014 **MOQ** 5 **Product type** Accessory kit	Activation key to support Intel and non-Intel NVMe* SSDs and enable RAID (0, 1, 5, 10) functionality.
	**Intel® Trusted Platform Module (TPM) 2.0** **iPC** AXXTPMENC8 **MM#** 955867 **UPC** 00735858345712 **EAN** 5032037106207 **MOQ** 1 **Product type** Accessory kit	A TPM is a hardware-based security device that addresses the growing concern on boot process integrity and offers better data protection. TPM protects the system start-up process by ensuring that it is tamper-free before releasing system control to the operating system. A TPM device provides secured storage to store data, such as security keys and passwords. In addition, a TPM device has encryption and hash functions. AXXTPMENC8 implements TPM as per TPM PC Client specifications revision 2.0 by the Trusted Computing Group (TCG)
	**Intel® Trusted Platform Module (TPM) 2.0** **iPC** AXXTPMCHNE8 **MM#** 960608 **UPC** 00735858347341 **EAN** 5032037107068 **MOQ** 1 **Product type** Accessory kit	**Note**: AXXTPMCHNE8 intended for use in China. A TPM is a hardware-based security device that addresses the growing concern on boot process integrity and offers better data protection. TPM protects the system start-up process by ensuring that it is tamper-free before releasing system control to the operating system. A TPM device provides secured storage to store data, such as security keys and passwords. In addition, a TPM device has encryption and hash functions. AXXTPMCHNE8 implements TPM as per TPM PC Client specifications revision 2.0 by the Trusted Computing Group (TCG)

4. Spare and Replacement Parts (FRUs)

System integrators and distributors may choose to hold additional stock of individual system components. Intel makes available the following spare and replacement parts (FRUs) compatible with the specified Intel® server family.

Table 20. Spare and Replacement Parts

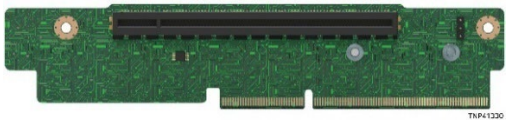
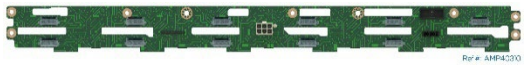
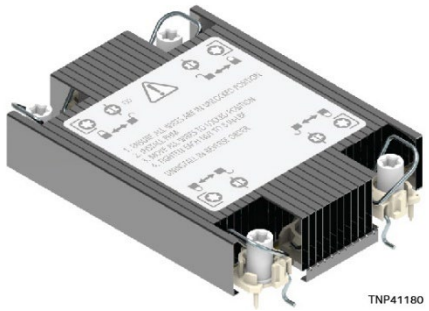
Image	Details	Description
	**1U PCIe* x16 Riser Card for Low-Profile PCIe* Card and M.2 Device.** **iPC** TNP1UCRRISER **MM#** 99AF4H **UPC** 00735858476270 **EAN** 5032037214155 **MOQ** 1 **Product type** Spare FRU	Riser card option for Intel® D40AMP compute modules Supports low-profile PCIe* add-in card on the right side and one SATA/PCIe* 80/110 mm M.2 device on the left side. Kit includes: • 1U riser card • M.2 standoff and screw
	**U.2 Hot Swap Backplane Assembly** **iPC** VP3U2HSBASSMBLF **MM#** 99AJLJ **UPC** 735858497817 **EAN** 5032037232876 **MOQ** 1 **Product type** Spare FRU	Spare hot-swap backplane assembly for use with chassis VP3U2HAC21W0. Supports up to 12 U.2 NVMe* SSDs
	**D40AMP 1U air-cooled heat sink for CPU1** **iPC** TNP1UHSF **MM#** 99A2F9 **UPC** 00735858469500 **EAN** 5032037208079 **MOQ** 1 **Product type** Spare FRU	Standard heat sink, for CPU 1.

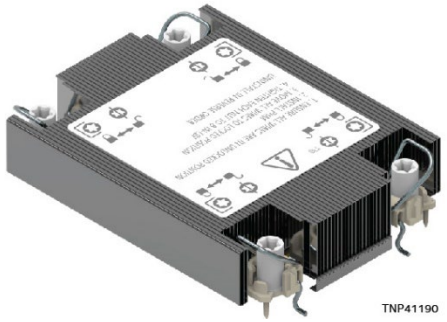
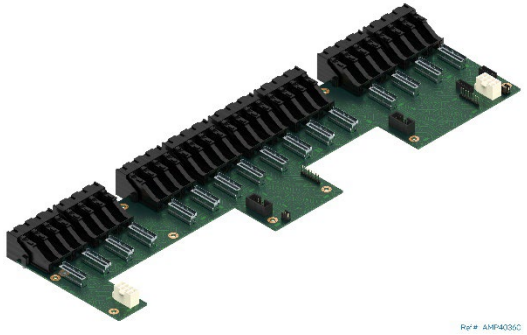
Image	Details	Description
	**D40AMP 1U air-cooled heat sink for CPU0** **iPC** TNP1UHSB **MM#** 99A2FA **UPC** 00735858469517 **EAN** 5032037208086 **MOQ** 1 **Product type** Spare FRU	Standard heat sink, for CPU 0.
	**EDSFF Midplane Assembly** **iPC** VP3E1LMPASSMBL **MM#** 99AJLD **UPC** 735858497824 **EAN** 5032037232883 **MOQ** 1 **Product type** Spare FRU	Spare midplane assembly for use with chassis VP3E1HAC21W0. Supports up to 32 EDSFF NVMe* SSDs
	**D40AMP M.2 heat sink air cooled assembly** **iPC** TNPM2HS **MM#** 99A2GA **UPC** 00735858469579 **EAN** 5032037208147 **MOQ** 1 **Product type** Spare FRU	M.2 heat sink spare kit. Compatible with D40AMP compute modules. Kit includes: • (1) M.2 heat sink and screw

Image	Details	Description
	**D40AMP DIMM Blank** **iPC** TNPDMMBLNK **MM#** 99A5ZC **UPC** 00735858469593 **EAN** 5032037208161 **MOQ** 1 **Product type** Spare FRU	Compatible with D40AMP compute modules. Kit includes 8 pieces per pack.
	**D40AMP EDSFF Blank** **iPC** TNPRLRBLNK **MM#** 99AF4C **UPC** 00735858476287 **EAN** 5032037214162 **MOQ** 1 **Product type** Spare FRU	Compatible with chassis VP3E1LMPASSMBL. Kit includes 4 pieces per pack.
	**2100 W Common Redundant Power Supply (CRPS)** **iPC** FCXX2100CRPS **MM#** 999D4L **UPC** 00735858424592 **EAN** 5032037166829 **MOQ** 1 **Product type** Spare FRU	2100 W AC common redundant power supply, 80 PLUS* Platinum efficiency.

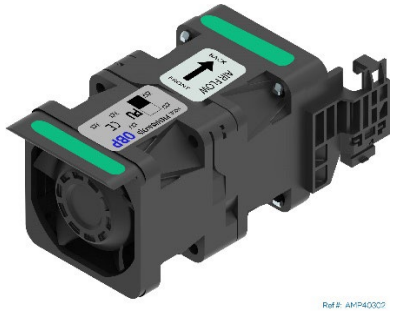
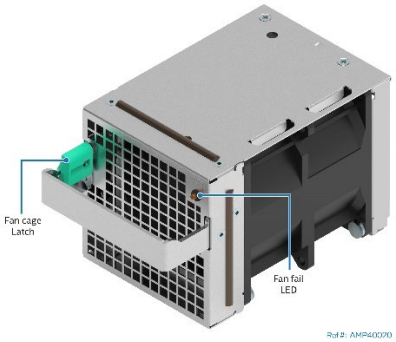
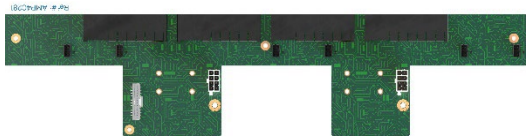
Image	Details	Description
	**Spare Integrated Dual Rotor 40 mm Fan** **iPC** CYPFAN1UKIT **MM#** 99A3NZ **UPC** 00735858471848 **EAN** 5032037210287 **MOQ** 1 **Product type** Spare FRU	System fan spare with Integrated dual rotor 40 mm fan.
	**Spare Fan Assembly with Integrated Dual Rotor 80 mm Fan** **iPC** VPXX80MMFAN **MM#** 99AJLL **UPC** 735858497855 **EAN** 5032037232913 **MOQ** 1 **Product type** Spare FRU	Fan assembly with integrated dual rotor 80 mm fan.
	**Primary Power Distribution Board Assembly** **iPC** VP3MPDBASSMBL **MM#** 99AJLG **UPC** 735858497831 **EAN** 5032037232890 **MOQ** 1 **Product type** Spare FRU	Primary power distribution board assembly spare kit.

Image	Details	Description
	**Secondary Power Distribution Board Assembly** **iPC** VP3DPDBASSMBL **MM#** 99AJLF **UPC** 735858497848 **EAN** 5032037232906 **MOQ** 1 **Product type** Spare FRU	Secondary Power distribution board assembly spare kit. Kit includes: • (1) power distribution board
	**Rail Kit** **iPC** VPXXRAILKIT **MM#** 99AJJ8 **UPC** 735858493345 **EAN** 5032037228947 **MOQ** 1 **Product type** Spare FRU	• Tool-less installation • Travel distance: 536mm • Max supported weight: 60kg
	**Spare North America Power Cable** **iPC** FPWRCABLENA **MM#** 879287 **UPC** 00735858181129 **EAN** 503203702015738 **MOQ** 1 **Product type** Spare FRU	Spare North America power cord.

Appendix A. 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
FRU	Field Replaceable Unit
iPC	Intel Product Code
iPN	Intel Product Number
LRDIMM	Load-Reduced DIMM
MM#	Master Material order number
MOQ	Minimum Order Quantity
NVMe*	NVM Express* – based on Non-Volatile Memory Host Controller Interface Specification (NVMHCI)
OR	Oct Rank
PCIe*	PCI Express*
PMem	Persistent Memory
QR	Quad Rank
RDIMM	Registered DIMM
SSD	Solid State Drive
SR	Single Rank
Intel® UPI	Intel® Ultra Path Interconnect
UPC	Universal Product Code (Barcode)
Intel® VROC	Intel® Virtual RAID on CPU