

Overview

Shape the Future of QuickSpecs – Your Input Matters

HPE Synergy 480 Gen12 Compute Module

HPE Synergy, the first platform built from the ground up for Composable Infrastructure, offers an experience that empowers IT to create and deliver new value instantly and continuously. It is a single infrastructure that reduces operational complexity for traditional workloads and increases operational velocity for the new breed of applications and services. Through a single interface, HPE Synergy composes physical and virtual compute, storage, and fabric pools into any configuration for any application. As an extensible platform, it easily enables a broad range of applications and operational models such as virtualization, hybrid cloud, and DevOps. With HPE Synergy, IT can become not just the internal service provider but the business partner to rapidly launch new applications that become the business.

The HPE Synergy 480 Gen12 Compute Module delivers exceptional capacity, efficiency, and flexibility in a two-socket, half-height form factor to support demanding workloads. Powered by Intel® Xeon® 6 Processors with up to 86 cores, HPE DDR5 Smart Memory supporting up to 4TB per processor, flexible storage controller options, multiple I/O connectors, and designed to create a pool of flexible compute capacity within a composable infrastructure the HPE Synergy 480 Gen12 Compute Module is the ideal platform for general-purpose enterprise workload performance now and in the future.

This QuickSpecs document focuses on the HPE Synergy 480 Gen12 Compute Module.

Notes: Installation of the HPE Synergy 480 Gen12 Compute Module involves a minimum upgrade requirement for component compatibility purposes. To ensure proper system functionality, you must update your system to the appropriate HPE Synergy Software Release before installing and operating your compute module.

For information on HPE Synergy Releases, go to: <http://www.hpe.com/downloads/synergy>.

Overview



Front View – HPE Synergy 480 Gen12 Compute Module (Shown with 8EDSFF Drive Cage Kit¹)

- | | |
|--|--|
| 1. UID LED | 5. Compute Module handle release latch |
| 2. Health Status LED | 6. Removable drive cage ¹ |
| 3. Mezzanine NIC status LED | 7. Quick Access Panel |
| 4. Power On/Stand by button and system power LED | 8. Serial Label Pull Tab ² |

Notes:

- ¹Options for 4 and 8 drive bays, or drive-less.
- ²Tab used for ID information on product. External USB 3.0 connector & iLO USB connection (behind serial label pull tab)

Overview



Front View – HPE Synergy 480 Gen12 Compute Module (Shown with 4SFF NVMe Direct Connect Drive Cage Kit¹)

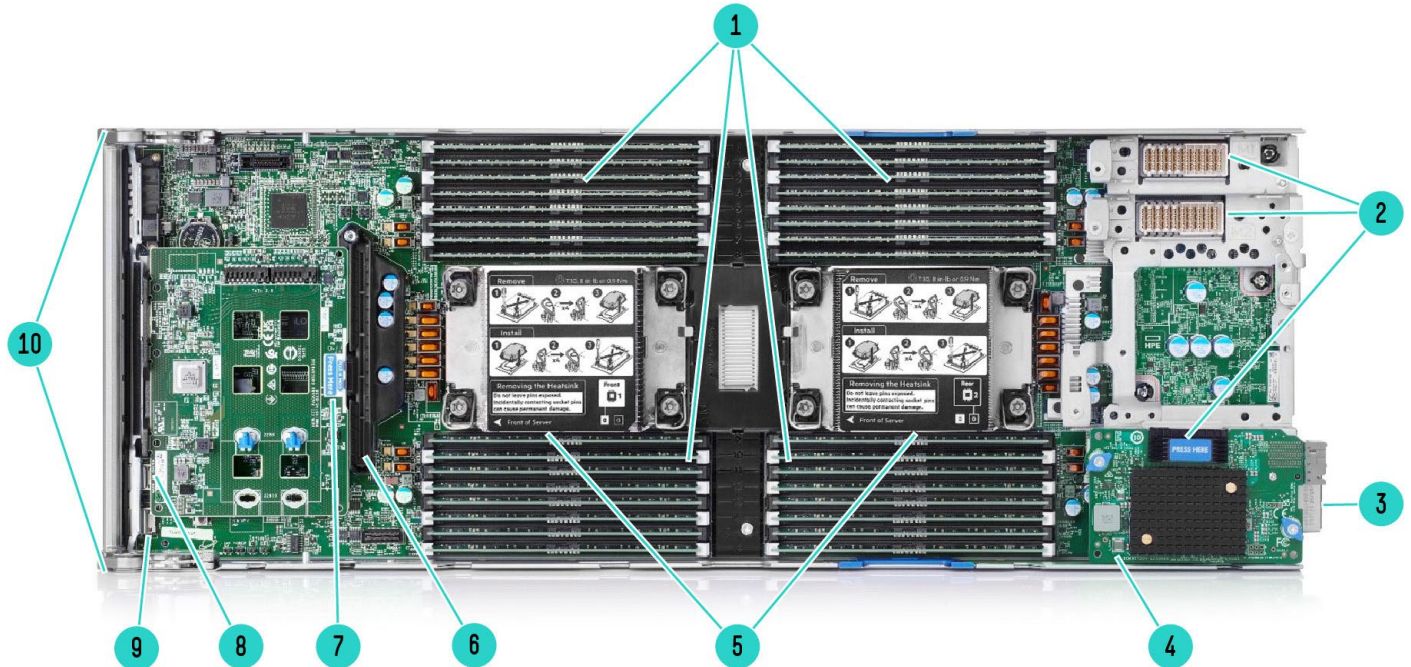
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Overview



Synergy 480 Gen12 Compute Module
(Drive Cage removed)

- | | |
|--|--|
| 1. Thirty Two (32) DDR5 DIMM memory slots ¹ | 6. Connection point for Optional Drive Cage solutions ² |
| 2. Mezzanine connectors (3 x16 PCIe 5.0) | 7. HPE NS204i-d Gen12 Boot Controller Connector |
| 3. Compute Module Power and Management / Power Connector | 8. External USB 3.0 |
| 4. Storage Controller Energy Pack connection | 9. External USB iLO |
| 5. Up to two (2) Intel Xeon® 6 processors | 10. Selectable front cage options ³ |

Notes:

- ¹16 per processor
- ²Drive Bays (4x NVMe Direct Connect or 4x SAS/SATA/NVMe), 8x Drive Bays (8x EDSFF NVMe E3.S OCP Controller or Direct Connect) or Drive-less.
- ³HPE Synergy NS204i-d v2 M.2 Boot Storage Device connects under drive cage

What's New

- The Gen12 compute module has been designed to provide increased performance and capacity.
- Optional drive cage options for 4 Drive, 8 Drive and Drive-less for your needed SAN and vSAN workloads.
- HPE Synergy NS204i-d v2 M.2 Boot Storage Device designed for VMware HW RAID Requirements - operates with all drive cage options (all delivered as Factory Installed or sold as customer installable options).
- Intel® Xeon® 6 processors.
- Up to 16 DIMMs per processor for a maximum of 32 DIMMs and 8TB of memory per Compute Module. DIMM capacities range from 16Gb to 256GB at speeds up to 6400MT/s.
- PCIe 5.0 throughout the module to provide the best performance for boot, storage and IO.
- Regional Certifications including Energy Star, EU Lot 9, and Top Runner – Japan Fully Compliant.



Overview

ErP Lot9 Quick Summary

The European Parliament (ErP) is responsible for setting the ecological standards for products that are imported into the EU. The European Parliament Commission Regulation 2019/424 (also known as the ErP Lot 9 regulation) are a new set of product standards that deal with servers and data storage devices and goes into effect on March 1, 2020. Products that are not compliant with Lot 9 requirements cannot be imported into the European Union after March 1, 2020. For details see Tech Specs section of this document. See Configure to Order section for details on configurable options.

The HPE Synergy 480 compute module meets Lot9 in all configurations.

For additional information, please visit: <https://www.hpe.com/us/en/about/environment/msds-specs-more.html> .

Documents provided by HPE: Lot 9 Declarations, White paper, and FAQ.

Platform Information

Form Factor

- Single Slot Blade – Half-Height

Chassis Types

- Single Compute chassis for CTO
- 4 SFF SAS/SATA/NVMe OCP Connect Option
- 4 SFF NVMe Direct Connect Drive Cage Option
- 8 EDSFF NVMe E3.S Direct Connect Drive Cage Option
- 8 EDSFF NVMe E3.s OCP Connect Drive Cage Option
- Drive-Less Cage Option

System Fans

- Comes with Frame by default and not with the HPE Synergy 480 Gen12 Compute Module (this product).

Notes: The HPE Synergy 480 Gen12 Compute Module requires the HPE Synergy 12000 Frame to be configured with the HPE Synergy 12000 High Capacity Fan Kits.



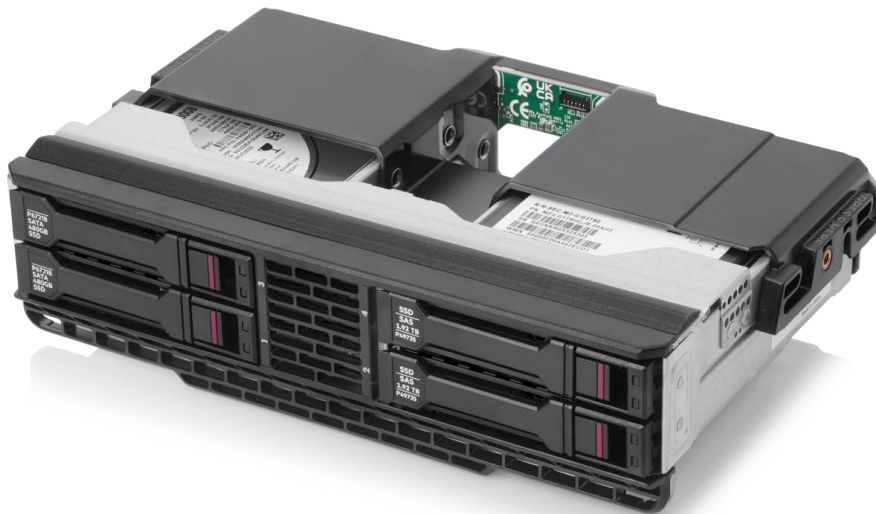
Overview

HPE Synergy Gen12 – Front Cage Options

The HPE Synergy 480 Gen12 compute module consists of a single base chassis with multiple selectable drive and controller option kits. The module includes multiple **Front Cage options** for boot and storage.

Notes:

- The Front Cage options are offered as factory installed and Build-To-Order (BTO) options offered for later field updates.
- One of the Drive Chassis options is required to ship to any customer.



HPE Synergy 480 Gen12 4SFF SAS/SATA/NVMe OCP Drive Cage Kit

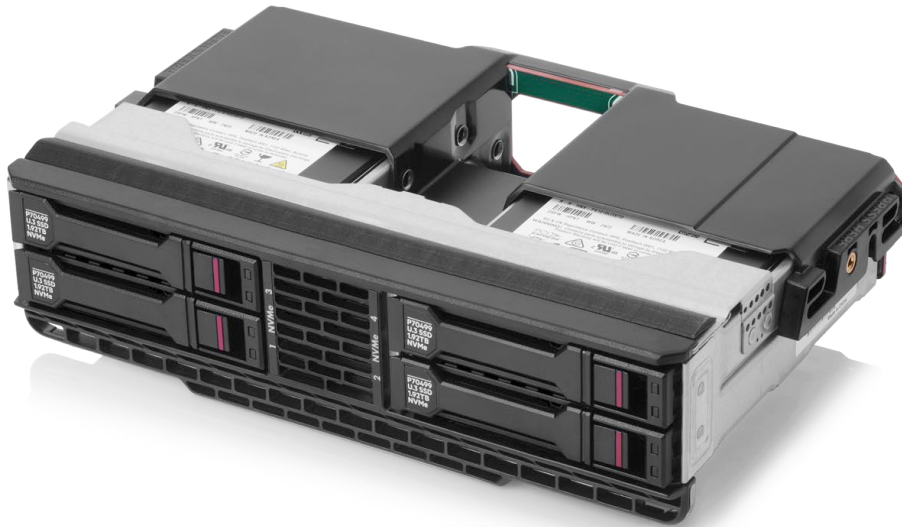
A four small form factor (SFF) drive SAS/SATA/NVMe Drive Cage Option for boot and storage requirements.

Notes: This drive cage requires the HPE MR416i-o Gen11 x16 Lanes 8GB Cache PCI OCP SPDM Storage Controller connected via the HPE Synergy 480 Gen12 MR416i-o Controller Cable Kit, HPE Synergy 480 Gen12 OCP Interposer Kit and the HPE Smart Hybrid Capacitor w/ 260mm cable kit.

For more details check your local sales office or see more details below in this QuickSpecs.



Overview



HPE Synergy 480 Gen12 4SFF NVMe Direct Connect Drive Cage Kit

A four SFF drive solution that supports up to 4x NVMe direct connect drives for boot and storage requirements. For more details look further down in this QuickSpecs.



HPE Synergy 480 Gen12 8EDSFF NVMe E3.S Direct Connect Drive Cage Kit

An eight drive solution that supports up to 8x NVMe direct connect E3.S drives for Boot and Storage requirements. For more details look further down in this QuickSpecs.



Overview



HPE Synergy 480 Gen12 8EDSFF NVMe E3.S OCP Drive Cage Kit

An eight drive solution that supports up to 8x EDSFF NVMe E3.S drives for boot and storage requirements.

Notes: This drive cage requires HPE Synergy 480 Gen12 MR416i-o Controller Cable Kit to connect to HPE MR416i-o Gen11 x16 Lanes 8GB Cache PCI OCP SPDM in Storage Controller, the HPE Synergy 480 Gen12 OCP Interposer Kit and the HPE Smart Hybrid Capacitor w/ 260mm cable kit.

For more details check your local sales office or see more details below in this QuickSpecs.



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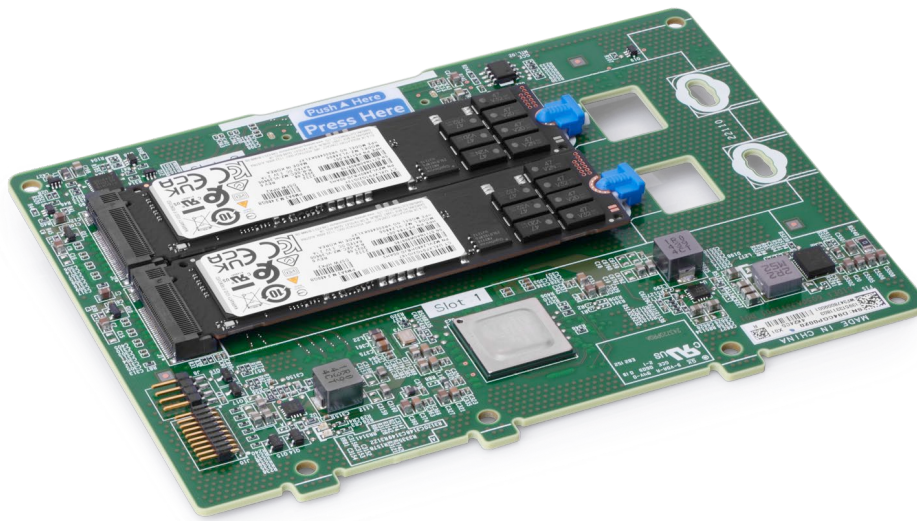
HPE Synergy 480 Gen12 without Drive Front Cage Kit

A Drive-less solution is for when no onboard storage is needed. It can be used for boot from SAN solutions or when only the HPE Synergy NS204i-d v2 M.2 Boot Storage Device solution is required.

For more details look further down in this QuickSpecs.



Overview



HPE Synergy NS204i-d v2 M.2 Boot Storage Device

The HPE Synergy NS204i-d v2 M.2 Boot Storage Device is a HW RAID solution and requires two (2) M.2 NVMe Drives to be configured with an option for Mirrored RAID.

Notes:

- May be used with any drive cage option above. May be selected as a CTO or BTO Option.
- Refer to the **Boot Devices Advisory Notice** for information about changes in VMware ESXi 7.0 or later.

Standard Features

HPE Synergy Management

HPE Synergy Composer2 powered by HPE OneView

Notes: Read and learn more about HPE [OneView](#)

On Compute Management Chipset

HPE iLO 7 ASIC

Notes: Read and learn more in the [iLO QuickSpecs](#)

Processors

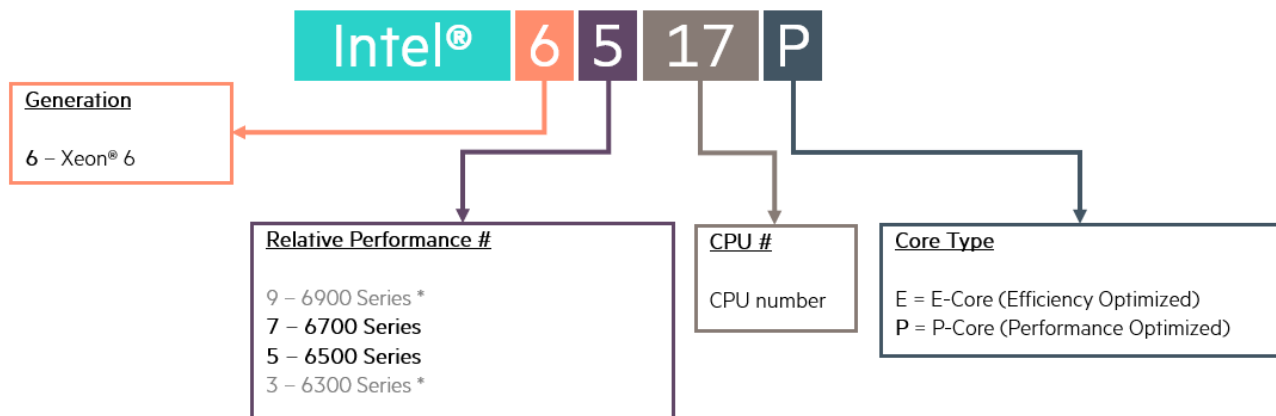
HPE Synergy 480 Gen12 compute module is designed on Intel® Xeon® 6 processors (65xxP and 67xxP).

Up to 2 of the following.

Notes:

- The 1st digit of the processor model number “6xxx” is used to denote the processor generation.
- The 2nd digit of the processor model number “x5xx or x7xx” is used to denote the processor relative performance.
- The next set of digits is used to denote the processor number.
- The last digit denotes the Core Type = E (E-Core for Efficiency Optimized or P (P-Core for Performance Optimized).
- This table covers the public Intel offering only.

For more information regarding Intel® Xeon® processors, please see the following: <http://www.intel.com/xeon>.



* CPU Series not support on HPE ProLiant Compute Gen12 platforms.

Standard Features

Intel® Xeon® 6 Processors

Model	Performance Level	CPU Frequency (GHz) Speed	Cores	L3 Cache (MB)	Power (Watts)	SGX Enclave size (GB)	UPI Links	DDR5 (MT/s)*	Die**
6507P Processor	5	3.5	8	48	150	512	4	6400	LCC
6505P Processor	5	2.2	12	48	150	128	4	6400	LCC
6515P Processor	5	2.3	16	72	150	128	4	6400	LCC
6517P Processor	5	3.2	16	72	190	512	4	6400	LCC
6520P Processor	5	2.4	24	144	210	128	4	6400	HCC
6527P Processor	5	3	24	144	255	512	4	6400	HCC
6530P Processor	5	2.3	32	144	225	128	4	6400	HCC
6737P Processor	7	2.9	32	144	270	512	4	6400	HCC
6730P Processor	7	2.5	32	288	250	512	4	6400	XCC
6736P Processor	7	2.0	36	144	205	512	4	6400	HCC
6740P Processor	7	2.1	48	288	270	128	4	6400	XCC
6745P Processor	7	3.1	32	336	300	512	4	6400	XCC
6747P Processor	7	2.7	48	288	330	512	4	6400	XCC
6760P Processor	7	2.2	64	320	330	128	4	6400	XCC
6767P Processor	7	2.4	64	336	350	512	4	6400	XCC
6787P Processor	7	2.0	86	336	350	512	4	6400	XCC

Notes:

- *Intel® Xeon 6® Processors support DDR5 support maximum memory speed of 6400 MT/s @ 1 DIMMs per channel (DPC) and 5200 MT/S @ 2DPC.
- **Intel® HCC & LCC die processors have delayed availability.

System Management Chipset

HPE iLO 7 ASIC

Notes: Read and learn more in the [iLO QuickSpecs](#).

Memory

Type	HPE DDR5 Smart Memory, Registered (RDIMM)
DIMM Slots Available	32 16 DIMM slots per processor, 8 channels per processor, 2 DIMMs per channel
Maximum capacity	8.0 TB 32 x 256 GB RDIMM and up to 6400 MT/s (depending on processor configuration)

Notes: The maximum memory speed is limited by the processor selection.

- All processors support up to 4TB memory per socket.
- The maximum memory speed is limited by the processor selection.
- To realize the performance memory capabilities listed in this document, HPE DDR5 Smart Memory is required.
- For additional information, please visit the [HPE Memory QuickSpecs and Technical White Papers](#) or [HPE DDR5 Smart Memory QuickSpecs](#).



Standard Features

Memory Protection

Advanced ECC

Advanced ECC uses single device data correction to detect and correct single and all multibit error that occurs within a single DRAM chip.

Memory

At least one of the following, depending on model.

The following memory supports Intel® Xeon® 6 processors.

- HPE 16GB (1x16GB) Single Rank x8 DDR5-6400 CAS-46-45-45 EC8 Registered Smart Memory Kit
- HPE 32GB (1x32GB) Dual Rank x8 DDR5-6400 CAS-46-45-45 EC8 Registered Smart Memory Kit
- HPE 64GB (1x64GB) Dual Rank x4 DDR5-6400 CAS-46-45-45 EC8 Registered Smart Memory Kit
- HPE 96GB (1x96GB) Dual Rank x4 DDR5-6400 CAS-46-45-45 EC8 Registered Smart Memory Kit
- HPE 128GB (1x128GB) Dual Rank x4 DDR5-6400 CAS-46-45-45 EC8 Registered Smart Memory Kit
- HPE 256GB (1x256GB) Quad Rank x4 DDR5-6400 CAS-60-52-52 EC8 Registered 3DS Smart Memory Kit

Notes: Important: Empty memory slots require DIMM Slot Blanks for improved thermal control. (HPE DDR-4 DIMM Blanks Kit, P07818-B21).

HPE memory from previous generation servers (DDR4) is not compatible with this compute module. HPE DDR5 Smart Memory is required to realize the memory performance improvements and enhanced functionality listed in this document for Gen12.

System requirements

Notes: Hewlett Packard Enterprise recommends that you implement best practice configurations for high availability (HA) such as clustered configurations.

The following hardware components are required for a complete HPE Synergy Solution:

- HPE Synergy 480 Gen12 compute module with Intel Xeon® 6 processors
- HPE DDR5 Standard Memory DIMM
- Boot and Storage solutions
- Network and IO Mezzanine
- HPE Synergy 12000 Frame
 - Composer2/OneView
 - Network and IO InterConnect Modules

Supported firmware versions:

- Latest System ROM version
- Server Platform Services (SPS) Firmware latest version
- HPE iLO Firmware latest version

Operating Systems and Virtualization Software Support

- Microsoft Windows Server
- Microsoft Hyper-V Server
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server
- VMware ESXi VMware vSphere

Notes:

- Operating System support may change. To get the most updated information, please go to the: **HPE Servers Support & Certification Matrices**
- For the most up to date information on HPE Synergy Service Packs refer to the: **HPE Synergy OS Support Tool**



Standard Features

Mezzanine Connectors (PCIe 5.0)

Three (3) I/O expansion mezzanine connectors:

- **Mezzanine 1 -- x16 PCIe 5.0**
 - Supports Type C and Type D mezzanine cards
 - Notes:** This mezzanine connector supports dual-port mezzanine cards: one port is routed to interconnect module bay 1 and the other to bay 4.
- **Mezzanine 2 -- x16 PCIe5.0**
 - Supports Type C and Type D mezzanine cards and the OCP Interposer
 - Notes:**
 - This mezzanine connector supports dual-port mezzanine cards: one port is routed to interconnect module bay 2 and the other to bay 5.
 - A second processor must be installed (in processor slot 2) to have access to mezzanine connector 2.
- **Mezzanine 3 -- x16 PCIe 5.0**
 - Supports Type C mezzanine cards
 - Notes:** This mezzanine connector supports dual-port mezzanine cards: one port is routed to interconnect module bay 3 and the other to bay 6.

Network & Storage Adapters or Mezzanine options include:

- HPE Synergy 5331C 32G Fibre Channel Host Bus Adapter
- HPE Synergy 6310C 25/50Gb Ethernet Adapter
- HPE MR416i-o Gen11 x16 Lanes 8GB Cache OCP SPDM Storage Controller
- HPE Synergy 480 Gen12 OCP Interposer Kit

Notes:

- Please refer to the Fabric/Network Options QuickSpecs for more details.
- The HPE MR416i-o Gen11 x16 Lanes 8GB Cache OCP SPDM Storage Controller and the HPE Synergy 480 Gen12 OCP Interposer Kit are only supported together and cannot be selected individually.
- The HPE MR416i-o Gen11 x16 Lanes 8GB Cache OCP SPDM Storage Controller and the HPE Synergy 480 Gen12 OCP Interposer Kit are only supported in Mezzanine 2 and two (2) processors are required.

HPE Compute Module ROM

HPE ROM (read only memory) is now digitally signed using the HPE Corporate Signing Service. As part of the Secure Start, this signature is verified before the flash process starts, reducing accidental programming and preventing malicious efforts to corrupt system ROM.

HPE ROM provides for essential initialization and validation of hardware components before control is passed to the customer-installed operating system. The ROM also provides the capability of booting from various fixed media (HDD, CD-ROM) and removable media (USB), to continue operation to the operating system.

HPE ROM performs very early configuration of the video controller, to allow monitoring of initialization progress via an attached monitor. If configuration or hardware errors are discovered during this early phase of hardware initialization, suitable messages are now displayed on the connected monitor. Additionally, these configuration or hardware errors are logged to the Integrated Management Log (IML) to assist in diagnosis.

HPE Synergy Compute ROM is used to configure the following:

- Processor and chipset status registers.
 - System memory, memory map, and memory initialization.
 - System hardware configuration (integrated PCI devices and optional PCIe Mezzanine cards).
 - Customer-specific BIOS configuration using the UEFI System Utilities.
-



Standard Features

Storage Drive cages and Controllers

One of the following depending on model:

Drive Cage Options

HPE Synergy 480 Gen12 4SFF SAS/SATA/NVMe OCP Drive Cage Kit

- Supports 4 SFF SAS, SATA, or NVMe Basic Carrier (BC) Drives to MR416i-o.
- Requires HPE MR416i-o Gen11 x16 Lanes 8GB Cache OCP SPDM Storage Controller, MR416i-o Controller cable kit P68224-B21 and HPE Synergy 480 Gen12 OCP Interposer Kit P68223-B21 and the HPE Smart Hybrid Capacitor w/ 260mm Cbl (P02381-B21).

HPE Synergy 480 Gen12 4SFF NVMe Direct Connect Drive Cage Kit

- Supports 4 SFF NVMe Basic Carrier drives direct connected to Socket 1.

HPE Synergy 480 Gen12 8EDSFF NVMe E3.S OCP Drive Cage Kit

- Supports 8 EDSFF NVMe E3.S Thin Carrier (EC1) drives to MR416i-o.
- Requires HPE MR416i-o Gen11 x16 Lanes 8GB Cache OCP SPDM Storage Controller, MR416i-o Controller cable kit P68224-B21 and HPE Synergy 480 Gen12 OCP Interposer Kit P68223-B21 and the HPE Smart Hybrid Capacitor w/ 260mm Cbl (P02381-B21).

HPE Synergy 480 Gen12 8EDSFF NVMe E3.S Direct Connect Drive Cage Kit

- Supports 8 EDSFF NVMe Thin Carrier (EC1) drives direct connected to Socket 1.

HPE Synergy 480 Gen12 without Drive Front Cage Kit

- Designed for the Stateless or No Drive solution where customer boots from SAN or alternate boot & store devices such and HPE Synergy NS204i-d v2 M.2 Boot Storage Device.

RAID solutions

NVMe Boot Devices – HW RAID

HPE Synergy NS204i-d v2 M.2 Boot Storage Device

Notes:

- Direct PCIe connection below drive cages. Supports 2x M.2 NVMe Drives ready for boot.
- Requires selection of qty 2 M.2 SSD drives.

Intel® VROC – HYBRID RAID

Notes: Only available with 4SFF NVMe Drive Direct Connect and 8EDSFF NVMe Drive Direct Connect drive cages.

Performance RAID Controller

- HPE MR416i-o Gen11 x16 Lanes 8GB Cache OCP SPDM Storage Controller Tri-Mode support PCIe Gen4 NVME, 12G SAS, 6G SATA), 8 internal 8 external lanes/2GB cache for use with 4 Drive and 8 DRIVE Premium front cages for SAS/SATA/NVME drives).
 - The HPE MR416i-o Gen11 x16 Lanes 8GB Cache OCP SPDM Storage Controller is only supported in Mezzanine 2 and two (2) processors are required.
-



Standard Features

Maximum Internal Storage

Drive	Capacity	Configuration
Hot Plug SAS HDD	9.6 TB	4 x 2.4TB (with 4SFF SAS/SATA/NVMe OCP drive cage)
Hot Plug SFF SAS SSD	61.44 TB	4 x 15.36 TB (with 4SFF SAS/SATA/NVMe OCP drive cage)
Hot Plug SFF SATA SSD	30.72 TB	4 x 7.68 TB (with 4SFF SAS/SATA/NVMe OCP drive cage)
Hot Plug SFF NVMe SSD	61.44 TB	4 x 15.36TB (with either 4SFF drive cage)
Hot Plug EDSFF NVMe E3.S SSD	245.76 TB	8 x 30.72TB (with either 8 EDSFF front drive cage)

Interfaces

Notes: The above options are intended for integrated hypervisor virtualization environments.

- External USB 3.0 Port for updates to Server Code.
- One (1) external USB 3.0 connector for USB flash media drive keys.
- One external iLO Service Port.

Frames

HPE Synergy 12000 Frame, is the base for all HPE Synergy products and supports:

- Up to twelve (12) half-height, or six (6) full-height single-wide compute Modules. (mixing allowed).
- One HPE Synergy 12000 Frame supports up to twelve (12) HPE Synergy 480 Gen12 Compute Modules.
- The HPE Synergy 480 Gen12 Compute Module requires HPE Synergy 12000 High Capacity Fans be installed in the frame.

Industry Standard Compliance

- Microsoft® Logo certifications
- WOL enabled on some adaptors
- PXE support enabled
- USB 3.0 Compliant; iLO USB 2.0 Compliant
- TPM 2.0 Support
- IEEE (specific IEEE standards depending on Ethernet adapter card(s) installed)
- Advanced Encryption Standard (AES)
- Triple Data Encryption Standard (3DES)
- SNMP v3
- SSL 2.0
- DMTF Systems Management Architecture for Server Hardware Command Line Protocol (SMASH CLP)
- Active Directory v1.0
- PCIe 5.0 Compliant
- UEFI (Unified Extensible Firmware Interface Forum)
- Redfish API (iLO6)
- Energy Star Compliant
- Top Runner – Japan Compliant
- ErP Lot9 Compliant (see Technical Specifications see [HPE Environmental Declarations website](#) for HPE Lot9 Declarations, a White Paper, FAQs and products list of verified products.

Notes: See requirements at the end of this document or in OCA for valid configurations to meet ErP Lot9 requirements.



Standard Features

Integrated VGA Controller (iLO)

- VGA Compatible Matrox G200eH3 Core with shared IOP/VGA memory architecture
- Video memory partition protected and configurable between 8M and 16M
- Supports 32bpp modes up to 1920 x 1200@60Hz

HPE iLO 7 on system management memory

- 32 MB Flash
- 8 Gbit DDR4 with ECC protection

HPE Server UEFI

Unified Extensible Firmware Interface (UEFI) is an industry standard that provides better manageability and more secured configuration while interacting with your server at boot time. HPE ProLiant Gen12 servers have a UEFI Class 2 implementation.

Notes: The UEFI System Utilities tool is analogous to the HPE ROM-Based Setup Utility (RBSU) of legacy BIOS. For more information, please visit <http://www.hpe.com/servers/uefi>

UEFI enables numerous capabilities specific to HPE Synergy Compute Modules such as:

- Secure Boot and Secure Start enable for enhanced security.
- Operating system specific functionality.
- Support for > 2.2 TB (using GPT) boot drives.
- USB 3.0 Stack.
- Embedded UEFI Shell.
- Mass Configuration Deployment Tool using iLO RESTful API that is Redfish API Conformant.
- PXE boot support for IPv6 networks.
- Workload Profiles for simple performance optimization.

UEFI Boot Mode only:

- TPM 2.0 Support.
- NVMe Boot Support.
- Platform Trust Technology (PTT) can be enabled.
- iSCSI Software Initiator Support.
- HTTP/HTTPs Boot support as a PXE alternative.
- Boot support for option cards that only support a UEFI option ROM.

Notes: For UEFI Boot Mode, boot environment and OS image installations should be configured properly to support UEFI.

Embedded Management

HPE Synergy Composer2 powered by HPE OneView

HPE Synergy integrates HPE OneView to deliver 'Composable infrastructure' with a view of resources. This flexible and scalable solution provides IT managers with the architecture to implement their Software-Defined data center (SDDC) -- and to address the changing business needs and the challenges of today's enterprise data centers.

HPE Integrated Lights-Out (HPE iLO)

Silicon Root of Trust. Protect, detect, recover with iLO. Monitor your servers for ongoing management, service alerting, reporting and remote management with HPE iLO. Learn more at <https://www.hpe.com/info/ilo>.

UEFI

Configure and boot your servers securely with industry standard Unified Extensible Firmware Interface (UEFI). Learn more at [UEFI System Utilities \(hpe.com\)](http://www.hpe.com/uefi)



Standard Features

iLO RESTful API

iLO RESTful API is Redfish API conformance and offers simplified server management automation such as configuration and maintenance tasks based on modern industry standards. Learn more at <https://www.hpe.com/info/restfulapi>.

Security

Newest forms of security based on iLO7 features.

- Secure Start, with hardware root of trust.
- HPE hardware designed logic in iLO chip validates iLO firmware burned in chip.
- iLO then validates system/compute ROM firmware for digital signature.
- iLO completes the chain of trust.
- ROM validates option ROMs and OS Bootloader via UEFI Secure Boot.

Please refer to the [HPE iLO 7 Security Technology Brief document](#) for more detailed information:

Standard security features

- Power-on password.
- Administrator's password.
- Keyboard password (QuickLock).
- HPE iLO Management On System Management Chipset with SSL encryption, Secure Shell version 2, Advanced Encryption Standard (AES) and Triple Data Encryption Standard (3DES) on browser, CLP and XML scripting interface, AES and RC4 encryption of video.
- External USB port enable/disable.
- Network server mode.
- Serial interface control.
- TPM (Trusted Platform Module) 2.0 support.
- Advanced Encryption Standard (AES).
- Intel® Advanced Encryption Standard-New Instructions (AES-NI).

Please refer to the HPE ProLiant Compute Gen12 Embedded Security QuickSpecs document for more detailed information at: <https://www.hpe.com/psnow/doc/a50009218enw>

About Trusted Platform Module

Trusted Platform Module (TPM) is a separate processor that monitors the system state. TPM is a passive component needing to be updated and not able to lock down any component in the system except access to its own memory. It also provides some cryptographic operations - among them: creating RSA keypairs, and working with them.

The first verification of signatures happens by code on the CPU, which can be intercepted and replaced. Emulating a "properly" booted system is possible by sending the right values to the TPM.

The bootblock, the part of the firmware that contains the first instructions executed by the CPU, comes first and anchors the root of trust. But if you can't trust the bootblock to send a truthful state into the TPM, this is a vulnerability.

About HPE Silicon Root of Trust

As soon as the server is powered on and the iLO firmware comes alive, it looks into the silicon for the immutable fingerprint that verifies all the firmware code is valid and uncompromised. Over a million lines of firmware code run before the operating system starts, making it vital to confirm that all server essential firmware is free from malware or compromised code.

During operation of the server, HPE has a new technology that conducts run-time firmware validation that checks the firmware stored in the server. At any point, if compromised code or malware is inserted in any of the critical firmware, an iLO audit log alert is created to notify the customer that a compromise has occurred. It is achieved by storing iLO 7 and UEFI firmware in non-volatile

Standard Features

Flash memory which is thoroughly scanned at regular user determined intervals. The contents of the firmware stored in memory must be exactly right, down to the individual bit, or else it is flagged as compromised. See the iLO 7 QuickSpecs for recovery processes.

Warranty

This product is covered by a global limited warranty and supported by HPE Services and a worldwide network of HPE Authorized Channel Partners resellers. Hardware diagnostic support and repair is available for three years from date of purchase. Support for software and initial setup is available for 90 days from date of purchase. Enhancements to warranty services are available through HPE Services operational services or customized service agreements. Hard drives have either a one year or three year warranty; refer to the specific hard drive QuickSpecs for details.

Notes: Server Warranty includes 3-Year Parts, 3-Year Labor, 3-Year Onsite support with next business day response. Warranty repairs may be accomplished through the use of Customer Self Repair (CSR) parts. These parts fall into two categories: 1) Mandatory CSR parts are designed for easy replacement. A travel and labor charge will result when customers decline to replace a Mandatory CSR part; 2) Optional CSR parts are also designed for easy replacement but may involve added complexity. Customers may choose to have Hewlett Packard Enterprise replace Optional CSR parts at no charge. Additional information regarding worldwide limited warranty and technical support is available at: <http://www.hpe.com/services/support>.



Optional Features

Server Management

HPE OneView Advanced

HPE OneView brings a new level of automation to infrastructure management by taking a template driven approach to provisioning, updating, and integrating compute, storage, and networking infrastructure. It provides full-featured licenses which can be purchased for managing Gen9, Gen10, Gen10 Plus, Gen11 and Gen12 servers.

HPE iLO Advanced (standard with HPE Synergy compute)

HPE iLO Advanced licenses offer smart remote functionality without compromise. The license includes the full integrated remote console, virtual keyboard, video, and mouse (KVM), multi-user collaboration, console record and replay, and GUI-based and scripted virtual media and virtual folders. This also includes the enhanced security and power management functionality.

Fibre Channel Support

Up to two (2) optional Fibre Channel mezzanine HBAs are supported on the HPE Synergy 480 Gen12

- HPE Synergy 5331C 32G Fibre Channel Host Bus Adapter.
-

Compatible SAN

HPE Synergy 480 Gen12 Compute Modules are optimized for HPE MSA, Nimble, Primera, and Alletra.

HPE Virtual Connect

HPE Synergy composable fabric delivers high performance and composability for the delivery of applications and services. The composable fabric is based on primary/satellite architecture.

The HPE Virtual Connect SE 100Gb F32 Module, primary modules, based on composable fabric is designed for Composable Infrastructure. Its disaggregated, rack-scale design uses a primary/satellite architecture to consolidate data center network connections, reduce hardware and scales network bandwidth across multiple HPE Synergy 12000 Frames.

The primary module contains intelligent networking capabilities that extend connectivity to satellite frames through Interconnect Link Modules. This eliminates top of rack switch need and substantially reduces cost. The reduction in components also simplifies fabric management at scale while consuming fewer ports at the data center aggregation layer.

The HPE Virtual Connect SE 100Gb F32 Module eliminates up to 95% of network sprawl at the compute module edge with one device that converges traffic inside frames and directly connects to external LANs. Each redundant pair of Virtual Connect modules provide eight adjustable downlink connections (six Ethernet and two Fibre Channel, or eight Ethernet) to dual-port 10 Gb and in case of 20 Gb Converged Network Adapters 16 adjustable downlinks connections 14 Ethernet and two Fibre Channel) on each compute module. Up to six uplinks using QSFP+ interfaces are available for connection to upstream Ethernet switches. Including splitter cables up to 24 uplinks are available for connection to upstream Ethernet and Fibre Channel. The HPE Virtual Connect SE 100 Gb F32 module avoids the confusion of traditional and other converged network solutions by eliminating the need for multiple Ethernet and Fibre Channel switches, extension modules, cables and software licenses. Also, Virtual Connect wire-once connection management is built-in enabling compute modules adds, moves and replacement in minutes instead of days or weeks. The Primary/Satellite disaggregated architecture removes fixed of ratios of interconnects in every frame and allows extending networking resources pool for Virtual Connect to satellite frames.

For more information on Virtual Connect and converged network options, see [**HPE Virtual Connect SE 100Gb F32 Module for Synergy**](#) for more details.

One Config Simple (SCE)

SCE is a guided self-service tool to help sales and non-technical people provide customers with initial configurations in 3 to 5 minutes. You may then send the configuration on for configuration help, or use in your existing ordering processes. If you require "custom" rack configuration or configuration for products not available in SCE.



Service and Support

HPE Services

No matter where you are in your digital transformation journey, you can count on HPE Services to deliver the expertise you need when, where and how you need it. From planning to deployment, ongoing operations and beyond, our experts can help you realize your digital ambitions.

<https://www.hpe.com/services>

Advisory & Professional Services

No matter where you are in your journey to hybrid cloud, experts can help you map out your next steps. From determining what workloads should live where, to handling governance and compliance, to managing costs, our experts can help you optimize your operations.

<https://www.hpe.com/services/consulting>

Managed Services

HPE runs your IT operations, providing services that monitor, operate, and optimize your infrastructure and applications, delivered consistently and globally to give you unified control and let you focus on innovation.

[HPE Managed Services | HPE](#)

Support services

Optimize your entire IT environment and drive innovation. Manage day-to-day IT operational tasks while freeing up valuable time and resources. Meet service-level targets and business objectives with features designed to drive better business outcomes.

<https://www.hpe.com/services/operational>

HPE Complete Care Service

HPE Complete Care Service is a modular, edge-to-cloud IT environment service designed to help optimize your entire IT environment and achieve agreed upon IT outcomes and business goals through a personalized experience. All delivered by an assigned team of HPE Services experts. HPE Complete Care Service provides:

- A complete coverage approach -- edge to cloud.
- An assigned HPE team.
- Modular and fully personalized engagement.
- Enhanced Incident Management experience with priority access.
- Digitally enabled and AI driven customer experience.

<https://www.hpe.com/services/complecare>

HPE Tech Care Service

HPE Tech Care Service is the operational support service experience for HPE products. The service goes beyond traditional support by providing access to product specific experts, an AI driven digital experience, and general technical guidance to not only reduce risk but constantly search for ways to do things better. HPE Tech Care Service delivers a customer-centric, AI driven, and digitally enabled customer experience to move your business forward. HPE Tech Care Service is available in three response levels. Basic, which provides 9x5 business hour availability and a 2-hour response time. Essential which provides a 15-minute response time 24x7 for most enterprise level customers, and Critical which includes a 6-hour repair commitment, where available and outage management response for severity 1 incidents.

<https://www.hpe.com/services/techcare>

HPE Multivendor Services

Single point of accountability for managing on-site hardware and software support for multivendor products. HPE experts help manage your IT across technologies and platforms for HPE and non-HPE technologies, acting as the single point of contact for your IT operational needs.

<https://www.hpe.com/us/en/hpe-multivendor-services.html>



Service and Support

HPE Lifecycle Services

HPE Lifecycle Services provide a variety of options to help maintain your HPE systems and solutions at all stages of the product lifecycle. A few popular examples include:

- Lifecycle Install and Startup Services: Various levels for physical installation and power on, remote access setup, installation and startup, and enhanced installation services with the operating system.
- Implementation assistance services: Highly trained technical service specialists to assist you with a variety of activities, ranging from design, implementation, and platform deployment to consolidation, migration, project management, and onsite technical forums.
- HPE Service Credits: Access to prepaid services for flexibility to choose from a variety of specialized service activities, including assessments, performance maintenance reviews, firmware management, professional services, and operational best practices.

Notes: To review the list of Lifecycle Services available for your product go to:

<https://www.hpe.com/services/lifecycle>

For a list of the most frequently purchased services using service credits, see the [HPE Service Credits Menu](#)

Other Related Services from HPE Services:

HPE Education Services

Training and certification designed for IT and business professionals across all industries. Broad catalogue of course offerings to expand skills and proficiencies in topics ranging from cloud and cybersecurity to AI and DevOps. Create learning paths to expand proficiency in a specific subject. Schedule training in a way that works best for your business with flexible continuous learning options.

<https://www.hpe.com/services/training>

Defective Media Retention

An option available with HPE Complete Care Service and HPE Tech Care Service and applies only to Disk or eligible SSD/Flash Drives replaced by HPE due to malfunction.

Consult your HPE Sales Representative or Authorized Channel Partner of choice for any additional questions and services options.

Parts and Materials

HPE will provide HPE supported replacement parts and materials necessary to maintain the covered hardware product in operating condition, including parts and materials for available and recommended engineering improvements.

Parts and components that have reached their maximum supported lifetime and/or the maximum usage limitations as set forth in the manufacturer's operating manual, product QuickSpecs, or the technical product data sheet will not be provided, repaired, or replaced as part of these services.

How to Purchase Services

Services are sold by Hewlett Packard Enterprise and Hewlett Packard Enterprise Authorized Service Partners:

- Services for customers purchasing from HPE or an enterprise reseller are quoted using HPE order configuration tools.
- Customers purchasing from a commercial reseller can find services at <https://ssc.hpe.com/portal/site/ssc/>

AI Powered and Digitally Enabled Support Experience

Achieve faster time to resolution with access to product-specific resources and expertise through a digital and data driven customer experience.

Sign into the HPE Support Center experience, featuring streamlined self-serve case creation and management capabilities with inline knowledge recommendations. You will also find personalized task alerts and powerful troubleshooting support through an intelligent virtual agent with seamless transition when needed to a live support agent.

<https://support.hpe.com/hpesc/public/home/signin>



Service and Support

Consume IT On Your Terms

HPE GreenLake cloud platform brings the cloud experience directly to your apps and data wherever they are—the edge, colocations, or your data center. It delivers cloud services for on-premises IT infrastructure specifically tailored to your most demanding workloads. With a pay-per-use, scalable, point-and-click self-service experience that is managed for you, HPE GreenLake platform accelerates digital transformation in a distributed, edge-to-cloud world.

- Get faster time to market.
- Save on TCO, align costs to business.
- Scale quickly, meet unpredictable demand.
- Simplify IT operations across your data centers and clouds.

To learn more about HPE Services, please contact your Hewlett Packard Enterprise sales representative or Hewlett Packard Enterprise Authorized Channel Partner. Contact information for a representative in your area can be found at "Contact HPE" <https://www.hpe.com/us/en/contact-hpe.html>

For more information

<http://www.hpe.com/services>



Configuration Information

Factory Integrated Models (CTO – Configure-To-Order Process)

This section lists some of the steps required to configure a Factory Integrated Model (configure-to-order or CTO compute module). To ensure only valid configurations are ordered, Hewlett Packard Enterprise recommends the use of an Hewlett Packard Enterprise approved configurator. Contact your local sales representative for information on CTO product offerings and requirements.

Notes:

- Not all models are available in all regions. Check with your local country Hewlett Packard Enterprise offices for availability.
- Configure-to-order compute modules must start with a CTO Compute Module.
- FIO indicates that this option is only available as a factory installable option.
- All Factory Integrated Models will be populated with sufficient drive blanks based on the number of initial drives ordered with the server.
- The Factory integrated w/o drive bay model ships with a grill blank in place of the drive cage and drive backplane.

CTO Compute Module	HPE Synergy 480 Gen12 x Compute Module (Configure-to-order)
SKU Number¹	P68217-B21
Processor	Up to 2 Selectable Intel® Xeon® 6Processors
DIMM Slots	Up to 32 DIMM slots (16 per processor) selectable below
Storage	Optional, not included in above SKUs: selectable 4 Drive, 4 Drive Direct Connect, 8 Drive, 8 Drive Direct Connect or no Drive cage options below.
Storage Controllers	Optional, not included in the above SKUs: HPE Synergy NS204i-d v2 M.2 Boot Storage Device Front Drive Cage Controller Options: HPE MR416i-o Gen11 x16 Lanes 8GB Cache OCP SPDM Storage Controller for 4 and 8 Drive OCP Connected Drive Cages and Intel VROC HYBRID RAID capable for 4 Drive and 8 Drive Direct Connect Drive Cages.
Drives supported	Optional, not included in above SKUs: SAS/SATA/NVMe/M.2 Drives
IO Expansion/ Mezzanine slots	3x 16 PCIe 5.0 Slots for Mezzanine Options
Network	Optional, not included in above SKUs: (HPE Synergy 5331C 32G Fibre Channel Host Bus Adapter, P76653-B21, HPE Synergy 6310C 25/50Gb Ethernet Adapter - P64724-B21)
Security	iLO 7
Management	HPE OneView 9.5 and iLO 7 Advanced (standard)

Notes:

- CTO SKUs are designed for specific use case fits.
- This information applies to factory CTO configurations, Field upgrades may differ depending field configurations.
- Backplane in the chassis description refers to the type of controller backplane in the Drive Cage modules.
- 4 and 8 Drive Premium Backplane Options are designed for flexible use of the Compute Module for most workloads. These SKUs use the HPE MR416i-o Gen11 x16 Lanes 8GB Cache OCP SPDM Storage Controller.
- The 4 Drive OCP Connect Backplane option supports 4 SFF SAS/SATA/NVMe Basic Carrier drives.
- The 8 Drive OCP Connect Backplane option supports 8 EDSFF NVMe E3.S Thin Carrier (EC1) drives.
- The 4 Drive Direct Connect Drive Cage option supports 4 NVMe Basic Carrier drives directly connected to Socket 1.
- The 8 Drive Direct Connect Drive Cage option supports 8 NVMe E3.S Thin Carrier (EC1) drives directly connected to Socket 1.
- The Drive-Less CTO option is intended for stateless on SAN/NAS boot use cases.
- The optional HPE Synergy NS204i-d v2 M.2 Boot Storage Device is a Direct Connect to PCIe from the processor and is configured with 2 M.2 drives for Hardware RAID Boots. This option resides below the front drive cages and is supported with all five drive cage options.
- ¹HPE offers multiple Trade Agreement Act (TAA) compliant configurations to meet the needs of US Federal Government customers. These products are either manufactured or substantially transformed in a designated country.



Configuration Information

Step 1: Base Configuration

Description

HPE Synergy 480 Gen12 Configure-to-order Compute Module

SKU

P68217-B21

Step 2: Choose your Boot, Drive Cage and Controller Options

Option 1: Front Drive Cage

HPE Synergy 480 Gen12 4SFF SAS/SATA/NVMe OCP Drive Cage Kit

P68218-B21

HPE Synergy 480 Gen12 8EDSFF NVMe E3.S OCP Drive Cage Kit

P68221-B21

Required Controller and options for above Drive Cages:

HPE MR416i-o Gen11 x16 Lanes 8GB Cache OCP SPDM Storage Controller

P47781-B21

HPE Synergy 480 Gen12 OCP Interposer Kit

P68223-B21

HPE Synergy 480 Gen12 MR416i-o Controller Cable Kit

P68224-B21

HPE Smart Storage Hybrid Capacitor with 260mm Cable Kit

PO2381-B21

Notes:

- Cable Required for 4 & 8 OCP Drive Cage Kits.
- Two processors required.

Option 2: Front Drive Cage

HPE Synergy 480 Gen12 4SFF NVMe Direct Connect Drive Cage Kit

P68219-B21

HPE Synergy 480 Gen12 8EDSFF NVMe E3.S Direct Connect Drive Cage Kit

P68220-B21

Option 3: Front Drive Cage

HPE Synergy 480 Gen12 without Drive Front Cage Kit

P68222-B21

Optional Controller:

HPE Synergy NS204i-d v2 M.2 Boot Storage Device

P68340-B21

Notes:

- M.2 HW RAID Controller.
- Installs below any Drive Cage option and can be used with any of the Drive Cage options above.

Step 3: Choose Required Options

Please select up to two matching processors.

Notes:

- Mixing of 2 different processor models is not supported.
- CTO server requires selection of heatsinks with your selection of 1 or 2 processors.

Processor Option Kits

Intel® Xeon®6

Notes:

- All SKUs below ship with processor only. Appropriate heatsinks must be selected.
- If quantity 1 processor is selected then HPE Synergy 480 Gen12 CPU Front Heat Sink Kit P68225-B21 is required. If qty 2 processors are selected then HPE Synergy 480 Gen12 CPU Front Heat Sink Kit P68225-B21 and HPE Synergy 480 Gen12 CPU Rear Heat Sink Kit P68226-B21 are required.
- Processors of different Wattage, Frequency and Cores cannot be mixed with each other. The same processor part number must be used for upgrading.
- 6400 MT/S maximum memory speed unless otherwise noted.



Configuration Information

Description

	SKU
Intel Xeon 6505P 2.2GHz 12-core 150W Processor for HPE	P74503-B21
Intel Xeon 6507P 3.5GHz 8-core 150W Processor for HPE	P74504-B21
Intel Xeon 6515P 2.3GHz 16-core 150W Processor for HPE	P74506-B21
Intel Xeon 6517P 3.2GHz 16-core 190W Processor for HPE	P74507-B21
Intel Xeon 6520P 2.4GHz 24-core 210W Processor for HPE	P74568-B21
Intel Xeon 6527P 3.0GHz 24-core 255W Processor for HPE	P74570-B21
Intel Xeon 6530P 2.3GHz 32-core 225W Processor for HPE	P74571-B21
Intel Xeon 6730P 2.5GHz 32-core 250W Processor for HPE	P74573-B21
Intel Xeon 6736P 2.0GHz 36-core 205W Processor for HPE	P74575-B21
Intel Xeon 6737P 2.9GHz 32-core 270W Processor for HPE	P74576-B21
Intel Xeon 6740P 2.1GHz 48-core 270W Processor for HPE	P73829-B21
Intel Xeon 6745P 3.1GHz 32-core 300W Processor for HPE	P81591-B21
Intel Xeon 6747P 2.7GHz 48-core 330W Processor for HPE	P73831-B21
Intel Xeon 6760P 2.2GHz 64-core 330W Processor for HPE	P73832-B21
Intel Xeon 6767P 2.4GHz 64-core 350W Processor for HPE	P73834-B21
Intel Xeon 6787P 2.0GHz 86-core 350W Processor for HPE	P73837-B21

Step 4: Choose Memory Options

Please select one or more memory DIMMs from below.

For the new Gen12 memory population rule whitepaper and optimal memory performance guidelines, please go to:

<https://www.hpe.com/docs/memory-population-rules>

Notes:

- The maximum memory speed and capacity is a function of the memory type, memory configuration, and processor model.
- Quantity of memory DIMMs selected per socket must be 1, 4, 8, 12 or 16.
- For additional information, please see the [HPE DDR5 Smart Memory QuickSpecs](#)

Registered DIMMs DDR5 (RDIMMs)

DDR5-6400 (applies to the Intel® Xeon® 6 Processors)

Description

	SKU
HPE 16GB (1x16GB) Single Rank x8 DDR5-6400 CAS-52-52-52 EC8 Registered Smart Memory Kit	P69726-B21
HPE 32GB (1x32GB) Dual Rank x8 DDR5-6400 CAS-52-52-52 EC8 Registered Smart Memory Kit	P69727-B21
HPE 64GB (1x64GB) Dual Rank x4 DDR5-6400 CAS-52-52-52 EC8 Registered Smart Memory Kit	P69728-B21
HPE 96GB (1x96GB) Dual Rank x4 DDR5-6400 CAS-52-52-52 EC8 Registered Smart Memory Kit	P69729-B21
HPE 128GB (1x128GB) Dual Rank x4 DDR5-6400 CAS-52-52-52 EC8 Registered Smart Memory Kit	P69730-B21
HPE 256GB (1x256GB) Quad Rank x4 DDR5-6400 CAS-60-52-52 EC8 Registered 3DS Smart Memory Kit	P73447-B21

Notes:

- 6400 MT/s memory SKUs offer a transfer rate of 6400 MT/s at 1 DIMM per channel and 5200 MT/s at 2 DIMMs per channel.
- 96GB Memory cannot be mixed with any other Memory.
- 128GB Memory cannot be mixed with any other Memory.
- 256GB DIMM cannot be selected with the 4SFF and 8EDSFF drive cages.



Configuration Information

Memory Blank Kit

Description

HPE DDR4 DIMM Blank Kit

SKU

P07818-B21

Notes:

- Important: Empty memory slots require DIMM Slot Blanks for improved thermal control. (HPE DDR4 DIMM Blanks Kit, P07818-B21).
- HPE memory from previous generation servers (DDR4) is not compatible with this compute module.
- The HPE DDR4 DIMM Blanks Kit - P07818-B21 is compatible with DDR5 slots and the Synergy 480 Gen12 Compute Module.

Step 5: Additional Factory Integratable Options

HPE Storage Controllers

HPE Synergy NS204i-d v2 M.2 Boot Storage Device

P68340-B21

Notes: Can be used with any Front Drive Cage options.

HPE MR416i-o Gen11 x16 Lanes 8GB Cache OCP SPDM Storage Controller

P47781-B21

Notes: For more information on the 4 and 8 Drive OCP Connect Cages with Cables defined, see the Drive Cage sections of QuickSpecs document above. Supports internal drives only.

HPE I/O Expansion Options

HPE Synergy 5331C 32Gb Fibre Channel Host Bus Adapter

P76653-B21

HPE Synergy 6310C 25/50Gb Ethernet Adapter

P64724-B21

Notes: See specifications sections below for Best Practices and requirements for options placement in correct mezzanine slots that match with Interconnect model slotting for correct operations. See frame and Interconnect QuickSpecs for additional information.

Step 6: Choose additional options for Factory Integration from Additional Options sections below or the following:

- HPE Synergy 12000 Frame QuickSpecs
<https://www.hpe.com/psnow/doc/c04815113>
- HPE Synergy Fibre Channel Host Bus Adapters
<https://www.hpe.com/psnow/doc/a00059753enw>
- HPE Synergy Networking Adapters
<https://www.hpe.com/psnow/doc/a00043968enw>
- Brocade 32Gb Fibre Channel SAN Switch Module for HPE Synergy
<https://www.hpe.com/psnow/doc/a00062177enw.pdf>
- HPE Synergy 10Gb Pass-Thru Module
<https://www.hpe.com/psnow/doc/c04815108>
- HPE Synergy 12Gb SAS Connection Module
<https://www.hpe.com/psnow/doc/c04815081>
- HPE Synergy 50Gb Interconnect Link Module
<https://www.hpe.com/psnow/doc/a00067743enw>
- HPE Synergy Frame Link Module (FLM)
<https://www.hpe.com/psnow/doc/a00030303enw>
- HPE Synergy Interconnect Link Cables
<https://www.hpe.com/psnow/doc/c04815247>



Configuration Information

- HPE Synergy Virtual Connect SE 32Gb FC Module
<https://www.hpe.com/psnow/doc/a00059758enw>
- HPE Virtual Connect SE 100Gb F32 Module for Synergy
<https://www.hpe.com/psnow/doc/PSN1011658390USEN>
- HPE Synergy Composer
<https://www.hpe.com/psnow/doc/c04815139>

Step 7: Choose from Services for HPE Synergy

HPE Synergy Operational Services

Description	SKU
HPE 5Y Tech Care Essential Service	HU4A6A5
HPE 5Y Tech Care Critical Service	HU4A3A5
HPE 5Y Complete Care Addon Essential Service	HU4D5A5
HPE 5Y Complete Care Addon Critical Service	HU4D2A5



Additional Options

Additional Options Available

Notes: wDMR, Defective Media Retention; cDMR, Comprehensive Defective Media Retention

Description	SKU
HPE 3Y Tech Care Basic Service	HU4B2A3
HPE 3Y Tech Care Basic with Defective Media Retention Service	HU4B3A3
HPE 3Y Tech Care Basic with Comprehensive Defective Material Retention Service	HU4B4A3
HPE 3Y Complete Care Addon Basic Service	HU4D8A3
HPE 3Y Complete Care Addon Basic with Defective Media Retention Service	HU4D9A3
HPE 3Y Complete Care Addon Basic with Comprehensive Defective Material Retention Service	HU4E0A3
HPE 3Y Tech Care Essential Service	HU4A6A3
HPE 3Y Tech Care Essential with Defective Media Retention Service	HU4A7A3
HPE 3Y Tech Care Essential with Comprehensive Defective Material Retention Service	HU4A8A3
HPE 3Y Complete Care Addon Essential Service	HU4D5A3
HPE 3Y Complete Care Addon Essential with Defective Media Retention Service	HU4D6A3
HPE 3Y Complete Care Addon Essential with Comprehensive Defective Material Retention Service	HU4D7A3
HPE 3Y Tech Care Critical Service	HU4A3A3
HPE 3Y Tech Care Critical with Defective Media Retention Service	HU4A4A3
HPE 3Y Tech Care Critical with Comprehensive Defective Material Retention Service	HU4A5A3
HPE 3Y Complete Care Addon Critical Service	HU4D2A3
HPE 3Y Complete Care Addon Critical with Defective Media Retention Service	HU4D3A3
HPE 3Y Complete Care Addon Critical with Comprehensive Defective Material Retention Service	HU4D4A3
HPE 4Y Tech Care Basic Service	HU4B2A4
HPE 4Y Tech Care Basic with Defective Media Retention Service	HU4B3A4
HPE 4Y Tech Care Basic with Comprehensive Defective Material Retention Service	HU4B4A4
HPE 4Y Complete Care Addon Basic Service	HU4D8A4
HPE 4Y Complete Care Addon Basic with Defective Media Retention Service	HU4D9A4
HPE 4Y Complete Care Addon Basic with Comprehensive Defective Material Retention Service	HU4E0A4
HPE 4Y Tech Care Essential Service	HU4A6A4
HPE 4Y Tech Care Essential with Defective Media Retention Service	HU4A7A4
HPE 4Y Tech Care Essential with Comprehensive Defective Material Retention Service	HU4A8A4
HPE 4Y Complete Care Addon Essential Service	HU4D5A4
HPE 4Y Complete Care Addon Essential with Defective Media Retention Service	HU4D6A4
HPE 4Y Complete Care Addon Essential with Comprehensive Defective Material Retention Service	HU4D7A4
HPE 4Y Tech Care Critical Service	HU4A3A4
HPE 4Y Tech Care Critical with Defective Media Retention Service	HU4A4A4
HPE 4Y Tech Care Critical with Comprehensive Defective Material Retention Service	HU4A5A4
HPE 4Y Complete Care Addon Critical Service	HU4D2A4
HPE 4Y Complete Care Addon Critical with Defective Media Retention Service	HU4D3A4

Additional Options

Description	SKU
HPE 4Y Complete Care Addon Critical with Comprehensive Defective Material Retention Service	HU4D4A4
HPE 5Y Tech Care Basic Service	HU4B2A5
HPE 5Y Tech Care Basic with Defective Media Retention Service	HU4B3A5
HPE 5Y Tech Care Basic with Comprehensive Defective Material Retention Service	HU4B4A5
HPE 5Y Complete Care Addon Basic Service	HU4D8A5
HPE 5Y Complete Care Addon Basic with Defective Media Retention Service	HU4D9A5
HPE 5Y Complete Care Addon Basic with Comprehensive Defective Material Retention Service	HU4E0A5
HPE 5Y Tech Care Essential Service	HU4A6A5
HPE 5Y Tech Care Essential with Defective Media Retention Service	HU4A7A5
HPE 5Y Tech Care Essential with Comprehensive Defective Material Retention Service	HU4A8A5
HPE 5Y Complete Care Addon Essential Service	HU4D5A5
HPE 5Y Complete Care Addon Essential with Defective Media Retention Service	HU4D6A5
HPE 5Y Complete Care Addon Essential with Comprehensive Defective Material Retention Service	HU4D7A5
HPE 5Y Tech Care Critical Service	HU4A3A5
HPE 5Y Tech Care Critical with Defective Media Retention Service	HU4A4A5
HPE 5Y Tech Care Critical with Comprehensive Defective Material Retention Service	HU4A5A5
HPE 5Y Complete Care Addon Critical Service	HU4D2A5
HPE 5Y Complete Care Addon Critical with Defective Media Retention Services	HU4D3A5
HPE 5Y Complete Care Addon Critical with Comprehensive Defective Material Retention Service	HU4D4A5

HPE Drives

Notes:

- The HPE Synergy 480 Gen12 Compute Module supports the HPE hot-plug small form factor (SFF) Basic Carrier Drives. HPE drives from generation G10 Plus servers and before are not compatible with the HPE Synergy 480 Gen12 drive bays.
- The mixing of standard SAS drives with SAS SSD is supported within the compute module but limits the RAID configuration to two separate RAID 0 volumes. Mixing of other drive types is not supported.
- HPE SAS and SATA drives are only supported on the 4-SFF SAS/SATA/NVMe OCP Drive Cage Kit".
- HPE drives have either a one year or three year warranty; refer to the specific drive QuickSpecs for details: **HPE Hard Disk Drives** or **HPE Solid State Drives**.
- The drive options are not required when configuring a drive-less model.
- For the most up to date HDD & SSDs options available Hewlett Packard Enterprise recommends the use of a Hewlett Packard Enterprise approved configurator.

HPE Hard Disk Drives

Enterprise - 12G SAS - SFF Drives

Description	SKU
HPE 2.4TB SAS 12G Mission Critical 10K SFF BC 3-year Warranty 512e Multi Vendor HDD	P28352-B21
HPE 2.4TB SAS 12G Mission Critical 10K SFF BC 3yr Wty 512e FIPS 140-2 TAA-compliant HDD	P28618-B21
HPE 1.8TB SAS 12G Mission Critical 10K SFF BC 3-year Warranty 512e Multi Vendor HDD	P53562-B21
HPE 1.2TB SAS 12G Mission Critical 10K SFF BC 3-year Warranty Multi Vendor HDD	P28586-B21



Additional Options

Description

SKU

HPE 1.2TB SAS 12G Mission Critical 10K SFF BC 3yr Wty FIPS 140-2 TAA-compliant HDD	P28622-B21
HPE 600GB SAS 12G Mission Critical 10K SFF BC 3-year Warranty Multi Vendor HDD	P53561-B21
HPE 300GB SAS 12G Mission Critical 10K SFF BC 3-year Warranty Multi Vendor HDD	P40430-B21

HPE Solid State Drives

For SSD selection guidance, please visit <https://ssd.hpe.com>

Read Intensive - 12G SAS - SFF - Solid State Drives

HPE 7.68TB SAS 12G Read Intensive SFF BC Value SAS Multi Vendor SSD	P40509-B21
HPE 3.84TB SAS 12G Read Intensive SFF BC Value SAS Multi Vendor SSD	P40508-B21
HPE 1.92TB SAS 12G Read Intensive SFF BC Value SAS Multi Vendor SSD	P40507-B21
HPE 960GB SAS 12G Read Intensive SFF BC Value SAS Multi Vendor SSD	P40506-B21

Read Intensive - 24G SAS - SFF - Solid State Drives

HPE 15.36TB SAS 24G Read Intensive SFF BC Multi Vendor SSD	P49045-B21
HPE 7.68TB SAS 24G Read Intensive SFF BC Multi Vendor SSD	P49041-B21
HPE 3.84TB SAS Read Intensive SFF BC Self-encrypting FIPS 140-2 PM7 SSD	P63875-B21
HPE 3.84TB SAS 24G Read Intensive SFF BC Multi Vendor SSD	P49035-B21
HPE 1.92TB SAS 24G Read Intensive SFF BC Multi Vendor SSD	P49031-B21
HPE 960GB SAS 24G Read Intensive SFF BC Multi Vendor SSD	P49029-B21

Notes: 24G SAS drives operate at 12G SAS speeds on HPE Synergy 480 Gen12 when the HPE MR416i-o Gen11 x16 Lanes 8GB Cache OCP SPDM Storage Controller is installed.

Mixed Use - 12G SAS - SFF - Solid State Drives

HPE 3.84TB SAS 12G Mixed Use SFF BC Value SAS Multi Vendor SSD	P40512-B21
HPE 1.92TB SAS 12G Mixed Use SFF BC Value SAS Multi Vendor SSD	P40511-B21
HPE 1.6TB SAS Mixed Use SFF BC Self-encrypting FIPS 140-2 PM7 SSD	P63871-B21
HPE 960GB SAS 12G Mixed Use SFF BC Value SAS Multi Vendor SSD	P40510-B21

Mixed Use - 24G SAS - SFF - Solid State Drives

HPE 6.4TB SAS 24G Mixed Use SFF BC Multi Vendor SSD	P49057-B21
HPE 3.2TB SAS 24G Mixed Use SFF BC Multi Vendor SSD	P49053-B21
HPE 1.6TB SAS 24G Mixed Use SFF BC Multi Vendor SSD	P49049-B21
HPE 800GB SAS 24G Mixed Use SFF BC Multi Vendor SSD	P49047-B21

Notes: 24G SAS drives operate at 12G SAS speeds on HPE Synergy 480 Gen12 when the HPE MR416i-o Gen11 x16 Lanes 8GB Cache OCP SPDM Storage Controller is installed.

Read Intensive - 6G SATA - SFF - Solid State Drives

HPE 7.68TB SATA 6G Read Intensive SFF BC Multi Vendor SSD	P40501-B21
HPE 3.84TB SATA 6G Read Intensive SFF BC Multi Vendor SSD	P40500-B21
HPE 1.92TB SATA 6G Read Intensive SFF BC Multi Vendor SSD	P40499-B21



Additional Options

Description

SKU

HPE 960GB SATA 6G Mixed Use SFF BC Self-encrypting 5400M SSD	P58244-B21
HPE 960GB SATA 6G Read Intensive SFF BC Multi Vendor SSD	P40498-B21
HPE 480GB SATA 6G Read Intensive SFF BC Self-encrypting 5400P SSD	P58236-B21
HPE 480GB SATA 6G Read Intensive SFF BC Multi Vendor SSD	P40497-B21
HPE 240GB SATA 6G Read Intensive SFF BC Multi Vendor SSD	P40496-B21

Mixed Use - 6G SATA - SFF - Solid State Drives

HPE 3.84TB SATA 6G Mixed Use SFF BC Multi Vendor SSD	P40505-B21
HPE 1.92TB SATA 6G Mixed Use SFF BC Multi Vendor SSD	P40504-B21
HPE 960GB SATA 6G Mixed Use SFF BC Multi Vendor SSD	P40503-B21
HPE 480GB SATA 6G Mixed Use SFF BC Multi Vendor SSD	P40502-B21

Read Intensive - NVMe - SFF - Solid State Drives

HPE 15.36TB NVMe Gen4 High Performance Read Intensive SFF BC U.3 PS1010 SSD	P70436-B21
HPE 15.36TB NVMe Gen4 High Performance Read Intensive SFF BC U.3 PM1733a SSD	P50224-B21
HPE 15.36TB NVMe Gen4 Mainstream Performance Read Intensive SFF BC U.3 Static SPDM Multi Vendor SSD	P69255-B21
HPE 15.36TB NVMe Gen4 High Performance Read Intensive SFF BC U.3 CM7 SSD	P63841-B21
HPE 7.68TB NVMe Gen4 High Performance Read Intensive SFF BC U.3 PS1010 SSD	P70434-B21
HPE 7.68TB NVMe Gen4 High Performance Read Intensive SFF BC U.3 PM1733a SSD	P50222-B21
HPE 7.68TB NVMe Gen4 Mainstream Performance Read Intensive SFF BC U.3 Static V2 Multi Vendor SSD	P64848-B21
HPE 7.68TB NVMe Gen4 High Performance Read Intensive SFF BC U.3 CM7 SSD	P63837-B21
HPE 7.68TB NVMe Gen4 High Performance Read Intensive SFF BC U.3 Self-encrypting FIPS 140-3 CM7 SSD	P61035-B21
HPE 3.84TB NVMe Gen4 High Performance Read Intensive SFF BC U.3 Self-encrypting FIPS 140-3 CM7 SSD	P61027-B21
HPE 3.84TB NVMe Gen4 High Performance Read Intensive SFF BC U.3 PM1733a SSD	P50219-B21
HPE 3.84TB NVMe Gen4 Mainstream Performance Read Intensive SFF BC U.3 Static V2 Multi Vendor SSD	P64846-B21
HPE 3.84TB NVMe Gen4 High Performance Read Intensive SFF BC U.3 CM7 SSD	P63833-B21
HPE 1.92TB NVMe Gen4 High Performance Read Intensive SFF BC U.3 PM1733a SSD	P50216-B21
HPE 1.92TB NVMe Gen4 Mainstream Performance Read Intensive SFF BC U.3 Static V2 Multi Vendor SSD	P64844-B21
HPE 1.92TB NVMe Gen4 High Performance Read Intensive SFF BC U.3 CM7 SSD	P63829-B21
HPE 1.92TB NVMe Gen4 High Performance Read Intensive SFF BC U.3 Self-encrypting FIPS 140-3 CM7 SSD	P61019-B21
HPE 960GB NVMe Gen4 Mainstream Performance Read Intensive SFF BC U.3 Static V2 Multi Vendor SSD	P64842-B21

Mixed Use - NVMe - SFF - Solid State Drives

HPE 6.4TB NVMe Gen4 High Performance Mixed Use SFF BC U.3 PS1030 SSD	P70428-B21
HPE 6.4TB NVMe Gen4 High Performance Mixed Use SFF BC U.3 Self-encrypting FIPS 140-3 CM7 SSD	P61059-B21
HPE 6.4TB NVMe Gen4 High Performance Mixed Use SFF BC U.3 PM1735a SSD	P50233-B21
HPE 6.4TB NVMe Gen4 High Performance Mixed Use SFF BC U.3 CM7 SSD	P63853-B21



Additional Options

Description	SKU
HPE 3.2TB NVMe Gen5 High Performance Mixed Use E3S EC1 EDSFF SPDM 9550 SSD	P77050-B21
HPE 3.2TB NVMe Gen4 High Performance Mixed Use SFF BC U.3 PS1030 SSD	P70426-B21
HPE 3.2TB NVMe Gen4 High Performance Mixed Use SFF BC U.3 Self-encrypting FIPS 140-3 CM7 SSD	P61051-B21
HPE 3.2TB NVMe Gen4 High Performance Mixed Use SFF BC U.3 PM1735a SSD	P50230-B21
HPE 3.2TB NVMe Gen4 High Performance Mixed Use SFF BC U.3 CM7 SSD	P63849-B21
HPE 1.6TB NVMe Gen4 High Performance Mixed Use SFF BC U.3 Self-encrypting FIPS 140-3 CM7 SSD	P61043-B21
HPE 1.6TB NVMe Gen4 High Performance Mixed Use SFF BC U.3 PM1735a SSD	P50227-B21
HPE 1.6TB NVMe Gen4 High Performance Mixed Use SFF BC U.3 CM7 SSD	P63845-B21
HPE 1.6TB NVMe Gen4 Mainstream Performance Mixed Use SFF BC U.3 Static V2 Multi Vendor SSD	P65007-B21
HPE 800GB NVMe Gen4 Mainstream Performance Mixed Use SFF BC U.3 Static V2 Multi Vendor SSD	P64999-B21
Read Intensive – NVMe – EDSFF E3.S – Solid State Drives	
HPE 15.36TB NVMe Gen5 High Performance Read Intensive E3S EC1 EDSFF SPDM 9550 SSD	P77061-B21
HPE 15.36TB NVMe Gen5 High Performance Read Intensive E3S EC1 Self-encrypting FIPS 140-3 CM7 SSD	P79122-B21
HPE 15.36TB NVMe Gen5 High Performance Read Intensive E3S EC1 EDSFF SPDM PM1743 SSD	P57807-B21
HPE 15.36TB NVMe Gen5 High Performance Read Intensive E3S EC1 EDSFF SPDM CM7 SSD	P61187-B21
HPE 15.36TB NVMe Gen5 High Performance Read Intensive E3S EC1 PS1010 SSD	P70397-B21
HPE 7.68TB NVMe Gen5 High Performance Read Intensive E3S EC1 EDSFF SPDM 9550 SSD	P77059-B21
HPE 7.68TB NVMe Gen5 High Performance Read Intensive E3S EC1 PS1010 SSD	P70395-B21
HPE 7.68TB NVMe Gen5 High Performance Read Intensive E3S EC1 EDSFF SPDM PM1743 SSD	P57803-B21
HPE 7.68TB NVMe Gen5 High Performance Read Intensive E3S EC1 EDSFF SPDM CM7 SSD	P61183-B21
HPE 7.68TB NVMe Gen5 High Performance Read Intensive E3S EC1 Self-encrypting FIPS 140-3 CM7 SSD	P70674-B21
HPE 3.84TB NVMe Gen5 High Performance Read Intensive E3S EC1 EDSFF SPDM 9550 SSD	P77057-B21
HPE 3.84TB NVMe Gen5 High Performance Read Intensive E3S EC1 EDSFF SPDM PM1743 SSD	P57799-B21
HPE 3.84TB NVMe Gen5 High Performance Read Intensive E3S EC1 EDSFF SPDM CM7 SSD	P61179-B21
HPE 3.84TB NVMe Gen5 High Performance Read Intensive E3S EC1 PS1010 SSD	P70392-B21
HPE 30.72TB NVMe Gen4 Mainstream Performance Very Read Optimized E3S EC1 EDSFF P5430 SSD	P79065-B21
HPE 15.36TB NVMe Gen5 Mainstream Performance Read Intensive E3S EC1 EDSFF SPDM PM9D3a SSD	P78921-B21
HPE 15.36TB NVMe Gen5 Mainstream Performance Read Intensive E3S EC1 EDSFF SPDM PE1010 SSD	P77275-B21
HPE 15.36TB NVMe Gen5 Mainstream Performance Read Intensive E3S EC1 CD8P SSD	P69546-B21
HPE 7.68TB NVMe Gen5 Mainstream Performance Read Intensive E3S EC1 EDSFF SPDM PM9D3a SSD	P78919-B21
HPE 7.68TB NVMe Gen5 Mainstream Performance Read Intensive E3S EC1 EDSFF SPDM PE1010 SSD	P77273-B21
HPE 7.68TB NVMe Gen5 Mainstream Performance Read Intensive E3S EC1 CD8P SSD	P69239-B21
HPE 3.84TB NVMe Gen5 Mainstream Performance Read Intensive E3S EC1 EDSFF SPDM PM9D3a SSD	P78917-B21
HPE 3.84TB NVMe Gen5 Mainstream Performance Read Intensive E3S EC1 EDSFF SPDM PE1010 SSD	P77271-B21
HPE 3.84TB NVMe Gen5 Mainstream Performance Read Intensive E3S EC1 CD8P SSD	P69237-B21
HPE 1.92TB NVMe Gen5 Mainstream Performance Read Intensive E3S EC1 EDSFF SPDM PM9D3a SSD	P78914-B21



Additional Options

Description	SKU
HPE 1.92TB NVMe Gen5 Mainstream Performance Read Intensive E3S EC1 EDSFF SPDM PE1010 SSD	P77269-B21
HPE 1.92TB NVMe Gen5 Mainstream Performance Read Intensive E3S EC1 CD8P SSD	P69234-B21
Notes: PCIe Gen5 E3.S drives operate at PCIe Gen4 speeds on HPE Synergy 480 Gen12 when the HPE MR416i-o Gen11 x16 Lanes 8GB Cache OCP SPDM Storage Controller is installed.	
Mixed Use – NVMe – EDSFF E3.S – Solid State Drives	
HPE 12.8TB NVMe Gen5 High Performance Mixed Use E3S EC1 EDSFF SPDM 9550 SSD	P77055-B21
HPE 12.8TB NVMe Gen5 High Performance Mixed Use E3S EC1 PS1030 SSD	P70403-B21
HPE 6.4TB NVMe Gen5 High Performance Mixed Use E3S EC1 EDSFF SPDM 9550 SSD	P77053-B21
HPE 6.4TB NVMe Gen5 High Performance Mixed Use E3S EC1 Self-encrypting FIPS 140-3 CM7 SSD	P70672-B21
HPE 6.4TB NVMe Gen5 High Performance Mixed Use E3S EC1 PS1030 SSD	P70401-B21
HPE 6.4TB NVMe Gen5 High Performance Mixed Use E3S EC1 EDSFF SPDM CM7 SSD	P61195-B21
HPE 3.2TB NVMe Gen5 High Performance Mixed Use E3S EC1 EDSFF SPDM CM7 SSD	P61191-B21
HPE 3.2TB NVMe Gen5 High Performance Mixed Use E3S EC1 PS1030 SSD	P70399-B21
HPE 3.2TB NVMe Gen5 High Performance Mixed Use E3S EC1 Self-encrypting FIPS 140-3 CM7 SSD	P70669-B21
HPE 6.4TB NVMe Gen5 Mainstream Performance Mixed Use E3S EC1 EDSFF SPDM PE1030 SSD	P77267-B21
HPE 6.4TB NVMe Gen5 Mainstream Performance Mixed Use E3S EC1 CD8P SSD	P69245-B21
HPE 3.2TB NVMe Gen5 Mainstream Performance Mixed Use E3S EC1 EDSFF SPDM PE1030 SSD	P77265-B21
HPE 3.2TB NVMe Gen5 Mainstream Performance Mixed Use E3S EC1 CD8P SSD	P69243-B21
HPE 1.6TB NVMe Gen5 Mainstream Performance Mixed Use E3S EC1 EDSFF SPDM PE1030 SSD	P77262-B21
HPE 1.6TB NVMe Gen5 Mainstream Performance Mixed Use E3S EC1 CD8P SSD	P69241-B21
HPE 15.36TB NVMe Gen4 Mainstream Performance Very Read Optimized E3S EC1 EDSFF P5430 SSD	P63938-B21
HPE 7.68TB NVMe Gen4 Mainstream Performance Very Read Optimized E3S EC1 EDSFF P5430 SSD	P63934-B21
HPE 3.84TB NVMe Gen4 Mainstream Performance Very Read Optimized E3S EC1 EDSFF P5430 SSD	P63930-B21
Notes: PCIe Gen5 E3.S drives operate at PCIe Gen4 speeds on HPE Synergy 480 Gen12 when the HPE MR416i-o Gen11 x16 Lanes 8GB Cache OCP SPDM Storage Controller is installed.	

M.2 Drive Options

HPE 480GB NVMe Gen3 Mainstream Performance Read Intensive M.2 Multi Vendor SSD	P40513-B21
HPE 480GB NVMe Gen4 Mainstream Performance Read Intensive M.2 PM9A3 SSD	P69543-B21
HPE 480GB NVMe Gen4 Mainstream Performance Read Intensive M.2 2280 PE9010 SSD	P80318-B21

Notes: 2x M.2 SSD required for HPE Synergy NS204i-d v2 M.2 Boot Storage Device.

HPE Security

HPE iLO Common Password FIO Setting	P08040-B21
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Additional Options

HPE Networking Ethernet

Notes:

- The compute module requires a minimum of one (1) mezzanine network adapter.
- Mezzanine network adapters can be installed in any mezzanine connector. Hewlett Packard Enterprise best practice is to install the first network adapter in mezzanine connector 3 to facilitate installation of Type C and D mezzanines in mezzanine connectors 1 or 2

Description	SKU
HPE Synergy 6310C 25/50Gb Ethernet Adapter	P64724-B21

HPE Fibre Channel

HPE Synergy 5331C 32Gb Fibre Channel Host Bus Adapter	P76653-B21
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HPE Storage Controllers

HPE MR416i-o Gen11 x16 Lanes 8GB Cache OCP SPDM Storage Controller	P47781-B21
HPE Synergy NS204i-d v2 M.2 Boot Storage Device	P68340-B21

Notes:

- HPE Synergy NS204i-d v2 M.2 Boot Storage Device requires 2x NVMe M.2 SSD
- OCP Connect Front Drive Cages, CTO offers 4 and 8 drive Premium Front Drive Cages for use with SFF SATA, SAS, or NVMe drives. Supports HPE MR416i-o Controller with HPE Synergy 480 Gen12 MR416i-o Controller Cable Kit (P68224-B21), HPE Synergy 480 Gen12 OCP Interposer Kit (P68223-B21 and the HPE Smart Hybrid Capacitor w/ 260mm Cbl (P02381-B21).



Memory

Memory Subsystem Architecture

Each processor socket contains eight memory channels that support two DIMMs each for a total of 16 DIMM per installed processor or a grand total of thirty two (32) DIMMs for the compute module with 2 processors.

HPE Gen12 Memory Population guidelines for Intel® Xeon® 6500P-Series and 6700P-Series Series Processors

To achieve the highest and most consistent memory bandwidth with minimal latency, DIMMs should be populated in a balanced configuration. Several factors determine whether a configuration is balanced. To optimize performance, consider the following guidelines:

For most workloads, performance peaks when all DIMMs are part of a single interleave set, forming a uniform memory region distributed across as many identical (same HPE PN) DIMMs as possible. The ideal balanced configuration consists of either eight DIMMs (1DPC) or sixteen DIMMs (2DPC) per CPU. Populating each channel with one or two DIMMs ensures efficient data distribution across channels within a single interleave set, resulting in maximum memory bandwidth and minimal latency. While eight DIMMs provide the highest bandwidth, sixteen DIMMs offer the greatest memory capacity.

If a fully balanced setup of eight or sixteen DIMMs per CPU is not feasible, the next best option is a near-balanced configuration. This can be achieved by symmetrically populating two, four, eight, twelve, or sixteen identical DIMMs per CPU. Deviating from these numbers can create disjointed memory regions, leading to multiple interleave sets and reduced efficiency. For optimal performance, all DIMMs must be identical in rank, capacity, type, and speed (guaranteed by using the same HPE PN). This principle also applies to processors in multi-socket Intel systems, where all CPUs should be identical, and each CPU socket must have the same memory configuration. A uniform memory setup across all CPU sockets further enhances memory access efficiency.

For more detailed memory population guidelines, refer to the HPE Memory Population **QuickSpecs** or use an approved HPE server configurator tool.

Notes: Memory DIMM Notes for HPE Synergy 480 Gen12 Configure-to-order Compute Module¹:

- A minimum of one DIMM is required per processor.
- Install DIMMs only if the corresponding processor is installed.
- If only one processor is installed in a two-processor system, only half of the DIMM slots are available.
- The maximum memory speed is a function of the memory type, memory configuration, and processor model.
- The maximum memory capacity is a function of the memory type and number of installed processors.
- Mixing of x4 and x8 DIMMs is not supported.
- Mixing of 3DS and non-3DS memory is not supported.
- Mixing of different Rank memory is allowed only if max qty of DIMMs are selected per processor (i.e. For 1 Processor it is 16 qty and for 2 Processors it is 32 qty).
- For 1 Processor, the allowed qty of 16GB 6400B Memory is 1, 2, 4, 8 only.
- For 2 Processor, the allowed qty of 16GB 6400B Memory is 2, 4, 8, 16 only.
- Mixing of different Rank memory is allowed only if maximum qty of DIMMs are selected per processor (i.e. For 1 Processor it is 16 and for 2 Processors it is 32).
- 96GB memory DIMM cannot be mixed with any other memory DIMM.
- 128GB memory DIMM cannot be mixed with any other memory DIMM.
- 256GB DIMM is not supported with the 4SFF and 8EDSFF drive cages.

Memory

HPE Synergy 480 Gen12 Compute Module Memory Tables

Registered DIMM (RDIMM)						
HPE SKU P/N	P69726-B21	P69727-B21	P69728-B21	P69729-B21	P69730-B21	P73447-B21
SKU Description	HPE 16GB (1x16GB) Single Rank x8 DDR5-6400 CAS-46-45-45 EC8 Registered Smart Memory Kit	HPE 32GB (1x32GB) Dual Rank x8 DDR5-6400 CAS-46-45-45 EC8 Registered Smart Memory Kit	HPE 64GB (1x64GB) Dual Rank x4 DDR5-6400 CAS-46-45-45 EC8 Registered Smart Memory Kit	HPE 96GB (1x96GB) Dual Rank x4 DDR5-6400 CAS-46-45-45 EC8 Registered Smart Memory Kit	HPE 128GB (1x128GB) Dual Rank x4 DDR5-6400 CAS-46-45-45 EC8 Registered Smart Memory Kit	HPE 256GB (1x256GB) Quad Rank x4 DDR5-6400 CAS-60-52-52 EC8 Registered 3DS Smart Memory Kit
DIMM Rank ->	Single Rank (1R)	Dual Rank (2R)	Dual Rank (2R)	Dual Rank (2R)	Dual Rank (2R)	Quad Rank (4R)
DIMM Capacity ->	16GB	32GB	64GB	96GB	128GB	256GB
Voltage	1.1V	1.1V	1.1V	1.1V	1.1V	1.1V
DRAM depth [bit]	2G	2G	4G	6G	8G	8G
DRAM Width [bit]	x8	x8	x4	x4	x4	x4
DRAM Density	16Gb	16Gb	16Gb	24Gb	32Gb	32Gb
CAS Latency	46-45-45	46-45-45	46-45-45	46-45-45	46-45-45	60-52-52
DIMM Native Speed (MT/s)	6400	6400	6400	6400	6400	6400

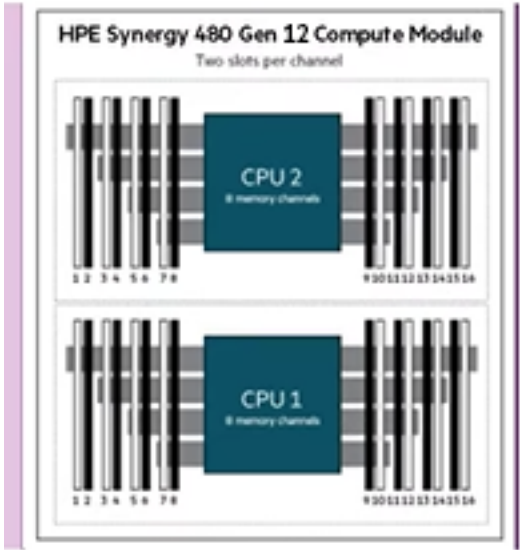
Notes: The maximum memory speed is a function of the memory type, memory configuration, and processor model.



Memory

Memory Population Rules and Guidelines

Drawing showing HPE Synergy Gen12 Compute Module system board layout for processors and memory.



Population guidelines for HPE Smart Memory DIMMs in HPE Synergy 480 Gen12 Compute Modules

HPE Synergy 480 Gen12 Compute Modules have sixteen (16) DIMM slots per CPU.

Table: Population guidelines for HPE Smart Memory DIMMs in HPE Synergy 480 Gen12 Compute Modules.

HPE Synergy 480 Gen12 Compute Module per CPU DIMM population order															
CPU 1															
1 DIMM									10						
4a DIMMs ²			3				7		10				14		
4b DIMMs ²	1				5						12				16
8a DIMMs ²	1		3		5		7		10		12		14		16
8b DIMMs ¹			3	4			7	8	9	10			13	14	
12 DIMMs	1		3	4	5		7	8	9	10		12	13	14	16
16 DIMMs ^{1,2}	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CPU 2															
1 DIMM							7								
4a DIMMs ²			3				7		10				14		
4b DIMMs ²	1				5						12				16
8a DIMMs	1		3		5		7		10		12		14		16
8b DIMMs ^{1,2}			3	4			7	8	9	10			13	14	
12 DIMMs	1		3	4	5		7	8	9	10		12	13	14	16
16 DIMMs ^{1,2}	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15



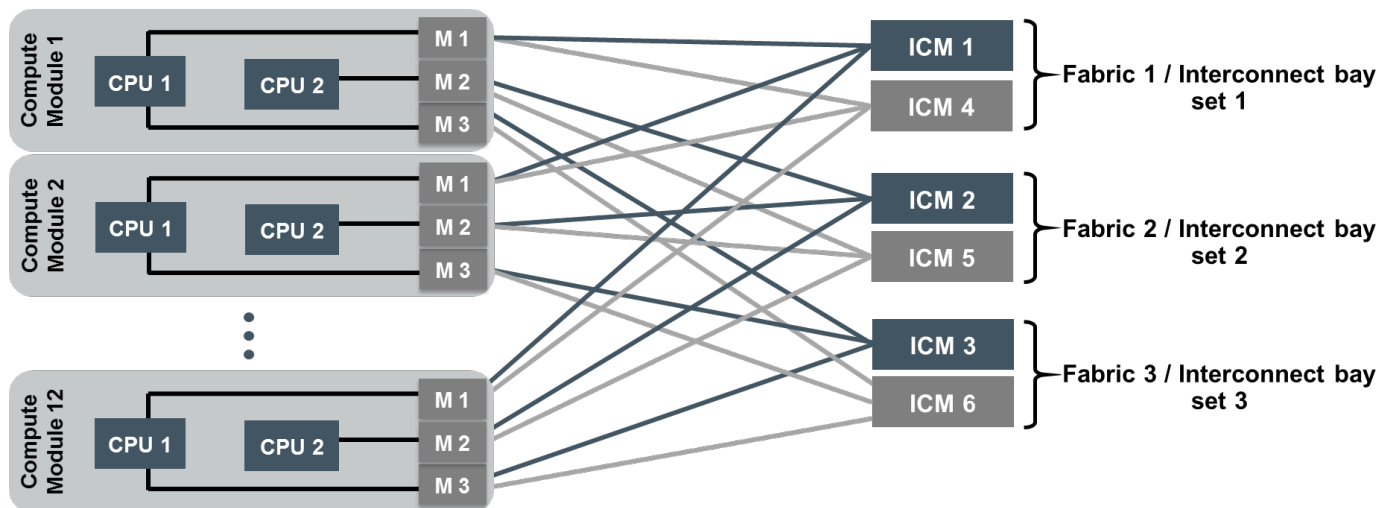
Memory

Notes:

- ¹Supports SGX (Software Guard Extensions)
- ²Supports Hemi (hemisphere mode).
- Cells without entries represent configurations not supported, and if populated, the server may result in non-optimal memory performance or other unexpected behavior.

For more information or additional DIMM configurations go to: [HPE Memory QuickSpecs and Technical White Papers](#).

Internal Fabric Routing



Technical Specifications

System Unit

Dimensions (H x W x D)

With Bezel

- 6.35 x 21.4 x 60.0 cm
- 2.5 x 8.43 x 23.62 in

Weight (approximate)

- 8.16 kg / 18 lb
Maximum: all processors, 32 DIMMs, drives, mezzanine cards, and one flash cache battery installed.
- 6.57 kg / 14.5 lb
Minimum: one processor and 1 DIMM installed.

Power Specifications

For power specifications including input requirements, BTU rating, and power supply output, please see the:

HPE Synergy Frame QuickSpecs.

To review typical system power ratings, use the HPE Power Advisor which is available via the online tool located at

<https://www.hpe.com/info/poweradvisor>.

System Inlet Temperature

- Operating: 10°C to 35°C (50°F to 95°F).
 - The upper limit may be limited by the type and number of options installed.
 - System performance may be reduced if operating with a fan fault.
- Non-operating: -30°C to 60°C (-22°F to 140°F).
- Standard Operating Temperature 10° to 35°C (50° to 95°F) at sea level with an altitude derating of 1.0°C per every 305 m (1.8°F per every 1000 ft) above sea level to a maximum of 3050 m (10,000 ft), no direct sustained sunlight. Maximum rate of change is 20°C/hr (36°F/hr). The upper limit and rate of change may be limited by the type and number of options installed.
System performance during standard operating support may be reduced if operating with a fan fault or above 30°C (86°F).
- Extended Ambient Operating Temperature For approved hardware configurations, the supported system inlet range is extended to be: 5° to 10°C (41° to 50°F) and 35° to 40°C (95° to 104°F) at sea level with an altitude derating of 1.0°C per every 175 m (1.8°F per every 574 ft) above 900 m (2953 ft) to a maximum of 3050 m (10,000 ft). The approved hardware configurations for this system are listed at the URL: <http://www.hpe.com/servers/ashrae> For approved hardware configurations, the supported system inlet range is extended to be: 40° to 45°C (104° to 113°F) at sea level with an altitude derating of 1.0°C per every 125 m (1.8°F per every 410 ft) above 900 m (2953 ft) to a maximum of 3050 m (10,000 ft). The approved hardware configurations for this system are listed at the URL:
<https://www.hpe.com/servers/ashrae>
System performance may be reduced if operating in the extended ambient operating range or with a fan fault.
- Non-operating -30° to 60°C (-22° to 140°F). Maximum rate of change is 20°C/hr (36°F/hr).

Extended Ambient Operating Support

Qualifications for extended ambient configurations are detailed at: **<https://www.hpe.com/servers/ASHRAE>**

Relative Humidity (non-condensing)

- Operating: 10% to 90% @ 28C (82.4F).
 - Non-operating: 5% to 95% @ 38.7C (101.7F).
-



Technical Specifications

Acoustic Noise

For acoustic noise specifications, please see the HPE Synergy 12000 Frame QuickSpecs.

ErP Lot9

The European Parliament (ErP) is responsible for setting the ecological standards for products that are imported into the EU. The European Parliament Commission Regulation 2019/424 (also known as the ErP Lot 9 regulation) are a new set of product standards that deal with servers and data storage devices and goes into effect on March 1, 2020. Products that are not compliant with Lot 9 requirements cannot be imported into the European Union after March 1, 2020. For details see Tech Specs section of this document. See Configure to Order section for details on configurable options.

For additional information, please visit: <https://www.hpe.com/us/en/about/environment/msds-specs-more.html>

Documents provided by HPE: Lot 9 Declarations, White paper, and FAQ.

Environment-friendly Products and Approach - End-of-life Management and Recycling

Hewlett Packard Enterprise offers **End-of-life product return, Trade-in, and Recycling programs**, in many geographic areas, for our products. Products returned to Hewlett Packard Enterprise will be recycled, recovered or disposed of in a responsible manner.

The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard Enterprise web site. These instructions may be used by recyclers and other WEEE treatment facilities as well as Hewlett Packard Enterprise OEM customers who integrate and re-sell Hewlett Packard Enterprise equipment.



Summary of Changes

Date	Version History	Action	Description of Change
28-Jul-2025	<u>Version 4</u>	Changed	Standard Features section was updated – URL 's on Security section were updated Technical Specification section was updated – URL on Power Specification section was updated.
07-Jul-2025	<u>Version 3</u>	Added	This SKU was added P81591-B21
12-May-2025	<u>Version 2</u>	Changed	Updated links and formatting Overview, Standard Features, Configuration Information and Memory sections were updated
05-May-2025	<u>Version 1</u>	New	New QuickSpecs



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For hard drives, 1GB = 1 billion bytes. Actual formatted capacity is less

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