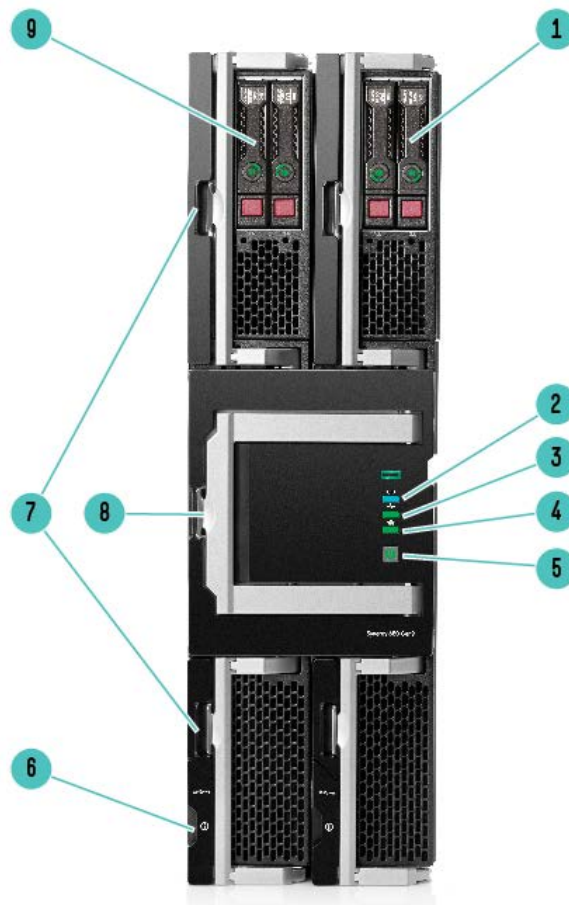


Overview

HPE Synergy 680 Gen9 Compute Module



HPE Synergy 680 Gen9 Compute Module – External View

1. SFF Drive Box 2: Drive Bay 1 and 2 (if uFF, Drive Bay 1/101 and 2/102)
2. UID LED
3. Health status LED
4. Mezzanine NIC status LED
5. Power On/Standby button and system power LED
6. External USB 2.0 connector (behind serial label pull tab)
7. Compute Module release latches
8. Compute Module Link with release latch
9. SFF Drive Box 1: Drive Bay 1 and 2 (if uFF, Drive Bay 1/101 and 2/102)

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.

Overview

HPE Synergy supports both two-socket and four-socket compute modules which provide the performance, scalability, density optimization, storage simplicity, and configuration flexibility to power a variety of workloads, including business processing, IT infrastructure, web infrastructure, collaborative, and high-performance computing.

The HPE Synergy 680 Gen9 Compute Module is a 4-socket mission-critical composable compute option designed to meet the needs of almost any enterprise IT tier and workload. This x86 compute module with Intel® Xeon® v4 processors is ideal for financial, insurance, healthcare, manufacturing, and retail enterprises that require mission-critical levels of availability, extended versatility, and real-time performance. The HPE Synergy 620 Gen9 Compute Module can be upgraded to the HPE Synergy 680 Gen9 Compute Module by ordering a 620 to 680 Upgrade Kit. Please see the HPE Synergy 620 Gen9 Compute Module QuickSpecs for information.

HPE Synergy offers additional compute module options (that have individual QuickSpecs) including:

- HPE Synergy 480 Gen10 (2-socket, general purpose)
- HPE Synergy 660 Gen10 (4-socket, general purpose)

This QuickSpecs document focuses on the HPE Synergy 680 Gen9 Compute Module.

Standard Features

NOTE: This document covers the HPE Synergy 680 Gen9 compute module only. For information on HPE Synergy 12000 Frame, interconnect, and mezzanine components, please see the [HPE Synergy 12000 Frame Specifications](#).

NOTE: For the Standard Features shipped in the "Factory Integrated Models", please see the "Configuration Information - Factory Integrated Models" section.

Processor Four of the following	HPE Synergy 620/680 Gen9 Intel® Xeon® E7-4850 v4 (2.1GHz/16-core/40MB/115W)
	HPE Synergy 620/680 Gen9 Intel® Xeon® E7-4830 v4 (2.0GHz/14-core/35MB/115W)
	HPE Synergy 620/680 Gen9 Intel® Xeon® E7-4820 v4 (2.0GHz/10-core/25MB/115W)
	HPE Synergy 620/680 Gen9 Intel® Xeon® E7-4809 v4 (2.1GHz/8-core/20MB/115W)
	HPE Synergy 620/680 Gen9 Intel® Xeon® E7-8894 v4 (2.4GHz/24-core/60MB/165W)
	HPE Synergy 620/680 Gen9 Intel® Xeon® E7-8891 v4 (2.8GHz/10-core/60MB/165W)
	HPE Synergy 620/680 Gen9 Intel® Xeon® E7-8893 v4 (3.2GHz/4-core/60MB/140W)
	HPE Synergy 620/680 Gen9 Intel® Xeon® E7-8890 v4 (2.2GHz/24-core/60MB/165W)
	HPE Synergy 620/680 Gen9 Intel® Xeon® E7-8880 v4 (2.2GHz/22-core/55MB/150W)
	HPE Synergy 620/680 Gen9 Intel® Xeon® E7-8870 v4 (2.1GHz/20-core/50MB/140W)
	HPE Synergy 620/680 Gen9 Intel® Xeon® E7-8860 v4 (2.2GHz/18-core/45MB/140W)

NOTE: Supports 4 processors. All processors within the compute module must be identical.

NOTE: DDR4 speed is the maximum memory speed of the processor. Actual memory speed may depend on the quantity and type of DIMMs installed. Please see the "Memory" section later in this document.

Cache Memory See processor list above for cores, model number, and cache memory size.

Chipset Intel® C602J Series Chipset
NOTE: For more information regarding Intel chipsets, please see the following: <https://ark.intel.com/products/66243/Intel-C602J-Chipset>

On System Management Chipset HPE iLO (Firmware HPE iLO4 2.0), 4GB NAND with 1GB USB user space configurable via UEFI and accessible via iLO. Read and learn more in the [iLO QuickSpecs](#).
NOTE: For more information, visit: <http://www.hpe.com/go/ilo>

Memory Protection Advanced ECC
Memory Mirroring
Memory Online Spare Mode (Rank Spare Mode)

Memory One of the following depending on Model	Type	HPE SmartMemory DDR4 Load Reduced (LRDIMM), or Registered (RDIMM)
	DIMM Slots Available	96 (24 DIMM slots per processor, 8 channels per processor, 3 DIMMs per channel)
	*Maximum (LRDIMM)	12TB (96 x 128GB)
	Maximum (RDIMM)	3TB (96 x 32GB)

NOTE:*128GB DIMMs will be available in the first half of 2017. Please see HPE Server memory for compatibility: <https://www.hpe.com/us/en/servers/memory.html>

Standard Features

NOTE: HPE memory from previous generation servers (DDR3) is not compatible with this compute module. HPE SmartMemory is required to realize the memory performance improvements and enhanced functionality listed in this document for Gen9. For additional information, please see the HPE SmartMemory QuickSpecs at: <https://www.hpe.com/us/en/product-catalog/servers/server-memory/pip.models.server-memory.7281077.html>

NOTE: LRDIMM and RDIMM are distinct memory technologies and cannot be mixed within a compute module.

NOTE: Depending on the memory configuration and processor model, the memory speed may run at 2133MHz, 1866MHz, or 1600MHz.

Memory Speed Table

Synergy 3DPC EX Platform – running in 2:1 “Performance” Mode

DIMM Type	Register DIMM (RDIMM)			
HPE SKU P/N	805347-B21	805349-B21	836220-B21	805351-B21
SKU Description	HPE 8GB 1Rx8 PC4-2400T-R Kit	HPE 16GB 1Rx4 PC4-2400T-R Kit	HPE 16GB 2Rx4 PC4-2400T-R Kit	HPE 32GB 2Rx4 PC4-2400T-R Kit
DIMM Rank	Single Rank (1R)	Single Rank (1R)	Dual Rank (2R)	Dual Rank (2R)
DIMM Capacity	8GB	16GB	16GB	32GB
Voltage	1.2V	1.2V	1.2V	1.2V
DRAM depth [bit]	1G	2G	1G	2G
DRAM Width [bit]	x8	x4	x4	x4
DRAM Density	8Gb	8Gb	4Gb	8Gb
CAS Latency	17-17-17	17-17-17	17-17-17	17-17-17
DIMM Native Speed (MT/s)	2400	2400	2400	2400
HPE Server Memory Speed (MT/s)				
1 DIMM Per Channel	1600	1600	1600	1600
2 DIMM Per Channel	1600	1600	1600	1600
3 DIMM Per Channel	1600	1600	1333	1333

DIMM Type	Load Reduced (LRDIMM)	
HPE SKU P/N	805358-B21	809208-B21
SKU Description	HPE 64GB 4Rx4 PC4-2400T-L Kit	HPE 128GB 8Rx4 PC4-2400U-L Kit
DIMM Rank	Quad Rank (4R)	Octal Rank (8R)
DIMM Capacity	64GB	128GB
Voltage	1.2V	1.2V
DRAM depth [bit]	2G	2G
DRAM Width [bit]	x4	x4
DRAM Density	8Gb	8Gb
CAS Latency	17-17-17	20-18-18
DIMM Native Speed (MT/s)	2400	2400
HPE Server Memory Speed (MT/s)		

Standard Features

1 DIMM Per Channel	1600	1600
2 DIMM Per Channel	1600	1600
3 DIMM Per Channel	1600	1333

Memory Speed Table

Synergy 3DPC EX Platform – running in 1:1 “Lockstep” Mode

DIMM Type	Register DIMM (RDIMM)		
HPE SKU P/N	805349-B21	836220-B21	805351-B21
SKU Description	HPE 16GB 1Rx4 PC4-2400T-R Kit	HPE 16GB 2Rx4 PC4-2400T-R Kit	HPE 32GB 2Rx4 PC4-2400T-R Kit
DIMM Rank	Single Rank (1R)	Dual Rank (2R)	Dual Rank (2R)
DIMM Capacity	16GB	16GB	32GB
Voltage	1.2V	1.2V	1.2V
DRAM depth [bit]	2G	1G	2G
DRAM Width [bit]	x4	x4	x4
DRAM Density	8Gb	4Gb	8Gb
CAS Latency	17-17-17	17-17-17	17-17-17
DIMM Native Speed (MT/s)	2400	2400	2400
HPE Server Memory Speed (MT/s)			
1 DIMM Per Channel	1866	1866	1866
2 DIMM Per Channel	1866	1866	1866
3 DIMM Per Channel	1600	1333	1333

DIMM Type	Load Reduced (LRDIMM)		
HPE SKU P/N	805353-B21	805358-B21	809208-B21
SKU Description	HPE 32GB 2Rx4 PC4-2400T-L Kit	HPE 64GB 4Rx4 PC4-2400T-L Kit	HPE 128GB 8Rx4 PC4-2400U-L Kit
DIMM Rank	Dual Rank (2R)	Quad Rank (4R)	Octal Rank (8R)
DIMM Capacity	32GB	64GB	128GB
Voltage	1.2V	1.2V	1.2V
DRAM depth [bit]	2G	2G	2G
DRAM Width [bit]	x4	x4	x4
DRAM Density	8Gb	8Gb	8Gb
CAS Latency	17-17-17	17-17-17	20-18-18
DIMM Native Speed (MT/s)	2400	2400	2400
HPE Server Memory Speed (MT/s)			
1 DIMM Per Channel	N/A	1866	1866

Standard Features

2 DIMM Per Channel	N/A	1866	1866
3 DIMM Per Channel	N/A	1600	1333

Network Controller

HPE Synergy 6810C 25/50Gb Ethernet Adapter

HPE Synergy 6410C 25/50Gb Ethernet Adapter

HPE Synergy 3830C 16Gb Fibre Channel Host Bus Adapter

HPE Synergy 3530C 16Gb Fibre Channel Host Bus Adapter

HPE Synergy 3820C 10/20Gb Converged Network Adapter

NOTE: Supports full hardware offload of FCoE storage protocol processing for high performance converged Ethernet data and storage networks.

HPE Synergy 2820C 10Gb Converged Network Adapter

NOTE: Delivers flexibility to compose multiple network flows including Ethernet and FCoE or iSCSI within each connection.

Standard iLO Network Controller:

One (1) 1Gbps port for the HPE iLO 4 to HPE Synergy Composer link.

Mezzanine connectors

Ten (10) I/O expansion mezzanine connectors (in PCIe discovery order):

- Mezzanine connectors 4 and 10 are X8 PCIe 3.0 and support Type C and D mezzanine cards for Fabric 1.
- Mezzanine connectors 6 and 12 are X16 PCIe 3.0 and support Type C mezzanine card for Fabric 3.
- Mezzanine connectors 3 and 9 are X8 PCIe 3.0 and support Type C mezzanine cards for Fabric 3.
- Mezzanine connectors 1 and 7 are X8 PCIe 3.0 and support Type C and Type D mezzanine cards for Fabric 1.
- Mezzanine connectors 2 and 8 are X16 PCIe 3.0 and support Type C and Type D mezzanine cards for Fabric 2.

Mezzanine options include:

- Dual-port 10/20Gb compute module mezzanine adapter options for additional network ports
- Dual-port 16Gb Fibre Channel HBA for SAN connectivity

HPE Compute Module ROM

HPE ROM (read only memory) is now digitally signed using the HPE Corporate Signing Service. 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).

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.

The HPE 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 cards).
- Customer-specific BIOS configuration using the HPE ROM-Based Setup Utility (RBSU).

Standard Features

NOTE: For further information, please refer to the HPE RBSU (ROM based setup utility) user guide: <http://h20564.www2.hp.com/hpsc/doc/public/display?docId=c04398276>

HPE Server Unified Extensible Firmware Interface (UEFI) or Legacy Mode

The HPE System BIOS is an EDK2 UEFI solution, and adheres to the latest revisions of UEFI Class 2 specifications which supports both legacy boot and UEFI boot operation. The HPE Synergy 680 Gen9 defaults to UEFI boot operation and can be factory or field configured for Legacy boot operation.

NOTE: For UEFI boot operation, boot environment and OS image installations should be configured properly to support UEFI.

NOTE: For more information on the HPE System BIOS and UEFI, see the UEFI Information Library: <http://www.hp.com/info/uefi/docs>

NOTE: HPE Legacy FIO Mode Setting (758959-B22) can be selected to configure the system in UEFI mode in the factory.

To modify the compute module configuration ROM default settings, press F9 in the HPE POST screen to enter the UEFI System Utilities screen. By default, the System Utilities menus are in the English language.

UEFI enables numerous new capabilities, including both industry standard functionality and features specific to HPE servers. Following are some of the features that UEFI enables and that the HPE Synergy 680 Gen9 can support when configured for UEFI boot operation:

- Secure Boot - A new feature in which the system firmware, option card firmware, operating systems, and software collaborate to greatly enhance platform security.
- Operating system specific functionality - Microsoft Windows 2012 supports several features only when installed in UEFI mode.
- Support for > 2.2 TB (using GPT) boot drives - Such drives could previously only be used for boot drives when using RAID solutions such as HPE Smart Array.
- UEFI Shell - Provides a pre-boot environment for running scripts and tools. The HPE UEFI Shell provides both standard capabilities as well as numerous enhancements.
- PXE boot support for IPv6 networks.
- PXE Multicast Boot allowing for faster PXE deployments for large numbers of servers.
- Boot support for option cards that only support a UEFI option ROM.

NOTE: When the server is configured for UEFI Boot Mode, PXE servers must be configured with a UEFI boot image.

NOTE: When the server boots in UEFI mode, it does not boot media with a legacy OS installation. This includes DOS targets and Windows or Linux systems installed in Legacy mode. The reverse is also true for servers that boot in Legacy mode.

Storage Controller Choice of:

- HPE Smart Array P240nr Controller with 1GB Flash-Backed Write Cache (FBWC) supporting RAID 0, 1, 10, 5, 6, and 1 ADM
- HPE Smart Array P542D Controller with 2GB Flash-Backed Write Cache (FBWC) supporting RAID 0, 1, 10, 5, 50, 6, 60, 1 ADM, and 10 ADM
- HPE H240nr Smart HBA supporting RAID 0, 1, 10, 5

Maximum Internal Storage	Hot Plug SFF SAS	61.0TB	4 x 15.3TB
One of the following depending on Model	Hot Plug SFF SATA	15.36TB	4 x 3.84TB
	Hot Plug SFF SAS SSD	61.80TB	4 x 3.84TB
	Hot Plug SFF SATA SSD	15.36TB	4 x 1.6TB
	Hot Plug SFF NVMe SSD	16.0TB	4 x 4.0TB

NOTE: The Synergy 680 Gen9 compute module includes the HPE hot plug small form factor (SFF) SmartDrive carrier for enhanced management and reduced maintenance errors. HPE drives from previous

Standard Features

generation servers (prior to Gen8) are not compatible with the Synergy 680 Gen9 drive bays.

Interfaces	Micro SDHC Slot	One (1) internal Micro Secure Digital High Capacity (Micro SDHC) card slot
	USB 2.0 Port	One (1) internal USB 2.0 connector for USB flash media drive keys
	USB 2.0 Port	One (1) external USB 2.0 connector for USB flash media drive keys

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

Industry Standard Compliance	<ul style="list-style-type: none"> • ACPI 2.0 • Microsoft® Logo certifications • USB 2.0 Support • IPMI 2.0 • Secure Digital 2.0 • TPM 1.2 and 2.0 Support • IEEE (specific IEEE standards depending on Ethernet adapter card(s) installed) • Advanced Encryption Standard (AES) • Triple Data Encryption Standard (3DES) • SNMP • SSL 2.0 • DMTF Systems Management Architecture for Server Hardware Command Line Protocol (SMASH CLP) • Active Directory v1.0 • PCIe 3.0 • ASHRAE A3
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Operating Systems and Virtualization Software Support for Compute modules	<ul style="list-style-type: none"> • Microsoft Windows Server 2012 Datacenter and 2012 R2 Datacenter • Microsoft Windows Server 2012 Standard and 2012 R2 Standard • Microsoft Hyper-V Server 2012 and 2012 R2 • Microsoft Windows Server 2016 Standard Edition (includes Nano Server) • Microsoft Windows Server 2016 Datacenter Edition (includes Nano Server) • Microsoft Hyper-V 2016 • Red Hat Enterprise Linux 6.7, 6.8, 7.2, and 7.3 GA (64-bit) (includes KVM & RHEVH) • SUSE Linux Enterprise Server 11 SP4, 12 SP1, 12 SP2, and 12 SP3 (64-bit) (includes XEN & KVM) • VMware vSphere 6.0 U3 and 6.5
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NOTE: In addition, CentOS 6.7, 6.8, 7.2, and 7.3 is qualified as a community/regional enabled operating system.

NOTE: Operating System support may change. To get the most updated information, please go to the HPE OS Support Matrix at <http://www.hpe.com/info/ossupport>

Frames	<p>HPE Synergy 12000 Frame is the base for all Synergy products and supports:</p> <ul style="list-style-type: none"> • Up to 12 half-height, 6 full-height single-wide, or 3 full-height double-wide Compute Modules (mixing allowed) • Up to 5 half-height double-wide HPE Synergy D3940 Storage Modules (mixing with compute modules in any to any ratio allowed) • Up to three (3) HPE Synergy 680 Gen9 Compute Modules
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Standard Features

Graphics	Integrated Matrox G200eh video controller <ul style="list-style-type: none"> • 1600 x 1200 (32 bpp) • 1920 x 1200 (16 bpp) HPE iLO Management On System Management Memory <ul style="list-style-type: none"> • 16 MB Flash Video Memory • 256 MB DDR 3 with ECC (112 MB after ECC and video) 	
Form Factor	HPE Synergy 680 Gen9 is a full-height double-wide compute module that plugs into the HPE Synergy Frame 12000 Frame.	
HPE management solution	HPE Synergy Composer with 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	Monitor your servers for ongoing management, service alerting, reporting and remote management with iLO. Learn more at http://www.hpe.com/info/ilo
	UEFI	Configure and boot your servers securely with industry standard Unified Extensible Firmware Interface (UEFI). Learn more at http://www.hpe.com/servers/uefi . http://itdoc.hitachi.co.jp/manuals/ha8000v/hard/Gen10/UEFI/881334-004_en.pdf
	HPE RESTful API	RESTful API is an application programming interface. RESTful Web Service API served by iLO's web server. https://www.hpe.com/servers/resttool
	Intelligent Provisioning	Provision servers by discovering and deploying 1 to few servers with Intelligent Provisioning. Learn more at https://www.hpe.com/servers/intelligentprovisioning
Server Utilities	HPE Smart Update Scripting Tool Kit and Windows PowerShell HPE RESTful Interface Tool HPE iLO Mobile Application	Optimize firmware and driver updates with HPE Smart Update solutions. Learn more at https://www.hpe.com/us/en/servers/smart-update.html Provision 1 to many servers using your own scripts to discover and deploy them with HPE Scripting Tool Kit for Windows and Linux or HPE Scripting Tools for Windows PowerShell. Learn more at http://wwdw.hpe.com/info/stk/docs or https://www.hpe.com/us/en/product-catalog/detail/pip.scripting-tools-for-windows-powershell.5440657.html HPE RESTful API tool is a scripting tool to provision servers using RESTful API Interface to discover and deploy servers at scale. Learn more at https://www.hpe.com/servers/resttool Enables the ability to access, deploy, and manage your server anytime from anywhere from select smartphones and mobile devices. For additional information please visit: https://www.hpe.com/us/en/servers/integrated-lights-out-ilo.html

Standard Features

Security

- 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) 1.2 and 2.0 options
- Advanced Encryption Standard (AES)
- Intel® Advanced Encryption Standard-New Instructions (AES-NI)

Availability

Memory

- Advanced ECC uses single device data correction (SDDC) to detect and correct single and all multi-bit error that occurs within a single DRAM chip. Both x4 and x8 SDDC are supported (x8 requires lockstep mode).
- Memory online spare mode (also known as rank spare mode) detects a rank that is degrading and switches operation to the spare rank.
- Memory demand and patrol scrubbing to prevent accumulation of correctable errors and reducing the likelihood of unplanned downtime.
- Failed DIMM isolation improves the service time thus improving the overall system availability.
- Address parity protection available on RDIMMs and LRDIMMs detects address bit errors to improve service time and overall system availability.

Mezzanine options and I/O

- Multiple I/O mezzanine connectors that support a wide variety of mezzanine cards each supporting multiple data paths routed to redundant interconnect modules.
- Network Adapter Teaming (bonding) provides network fault tolerance, transmit load balancing, and switch-assisted load balancing.

Storage

- Four (4) Small Form Factor hot-plug SAS drive bays or eight (8) Micro Form Factor hot-plug drives.
- Choice of the HPE Smart Array P240nr Controller with 1GB FBWC, HPE Synergy Smart Array P542D Controller with 2GB FBWC, or the HPE H240nr Smart HBA.
- RAID 0,1, 5, and 10 support for all storage controller offerings.
- Optional dual-port Fibre Channel mezzanine card(s) for redundant SAN connections.

Processor/Chipset

- Processor internal sensors & thermal control protection against over-temperature conditions.
- Cache parity/ECC protects cache data from accidental data corruption.
- Machine Check Architecture (MCA) detects and captures hardware errors such as system bus, memory ECC, parity, and cache, and improves service time.
- Intel® QPI Protocol Protection allows detection of data errors using a checksum of 8-bits.
- Core Disable for FRB (fault resilient boot) allows a system to power-on despite a failing core-pair. It uses BIST (built-in self test) results to detect a failure and disables the target core-pair upon subsequent boot.
- Intel® 602J Chipset with the highest amount of RAS (reliability, availability, and serviceability) features.

HPE Synergy 12000 Frame

Standard Features

- Up to 12 half-height, 6 full-height single-wide, or 3 full-height double-wide Compute Modules (mixing allowed)
NOTE: The HPE Synergy 680 Gen 9 compute module has a full-height, double-wide form factor.
- Up to 4 half-height double-wide HPE Synergy D3940 Storage Modules (mixing with compute modules in any to any ratio allowed) with a single Synergy 680 Compute.
- Ten fans and single Frame Link Module included with every system
- Two appliance bays for redundant management appliances, embedded OneView and other solutions to come via REST
- Up to six 2650 Watt Power Supplies of Titanium class efficiency providing 7950 Watts of redundant power
- Up to 6 ICM module/switch bays for full redundancy of 3 fabrics.
- 2 slots for Frame Link Modules, offers links to multiple frames through a private air-gapped management network
- HPE Thermal Logic technology to maximize power and cooling efficiency
- HPE Intelligent Resources technology built-in to every option for OneView Auto-Discovery of resources.

Warranty

This product is covered by a global limited warranty and supported by Hewlett Packard Enterprise Services and a worldwide network of Hewlett Packard Enterprise Authorized Channel Partners. 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 Support services or customized service agreements. Certain restrictions and exclusions apply. Drives have either a one year or three year warranty; refer to specific drive QuickSpecs for details.

NOTE: Compute module warranty includes 3-year Parts, 3-year Labor, 3-year on-site support. 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 replace Optional CSR parts at no charge. Additional information regarding worldwide limited warranty and technical support is available at <http://h20564.www2.hp.com/hpsc/wc/public/home>.

Optional Features

Fibre Channel Support

Up to four (4) optional Fibre Channel mezzanine HBAs are supported on the HPE Synergy 680 Gen9.

Compatible SAN

HPE Synergy 680 Gen9 compute modules are optimized for HPE MSA, EVA, 3PAR, XP, and LeftHand.

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 master/satellite architecture.

The HPE Virtual Connect SE 40Gb F8 Module, master module, based on composable fabric is designed for Composable Infrastructure. Its disaggregated, rack-scale design uses a master/satellite architecture to consolidate data center network connections, reduce hardware and scales network bandwidth across multiple HPE Synergy Frames.

The master 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 VC SE 40Gb F8 modules eliminate 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 10Gb and in case of 20Gb 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 VC SE 40Gb F8 modules avoid 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 Master/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 <http://www.hpe.com/info/virtualconnect>.

Storage Software

Whether you need to solve a specific data protection, archiving, or storage command and control challenge, or deliver on strategic consolidation, compliance, or continuity initiatives, look no further than HPE storage software. Our storage software helps you reduce costs, simplify storage infrastructure, protect vital assets and respond faster to business opportunities.

Storage software that gets the job done:

- **Data Protection and Recovery Software**

Whether you're a large enterprise or a smaller business, HPE data protection and recovery software will cost-effectively protect you against disaster and ensure business continuity.

- **Data Archive and Migration Software**

The HPE storage software enables you to comply with data retention and retrieval requirements, improve application performance, and reduce costs by efficiently migrating infrequently accessed or less valuable data to lower cost storage.

- **Storage Resource Management Software (SRM)**

The HPE storage resource management software reduces operational costs and provides the

Optional Features

command and control foundation you need to efficiently manage and visualize your physical and virtual environments.

- **Data Replication Software**
Hewlett Packard Enterprise offers array-based and host-based replication software for use in disaster recovery, testing, application development and reporting.
- **Storage Device Management Software**
Maximize your investment in HPE storage and networking with software that enables hardware-specific configuration, performance tuning and connectivity management.
- **HPE StoreVirtual VSA**
HPE StoreVirtual VSA allows you to create fully featured shared storage on a VMware vSphere or Microsoft Hyper-V virtualized server.

NOTE: For more information available Storage Software including QuickSpecs, please see: <https://www.hpe.com/us/en/product-catalog/storage/storage-software.hits-12.html>.

Upgradability

The HPE Synergy 620 Gen9 Compute Module can be upgraded to an HPE Synergy Gen9 Compute Module by ordering a 620 to 680 Upgrade Kit. Please see the HPE Synergy 620 Gen9 Compute Module QuickSpecs for information.

Service and Support

Service and Support

HPE Technology Services offers you a rich portfolio of consulting and support services designed to add value to our core products and solutions. We have the know-how and experience to put technology to work for you. We work closely with you, as your strategic partner, leveraging our full services portfolio to make sure that everything works to help optimize your enterprise.

Choose from services aligned to our product offerings and lifecycle. From proactive onsite services to innovative support when your products are connected to Hewlett Packard Enterprise, you choose the precise level of attention and support your business demands.

HPE Technology Services for HPE Synergy

HPE Technology Services delivers confidence, reduces risk and helps customers realize agility and stability. Connect to Hewlett Packard Enterprise to help prevent problems and solve issues faster. Our support technology lets you to tap into the knowledge of millions of devices and thousands of experts to stay informed and in control, anywhere, any time.

Protect your business beyond warranty with HPE Support Services

HPE support services offer complete care and support expertise with committed response choices that are designed to meet your IT and business needs.

HPE Foundation Care services offer scalable reactive support packages for HPE Synergy and software. You choose the type and level of service that is most suitable for your IT and business needs.

HPE Proactive Care keeps your system stable and reliable helping to prevent problems and reduce outages through proactive service management and enhanced technical response.

Advise, transform, integrate, support, automate, and flex

HPE Technology Services helps you get the most out of what you have today and transition to HPE Synergy, a composable infrastructure, at your pace and from wherever you are on the journey.

Start with the HPE Transformation Workshop to ensure that your business and IT organizations collaborate, define the topline strategy for composable, software-defined, cloud-ready infrastructure and kick-start your projects confidently. This workshop clarifies your business requirements and the issues that IT and operations teams must resolve in order to meet these requirements. A detailed executive briefing or high-level report summarizes the strategies, high-level plan and functional requirements.

HPE Modernization and Migration Services helps you choose the right platform for the right workload at the right cost and evolve your IT infrastructure, processes and organization taking advantage of “on-hybrid infrastructure” innovations such as composable, converged, software-defined, technologies. Hewlett Packard Enterprise experts advise, transform, integrate and implement for platform refresh, datacenter consolidation virtualization, migration and automation projects.

HPE Flexible Capacity is a pay per use model for on premise infrastructure. This offers needed HPE Synergy capacity in the datacenter, plus a buffer of additional capacity. As HPE Synergy will be a dynamic environment, this provides enough room to grow your environment, but only pay for actual metered use. Technology transitions and refresh can be built in, infrastructure and services are billed monthly, enabling you to align costs to business use.

HPE Datacenter Care Infrastructure Automation: HPE Synergy with OneView embedded helps enable infrastructure automation and is integrated with tools such as those from Chef, Puppet, and Docker, to enable rapid bare metal provisioning. With DC-IA, HPE service experts provide advice, support, best practices, for these tools that work with OneView to help create a fast, agile, and reliable automated IT environment. With this approach, customers can deploy faster. DC-IA delivers support to customers to enable infrastructure as code and agile processes as part of the service. Customers schedule quarterly

Optional Features

reviews and reports with HPE Center of Expertise, as well as having access to these experts when needed, for automation development and code coaching.

Choose the right support to maximize uptime, free up your resources, and achieve improved value—as you get the most out of the existing IT assets while accelerating time-to-revenue.

Optimized Support **HPE Proactive Care Advanced - 24x7 coverage, three year Support Service**

Builds and incorporates on Proactive Care and also gives customers personalized technical and operational advice from an assigned, local Account Support Manager for personalized technical collaboration, flexible access to specialist skills to help optimize business critical IT, and Critical Incident Management to help so the business is not affected if there is a system or device outage. This recommendation provides 24x7 coverage with four-hour response for hardware and Basic Software Support and Collaborative Call Management for selected non-HPE software that offers two-hour callback for supported software issues.

<https://www.hpe.com/h20195/v2/GetPDF.aspx/4AA5-3259ENW.pdf>

Standard Support **HPE Proactive Care with 24x7 coverage, three year Support Service**

Hardware and software support services designed specifically for your technology with rapid access to Advanced Solution Center specialists for start to finish case management plus proactive reports and recommendations for firmware and software management and best practice advice. This recommendation provides 24x7 coverage with four-hour response for hardware and Basic Software Support and Collaborative Call Management for selected non-HPE software that offers two-hour callback for supported software issues.

<https://www.hpe.com/h20195/v2/GetPDF.aspx/4AA3-8855ENW.pdf>

Deploy and integrate

HPE Synergy First Frame Installation and Startup - Provides for hardware installation (HPE Synergy compute modules, Storage Modules, Virtual Connect modules, Interconnect Link Modules, Frame Link Modules, and HPE Synergy D3940 Storage Modules) and software startup for the first frame of your HPE Synergy deployment. Additional frames can be added using the HPE Synergy Additional Frame Installation and Startup Service.

HPE Synergy Additional Frame Installation and Startup Service - Add additional frames to your HPE Synergy First Frame Startup service or expand your existing HPE Synergy Infrastructure.

HPE Education Services

Training your IT staff is critical to help drive the value of HPE Synergy with increased efficiencies and better business outcomes. Training is key to the transformation and management of HPE Synergy.

Parts and Materials

Hewlett Packard Enterprise 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 quick-specs, or the technical product data sheet will not be provided, repaired, or replaced as part of these services.

The defective media retention service feature option applies only to Disk or eligible SSD/Flash Drives replaced by Hewlett Packard Enterprise due to malfunction.

For more information

Additional Support Services can be found at HPE Support Services Central
<http://h20565.www2.hpe.com/portal/site/hpsc/>

Pre-configured Models

For Standard Features shipped in the "Factory Integrated Models", please see "Configuration Information - Factory Integrated Models" section.

1. Pre-configured models ship with configurations below. Options can be selected from Core or Additional options section of this QuickSpecs.
2. Hewlett Packard Enterprise does not allow factory integration of options into pre-configured models. Any additional options purchased will be shipped separately.
3. If a custom configuration is desired, please see "Configuration Information - Factory Integrated Models" section of this QuickSpecs.

Models	HPE SY 680 Gen9 4S-EX Base Cmpt Mdl	HPE SY 680 Gen9 4S-EX Perf Cmpt Mdl
SKU	834481-B21	834480-B21
Processor(s)	4x E7-8860 v4	4x E7-8891 v4
DIMM Slots	8x HP 32GB 2Rx4 PC4-2400T-R Kit	96x HP 32GB 2Rx4 PC4-2400T-R Kit
I/O slots	10 mezz slots: 4 x16 PCIe 3.0 (Type-C), 6 x 8 PCIe 3.0 (Type-D)	
Storage controller	HPE Smart ArrayP542D/2GB FBWC	
Network Mezz Adapters	HPE Synergy 3820C 10/20Gb CNA	
Drive Options	2x HPE 600GB 12G SAS 15K 2.5in SC 512e HDD	
Security	TPM module 2.0	
USB and MicroSD	<ul style="list-style-type: none"> • 1 x internal USB 2.0 slot • 1 x external (front) USB 2.0 slot • 1 x internal uSD slot 	
Management	HPE OneView, HPE iLO, HPE RESTful Interface Tool	

Configuration Information – Factory Integrated Models

NOTE: 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.

NOTE: Configure-to-order compute modules must start with a CTO Compute Module.

NOTE: FIO indicates that this option is only available as a factory installable option.

NOTE: All Factory Integrated Models will be populated with sufficient drive blanks based on the number of initial drives ordered with the server.

Step 1: Base Compute Module Configuration (Select a Compute Module)

Models	HPE SY 680 Gen9 4S-EX CTO CmpT Mdl
SKU	834482-B21
Processor(s)	Four (4) E7-4800 or E7-8800 v4 series processors
DIMM Slots	96 DIMM slots for DDR4 RDIMM or LRDIMM Memory (min 4)
I/O slots	10 mezz slots: 4 x16 PCIe 3.0 (Type-C), 6 x 8 PCIe 3.0 (Type-D)
Storage controller choices	Choice of: <ul style="list-style-type: none"> • HPE H240nr Smart Host Bus Adapter • HPE Smart Array P240nr/1GB FBWC • HPE Smart ArrayP542D/2GB FBWC
Network Mezz Adapters	Choice of: <ul style="list-style-type: none"> • HPE Synergy 6810C 25/50Gb Ethernet Adapter • HPE Synergy 64810C 25/50Gb Ethernet Adapter • HPE Synergy 3820C 10/20Gb CNA • HPE Synergy 2820C 10Gb can • HPE Synergy 3830C 16Gb Fibre Channel Host Bus Adapter • HPE Synergy 3530C 16Gb Fibre Channel Host Bus Adapter
Drive Options	0 or 4 HPE small form factor (SFF) hot-plug SAS/SATA HDD or NVME SSD drive bays, or support for 0 or 8 uFF drives
Security	TPM module 1.2 or 2.0
USB and MicroSD	<ul style="list-style-type: none"> • 1 x internal USB 2.0 slot • 1 x external (front) USB 2.0 slot • 1 x internal uSD slot
Mgmt	HPE OneView, HPE iLO, HPE RESTful Interface Tool

Configuration Information – Factory Integrated Models

Step 2: Choose Required Options (one of the following from each list unless otherwise noted)

HPE Processors **NOTE:** Must select one xxxxxx-L21 and three corresponding xxxxxx-B21 processors.

HPE Processors

HPE Synergy 620/680 Gen9 Intel Xeon E7-4820 v4 (2.0GHz/10-core/25MB/115W) FIO Processor Kit	834490-L21
HPE Synergy 620/680 Gen9 Intel Xeon E7-4820 v4 (2.0GHz/10-core/25MB/115W) Processor Kit	834490-B21
HPE Synergy 620/680 Gen9 Intel Xeon E7-4809 v4 (2.1GHz/8-core/20MB/115W) FIO Processor Kit	834492-L21
HPE Synergy 620/680 Gen9 Intel Xeon E7-4809 v4 (2.1GHz/8-core/20MB/115W) Processor Kit	834492-B21
HPE Synergy 620/680 Gen9 Intel Xeon E7-8894 v4 (2.4GHz/24-core/60MB/165W) FIO Processor Kit	876215-L21
HPE Synergy 620/680 Gen9 Intel Xeon E7-8894 v4 (2.4GHz/24-core/60MB/165W) Processor Kit	876215-B21
HPE Synergy 620/680 Gen9 Intel Xeon E7-8891 v4 (2.8GHz/10-core/60MB/165W) FIO Processor Kit	834494-L21
HPE Synergy 620/680 Gen9 Intel Xeon E7-8891 v4 (2.8GHz/10-core/60MB/165W) Processor Kit	834494-B21
HPE Synergy 620/680 Gen9 Intel Xeon E7-8890 v4 (2.2GHz/24-core/60MB/165W) FIO Processor Kit	834498-L21
HPE Synergy 620/680 Gen9 Intel Xeon E7-8890 v4 (2.2GHz/24-core/60MB/165W) Processor Kit	834498-B21
HPE Synergy 620/680 Gen9 Intel Xeon E7-8880 v4 (2.2GHz/22-core/55MB/150W) FIO Processor Kit	834500-L21
HPE Synergy 620/680 Gen9 Intel Xeon E7-8880 v4 (2.2GHz/22-core/55MB/150W) Processor Kit	834500-B21
HPE Synergy 620/680 Gen9 Intel Xeon E7-8867 v4 (2.4GHz/18-core/45MB/165W) FIO Processor Kit	860824-L21
HPE Synergy 620/680 Gen9 Intel Xeon E7-8867 v4 (2.4GHz/18-core/45MB/165W) Processor Kit	860824-B21

NOTE: Supports 4 processors. All processors within the compute module must be identical.

NOTE: DDR4 speed is the maximum memory speed of the processor. Actual memory speed may depend on the quantity and type of DIMMs installed. Please see the "Memory" section later in this document.

HPE Memory

HPE SmartMemory

HPE 16GB (1x16GB) Single Rank x4 DDR4-2400 CAS-17-17-17 Registered Memory Kit	805349-B21
HPE 32GB (1x32GB) Dual Rank x4 DDR4-2400 CAS-17-17-17 Registered Memory Kit	805351-B21
HPE 64GB (1x64GB) Quad Rank x4 DDR4-2400 CAS-17-17-17 Load Reduced Memory Kit	805358-B21
HPE 8GB (1x8GB) Single Rank x8 DDR4-2400 CAS-17-17-17 Registered Memory Kit	805347-B21
HPE 32GB (1x32GB) Dual Rank x4 DDR4-2400 CAS-17-17-17 Load Reduced Memory Kit	805353-B21
HPE 128GB (1x128GB) Octal Rank x4 DDR4-2400 CAS-20-18-18 Load Reduced Memory Kit	809208-B21
HPE SmartMemory	
HPE 16GB (1x16GB) Dual Rank x4 DDR4-2400 CAS-17-17-17 Registered Memory Kit	836220-B21

Configuration Information – Factory Integrated Models

NOTE: HPE memory from previous generation servers (DDR3) is not compatible with this compute module. HPE SmartMemory is required to realize the memory performance improvements and enhanced functionality listed in this document for Gen9. For additional information, please see the HPE SmartMemory QuickSpecs

at: <https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04111535>

NOTE: LRDIMM and RDIMM are distinct memory technologies and cannot be mixed within a compute module.

HPE Networking	10/20Gb Mezzanine Adapters	
	NOTE: The compute module requires a minimum of one (1) mezzanine network adapter.	
	NOTE: 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	
	HPE Synergy 6810C 25/50Gb Ethernet Adapter	867322-B21
	HPE Synergy 6410C 25/50Gb Ethernet Adapter	868779-B21
	HPE Synergy 3830C 16Gb Fibre Channel Host Bus Adapter	777452-B21
	HPE Synergy 3530C 16Gb Fibre Channel Host Bus Adapter	777454-B21
	HPE Synergy 2820C 10Gb Converged Network Adapter	794538-B21
	HPE Synergy 3820C 10/20Gb Converged Network Adapter	777430-B21

Step 3: Choose Additional Factory Integration Options

HPE Drive Cages	HPE Synergy 620/680 Gen9 FIO Standard Backplane Kit	850145-B21
	HPE Synergy 620/680 Gen9 Premium Backplane Kit	850146-B21
	NOTE: Up to two Backplane Kits may be selected.	
	NOTE: Only NROC controllers can be used with the Standard Backplan (850145-B21) but NROC controllers are NOT supported with the Premium Backplan (850146-B21)	
	NOTE: When NVMe drives are use the Premium Backplane (850146-B21) must be selected.	
	NOTE: If P542D controller is selected, and the local drives are used then the SAS Cable and the Premium Backplan (850146-B21) must be selected.	
	NOTE: Mixing of hard drive backplane is allowed.	
	NOTE: NVMe drives can only be used along with premium backplane. If one premium backplane is selected and any capacity NVME is selected, they must be paired with the premium backplane in the Primary Compute Module.	
HPE Storage Controllers	HPE Legacy FIO Mode Setting	758959-B22
	HPE Manufacturing FIO Enable HBA Mode Setting	792962-B21

Step 4: Choose Additional Options for Factory Integration

NOTE: For additional options, please refer to the "Core Options" and "Additional Options" section below. For additional options please see the Core Options and Additional sections below; or the following:

- HPE Synergy 12000 Frame QuickSpecs
<http://www8.hp.com/h20195/v2/GetHtml.aspx?docname=c04815113>
- HPE Synergy Interconnect and Mezzanine Components
<https://www.hpe.com/h20195/v2/GetHtml.aspx?docname=c04815110>
- HPE Synergy D3940 Storage Module QuickSpecs
<https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04815141>

Additional Options

HPE SmartMemory

Registered DIMMs (RDIMMs)

HPE 8GB (1x8GB) Single Rank x8 DDR4-2400 CAS-17-17-17 Registered Memory Kit	805347-B21
HPE 16GB (1x16GB) Single Rank x4 DDR4-2400 CAS-17-17-17 Registered Memory Kit	805349-B21
HPE 16GB (1x16GB) Dual Rank x4 DDR4-2400 CAS-17-17-17 Registered Memory Kit	836220-B21
HPE 32GB (1x32GB) Dual Rank x4 DDR4-2400 CAS-17-17-17 Registered Memory Kit	805351-B21

Load Reduced DIMMs (LRDIMMs)

HPE 32GB (1x32GB) Dual Rank x4 DDR4-2400 CAS-17-17-17 Load Reduced Memory Kit	805353-B21
HPE 64GB (1x64GB) Quad Rank x4 DDR4-2400 CAS-17-17-17 Load Reduced Memory Kit	805358-B21
HPE 128GB (1x128GB) Octal Rank x4 DDR4-2400 CAS-20-18-18 Load Reduced Memory Kit	809208-B21

HPE Drive Cage

HPE Synergy 620/680 Gen9 Standard Backplane Hard Disk Drive Upgrade Kit	861546-B21
HPE Synergy 620/680 Gen9 Premium Backplane Hard Disk Drive Upgrade Kit	861547-B21

HPE Drives

NOTE: The HPE Synergy 480 Gen10 Compute Module supports the HPE hot-plug small form factor (SFF) SmartDrive carrier for enhanced management and reduced maintenance errors. HPE drives from generation G7 servers and before are not compatible with the HPE Synergy 480 Gen10 drive bays.

NOTE: 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 drives types is not supported.

NOTE: 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](#)

HPE Synergy 480 Gen10 Compute Module support all small form factor (SFF) SAS and SATA HDDs and SSDs currently certified in HPE Smart Carriers. Any exceptions to this qualification will be listed on this page by drive description and part number.

Enterprise - 12G SAS - SFF Drives

HPE 300GB SAS 12G Enterprise 10K SFF (2.5in) SC 3yr Wty Digitally Signed Firmware HDD	872475-B21
HPE 300GB SAS 12G Enterprise 15K SFF (2.5in) SC 3yr Wty Digitally Signed Firmware HDD	870753-B21
HPE 600GB SAS 12G Enterprise 15K SFF (2.5in) SC 3yr Wty Digitally Signed Firmware HDD	870757-B21
HPE 600GB SAS 12G Enterprise 10K SFF (2.5in) SC 3yr Wty Digitally Signed Firmware HDD	872477-B21
HPE 900GB SAS 12G Enterprise 15K SFF (2.5in) SC 3yr Wty Digitally Signed Firmware HDD	870759-B21
HPE 1.2TB SAS 12G Enterprise 10K SFF (2.5in) SC 3yr Wty Digitally Signed Firmware HDD	872479-B21
HPE 1.8TB SAS 12G Enterprise 10K SFF (2.5in) SC 3yr Wty 512e Digitally Signed Firmware HDD	872481-B21
HPE 2.4TB SAS 12G Enterprise 10K SFF (2.5in) SC 3yr Wty 512e Digitally Signed Firmware HDD	881457-B21
HPE 900GB SAS 12G Enterprise 15K SFF (2.5in) SC 3yr Wty 512e Digitally Signed Firmware HDD	870765-B21

Midline - 12G SAS - SFF Drives

HPE 1TB SAS 12G Midline 7.2K SFF (2.5in) SC 1yr Wty Digitally Signed Firmware HDD	832514-B21
HPE 2TB SAS 12G Midline 7.2K SFF (2.5in) SC 1yr Wty 512e HDD	765466-B21

Midline - 12G SAS - SFF Drives

HPE 1TB SAS 12G Midline 7.2K SFF (2.5in) SC 1yr Wty 512e Digitally Signed Firmware HDD	765464-B21
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Midline 6G SATA - SFF Drives

HPE 1TB SATA 6G Midline 7.2K SFF (2.5in) SC 1yr Wty Digitally Signed Firmware HDD	655710-B21
HPE 1TB SATA 6G Midline 7.2K SFF (2.5in) SC 1yr Wty 512e Digitally Signed Firmware HDD	765453-B21
HPE 2TB SATA 6G Midline 7.2K SFF (2.5in) SC 1yr Wty 512e Digitally Signed Firmware HDD	765455-B21

Configuration Information – Factory Integrated Models

Write Intensive - NVMe- SFF - Solid State Drives

HPE 375GB NVMe x4 Lanes Write Intensive SFF (2.5in) SCN 3yr Wty Digitally Signed Firmware SSD 878014-B21

Write Intensive – SAS SFF - Solid State Drives

HPE 400GB SAS 12G Write Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD 873351-B21

HPE 800GB SAS 12G Write Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD 873355-B21

HPE 1.6TB SAS 12G Write Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD 873357-B21

Read Intensive - SATA - SFF Drives

HPE 480GB SATA 6G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD P06194-B21

HPE 960GB SATA 6G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD P06196-B21

HPE 1.92TB SATA 6G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD P06198-B21

HPE 240GB SATA 6G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD 868814-B21

HPE 240GB SATA 6G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD P04556-B21

HPE 480GB SATA 6G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD 868818-B21

HPE 480GB SATA 6G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD P04560-B21

HPE 960GB SATA 6G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD 868822-B21

HPE 960GB SATA 6G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD P04564-B21

HPE 1.92TB SATA 6G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD 868826-B21

HPE 1.92TB SATA 6G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD P04566-B21

HPE 240GB SATA 6G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD 875503-B21

HPE 480GB SATA 6G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD 875509-B21

HPE 960GB SATA 6G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD 875511-B21

HPE 1.92TB SATA 6G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD 875513-B21

HPE 3.84TB SATA 6G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD P04570-B21

Read Intensive - SATA - SFF Drives

HPE 3.84TB SATA 6G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD P06200-B21

HPE 480GB SATA 6G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD P04474-B21

HPE 960GB SATA 6G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD P04476-B21

HPE 1.92TB SATA 6G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD P04478-B21

HPE 3.84TB SATA 6G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD P04480-B21

HPE 7.68TB SATA 6G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD P04482-B21

Mixed Use – uFF Dual SATA Drives

HPE Dual 240GB SATA 6G Mixed Use M.2 - UFF to SFF SCM 3yr Wty Digitally Signed Firmware SSD P06607-B21

HPE Dual 480GB SATA 6G Read Intensive M.2 - UFF to SFF SCM 3yr Wty Digitally Signed Firmware SSD P06609-B21

Standard – M.2 Solid State Drives

NOTE: M.2's require adapter kit for Synergy 480 Gen10

HPE Synergy 480 Gen10 M.2 NGFF FIO Adapter Board Kit 873165-B21

HPE 480GB SATA 6G Read Intensive M.2 2280 3yr Wty Digitally Signed Firmware SSD 875498-B21

Standard – M.2 Solid State Drives

HPE 480GB SATA 6G Mixed Use M.2 2280 3yr Wty Digitally Signed Firmware SSD 875490-B21

HPE 960GB SATA 6G Mixed Use M.2 2280 3yr Wty Digitally Signed Firmware SSD 875492-B21

HPE 960GB SATA 6G Read Intensive M.2 2280 3yr Wty Digitally Signed Firmware SSD 875500-B21

Read Intensive – SAS SFF - Solid State Drives

HPE 480GB SAS 12G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD 875311-B21

Configuration Information – Factory Integrated Models

HPE 960GB SAS 12G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	872390-B21
HPE 1.92TB SAS 12G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	872392-B21
HPE 3.84TB SAS 12G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	872394-B21
HPE 960GB SAS 12G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	875313-B21
HPE 1.92TB SAS 12G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	875326-B21
HPE 3.84TB SAS 12G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	875330-B21
HPE 7.68TB SAS 12G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	870144-B21
HPE 15.3TB SAS 12G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	870148-B21
HPE 960GB SAS 12G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P06584-B21
HPE 1.92TB SAS 12G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P06586-B21
HPE 3.84TB SAS 12G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P06588-B21
HPE 7.68TB SAS 12G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P06590-B21
HPE 15.3TB SAS 12G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P06592-B21
HPE 960GB SAS 12G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P04517-B21
HPE 1.92TB SAS 12G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P04519-B21
HPE 3.84TB SAS 12G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P04521-B21
HPE 7.68TB SAS 12G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P04523-B21

Write Intensive – SAS SFF - Solid State Drives

HPE 400GB SAS Write Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD

HPE 400GB SAS 12G Write Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P09098-B21
HPE 800GB SAS 12G Write Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P04543-B21
HPE 800GB SAS 12G Write Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P09100-B21
HPE 1.6TB SAS 12G Write Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P04545-B21
HPE 1.6TB SAS 12G Write Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P09102-B21
HPE 3.2TB SAS 12G Write Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P04547-B21

Mixed Use – SFF - Solid State Drives

HPE 3.84TB SATA 6G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P00896-B21
HPE 400GB SAS 12G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	872374-B21
HPE 400GB SAS 12G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P04525-B21
HPE 800GB SAS 12G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	872376-B21
HPE 800GB SAS 12G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P04527-B21
HPE 1.6TB SAS 12G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	872382-B21
HPE 1.6TB SAS 12G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P04533-B21
HPE 3.2TB SAS 12G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	872386-B21
HPE 3.2TB SAS 12G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P04537-B21
HPE 6.4TB SAS 12G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P04539-B21

Mixed Use - SATA - SFF - Solid State Drives

HPE 240GB SATA 6G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	875483-B21
HPE 480GB SATA 6G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	872344-B21
HPE 480GB SATA 6G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	875470-B21
HPE 480GB SATA 6G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P09712-B21
HPE 960GB SATA 6G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	872348-B21
HPE 960GB SATA 6G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	875474-B21
HPE 960GB SATA 6G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P09716-B21

Configuration Information – Factory Integrated Models

HPE 1.92TB SATA 6G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	872352-B21
HPE 1.92TB SATA 6G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	875478-B21
HPE 1.92TB SATA 6G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P09722-B21
HPE 3.84TB SATA 6G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P00896-B21

Mixed Use - SATA - SFF - Solid State Drives

HPE 240GB SATA 6G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	880295-B21
HPE 480GB SATA 6G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P07922-B21
HPE 960GB SATA 6G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P07926-B21
HPE 1.92TB SATA 6G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P07930-B21

NVMe - SFF Drives

HPE 1.6TB NVMe x4 Lanes Mixed Use SFF (2.5in) SCN 3yr Wty Digitally Signed Firmware SSD	P10222B21
HPE 1.6TB NVMe x4 Lanes Mixed Use SFF (2.5in) SCN 3yr Wty Digitally Signed Firmware SSD	877994-B21
HPE 1.92TB NVMe x4 Lanes Read Intensive SFF (2.5in) SCN 3yr Wty Digitally Signed Firmware SSD	P10214-B21
HPE 2TB NVMe x4 Lanes Read Intensive SFF (2.5in) SCN 3yr Wty Digitally Signed Firmware SSD	877986-B21
HPE 3.2TB NVMe x4 Lanes Mixed Use SFF (2.5in) SCN 3yr Wty Digitally Signed Firmware SSD	P10224-B21
HPE 3.2TB NVMe x4 Lanes Mixed Use SFF (2.5in) SCN 3yr Wty Digitally Signed Firmware SSD	877998-B21
HPE 3.84TB NVMe x4 Lanes Read Intensive SFF (2.5in) SCN 3yr Wty Digitally Signed Firmware SSD	P10216-B21
HPE 6.4TB NVMe x4 Lanes Mixed Use SFF (2.5in) SCN 3yr Wty Digitally Signed Firmware SSD	P10226-B21
HPE 7.68TB NVMe x4 Lanes Read Intensive SFF (2.5in) SCN 3yr Wty Digitally Signed Firmware SSD	P10218-B21

Mixed Use - RAW – SATA M.2 Solid State Drives

HPE 240GB SATA 6G Mixed Use M.2 2280 3yr Wty Digitally Signed Firmware SSD	875488-B21
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Mixed Use – SAS SFF - Solid State Drives

HPE 400GB SAS 12G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	872374-B21
HPE 400GB SAS 12G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	873359-B21
HPE 400GB SAS 12G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P09088-B21
HPE 800GB SAS 12G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	873363-B21
HPE 800GB SAS 12G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P09090-B21
HPE 1.6TB SAS 12G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	873365-B21
HPE 1.6TB SAS 12G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P09092-B21
HPE 3.2TB SAS 12G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	873367-B21
HPE 3.2TB SAS 12G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P09094-B21
HPE 6.4TB SAS 12G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P09096-B21

Drive Qualification Exceptions:

At this time there are no exceptions to list.

Networking

HPE Synergy 3820C 10/20Gb Converged Network Adapter	777430-B21
HPE Synergy 6810C 25/50Gb Ethernet Adapter	867322-B21
HPE Synergy 6410C 25/50Gb Ethernet Adapter	868779-B21

Storage Controllers

Fibre Channel

HPE Synergy 3830C 16Gb Fibre Channel Host Bus Adapter	777452-B21
HPE Synergy 3530C 16Gb Fibre Channel Host Bus Adapter	777454-B21

Configuration Information – Factory Integrated Models**SAS**

HPE Smart Array P240nr/1GB FBWC 12Gb 1-port Internal SAS Controller	758801-B21
HPE H240nr 12Gb 1-port Internal Smart Host Bus Adapter	759553-B21
HPE Smart Array P542D/2GB FBWC 12Gb Mezzanine SAS Controller	759557-B21

Cables

HPE Compute Module Smart Array P542D SAS Cable	815173-B21
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Upgrades

HPE 96W Smart Storage Battery (up to 20 Devices) with 260mm Cable Kit	P01367-B21
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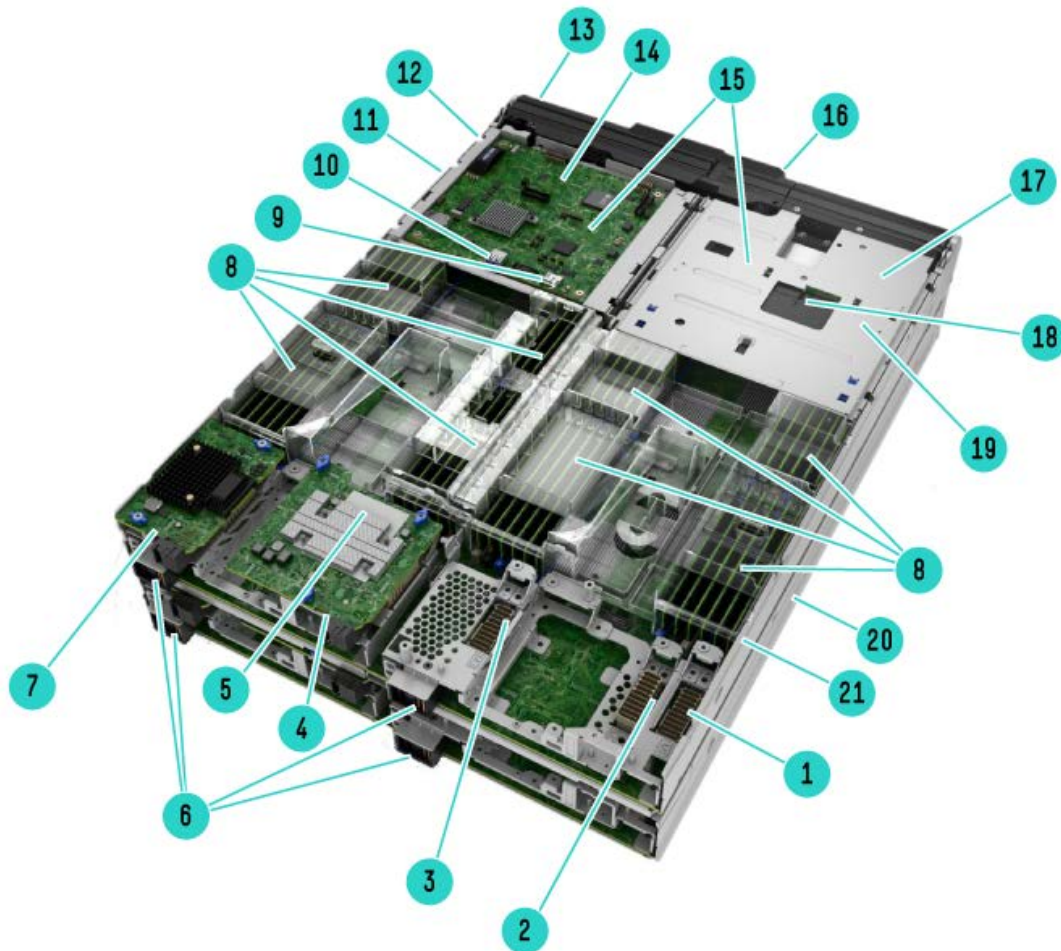
HPE Security Options

HPE Trusted Platform Module Option	488069-B21
HPE Trusted Platform Module 2.0 Kit	745823-B21

USB and SD Options

HPE 32GB microSD Flash Memory Card	700139-B21
HPE 8GB microSD Flash Memory Card	726116-B21
HPE 8GB microSD Flash USB Drive	737953-B21
HPE 8GB Dual microSD Flash USB Drive	741279-B21

Memory



HPE Synergy 680 Gen9 Compute Module – Internal View

- | | | | |
|-----|--|-----|--|
| 1. | Mezzanine Connectors 1 and 7 (underneath in primary module) - Fabric 1 | 12. | TPM connector (under Manageability Card) |
| 2. | Mezzanine Connectors 2 and 8 (underneath in primary module) - Fabric 2 | 13. | USB 2.0 (external) – behind serial pull tab |
| 3. | Mezzanine Connector 3 and 9 (underneath in primary module) - Fabric 3 | 14. | Manageability Card (on primary module only) |
| 4. | Mezzanine Connector 4 (under RAID card shown) and 10 (underneath in primary module) – Fabric 1 | 15. | Processors (P1/P3 beneath Manageability Card and P2/P4 beneath HDD cage) |
| 5. | Smart Storage battery connector (under card in view) | 16. | 4-socket Compute Module Link |
| 6. | Management Power Connectors | 17. | 4 x Hard Disk Drive (HDD) bays |
| 7. | Mezzanine Connector 6 (under LOM card shown) and 12 (underneath in primary module) – Fabric 3 | 18. | Storage controller connector (under HDD cage hood) |
| 8. | DIMMs (min 2/max 24 per processor; min 8/max 96 in unit) | 19. | Backplane connector (under HDD assembly) |
| 9. | uSD | 20. | Primary Module (bottom in view) |
| 10. | USB 2.0 (internal) | 21. | Expansion Module (top in view) |
| 11. | Manageability Card connector (under Manageability Card) | | |
-

Memory

Memory Subsystem Architecture

Each processor socket contains eight memory channels that support three DIMMs each for a total of 24 (24) DIMMs per installed processor or a grand total of ninety-six (96) DIMMs for the compute module. Up to 128GB capacity DIMMs are supported for 12TB of memory (96 DIMM slots x 128GB per DIMM).

Memory Population Rules and Guidelines:

- A minimum of one DIMM is required per processor.
- The HPE Synergy 680 requires a minimum of 4 processors, so a minimum of 4 DIMMs.
- Install DIMMs only if the corresponding processor is installed.
- DIMM sizes can be mixed in channel, but must be the same DIMM type in the compute module. To maximize performance, it is recommended to balance the total memory capacity between all installed processors and to load the channels similarly whenever possible.
- LRDIMM and RDIMMs are all distinct memory technologies and cannot be mixed within a compute module.
- 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.
- HPE memory from previous generation servers is not compatible with the HPE Synergy 680 Gen9 Compute Module.
- To realize the performance memory capabilities listed in this document, HPE SmartMemory is required. For additional information, please see the HPE SmartMemory QuickSpecs at: [HPE DDR4 SmartMemory QuickSpecs](#)

HPE Memory	HPE 8GB (1x8GB) Single Rank x8 DDR4-2400 CAS-17-17-17 Registered Memory Kit	805347-B21
	HPE 16GB (1x16GB) Single Rank x4 DDR4-2400 CAS-17-17-17 Registered Memory Kit	805349-B21
	HPE 16GB (1x16GB) Dual Rank x4 DDR4-2400 CAS-17-17-17 Registered Memory Kit	836220-B21
	HP 32GB (1x32GB) Dual Rank x4 DDR4-2400 CAS-17-17-17 Registered Memory Kit	805351-B21
	HPE 32GB (1x32GB) Dual Rank x4 DDR4-2400 CAS-17-17-17 Load Reduced Memory Kit	805353-B21
	HPE 64GB (1x64GB) Quad Rank x4 DDR4-2400 CAS-17-17-17 Load Reduced Memory Kit	805358-B21
	HPE 128GB (1x128GB) Octal Rank x4 DDR4-2400 CAS-20-18-18 Load Reduced Memory Kit	809208-B21

Technical Specifications

System Unit	Dimensions (H x W x D) (with bezel)	5.06in x 16.94in x 23.62in (127mm x 430.3mm x 600mm)
	Weight (approximate)	<p>Maximum: all processors, 96 DIMMs, drives, mezzanine cards, and one flash cache battery installed) 69.85Lbs (31.752Kg)</p> <p>Minimum: four processors and four DIMMs installed 59.73Lbs (27.15Kg)</p>
	Power Specifications	For power specifications including input requirements, BTU rating, and power supply output, please see the HPE Synergy Frame TechSpecs. To review typical system power ratings use the HPE Power Advisor which is available via the online tool located at http://www.hpe.com/info/hppoweradvisor
	System Inlet Temperature	<p>Operating 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).</p> <p>Non-operating -30° to 60°C (-22° to 140°F). Maximum rate of change is 20°C/hr (36°F/hr).</p>
	Extended Ambient Operating Support	<p>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).</p> <p>The approved hardware configurations for this system are listed at the URL: https://www.hpe.com/servers/ASHRAE</p> <p>NOTE: Qualifications for extended ambient configurations are detailed at: https://www.hpe.com/servers/ASHRAE</p>
	Relative Humidity (non-condensing)	<p>Operating Minimum to be the higher (more moisture) of -12°C (10.4°F) dew point or 8% relative humidity. Maximum to be the lower (less moisture) of 24°C (75.2°F) dew point or 90% relative humidity.</p> <p>Non-operating 5 to 95% relative humidity (Rh), 38.7°C (101.7°F) maximum wet bulb temperature, non-condensing.</p>
	Altitude	<p>Operating 3050 m (10,000 ft). This value may be limited by the type and number of options installed. Maximum allowable altitude change rate is 457 m/min (1500 ft/min).</p> <p>Non-operating 9144 m (30,000 ft). Maximum allowable altitude change rate is 457 m/min (1500 ft/min).</p>
	Acoustic Noise	For acoustic noise specifications, please see the HPE Synergy Frame 12000 TechSpecs located at:

Technical Specifications

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

Hewlett Packard Enterprise offers end-of-life HPE product return, trade-in, and recycling programs in many geographic areas. For trade-in information, please go to: <http://www.hpe.com/info/recycle>. To recycle your product, please go to: <http://www.hpe.com/info/recycle> or contact your nearest Hewlett Packard Enterprise sales office. 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 at: <http://www.hpe.com/info/recycle>. 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
03-Dec-2018	Version 11	Changed	Standard Features, Configuration Information - Factory Integrated Models, Memory and Technical Specifications sections were updated.
01-Oct-2018	Version 10	Changed	Standard Features and Configuration Information - Factory Integrated Models sections were updated.
		Added	SKUs added in Configuration Information – Factory Integrated Models: 868779-B21, 872475-B21, 870753-B21, 870757-B21, 872477-B21, 870759-B21, 872479-B21, 872481-B21, 881457-B21, 870765-B21, 832514-B21, 765466-B21, 765464-B21, 655710-B21, 765455-B21, 878014-B21, 73351-B21, 873355-B21, 873357-B21, P06194-B21, P06196-B21, P06198-B21, P04556-B21, P04560-B21, P04564-B21, P04566-B21, 875503-B21, 875509-B21, 875511-B21, 875513-B21, P04570-B21, P06200-B21, 877740-B21, P04474-B21, 877746-B21, P04476-B21, 877752-B21, P04478-B21, 877758-B21, 877764-B21, P04480-B21, P04482-B21, P06607-B21, P06609-B21, 875587-B21, 875589-B21, 875591-B21, 873165-B21, 875498-B21, 875490-B21, 875492-B21, 875500-B21, 875311-B21, 872390-B21, 872392-B21, 872394-B21, 875313-B21, 875326-B21, 875330-B21, 870144-B21, 870148-B21, P06584-B21, P06586-B21, P06588-B21, P06590-B21, P06592-B21, P00896-B21, 872374-B21, 872376-B21, 872382-B21, 872386-B21, 875483-B21, 875470-B21, 875474-B21, 875478-B21, 880295-B21, 877776-B21, 877782-B21, 877788-B21, P07922-B21, P07926-B21, P07930-B21, 877986-B21, 877994-B21, 877984-B21, 877988-B21, 877998-B21, 875488-B21, 873359-B21, 873363-B21, 873365-B21, 873367-B21.
06-Aug-2018	Version 9	Changed	Configuration Information – Factory Integrated Models were updated.
		Added	SKU added: 759553-B21.
		Removed	Obsolete SKUs were deleted: 814068-B21, 814069-B21, 759553-B21, 834486-L21, 834488-L21, 834496-L21, 834501-L21, 834503-L21, 782958-B21.
04-Jun-2018	Version 8	Changed	Overview, Standard Features, Optional Features, and Configuration Information - Factory Integrated Models sections were updated.
07-Aug-2017	Version 7	Changed	Standard Features and Configuration Information - Factory Integrated Models, sections were updated.
		Added	SKU added in Configuration Information - Factory Integrated Models: 867322-B21.
11-Jul-2017	Version 6	Changed	Standard Features, Configuration Information - Factory Integrated Models, and Additional Options sections were updated.
		Added	SKUs added in Configuration Information - Factory Integrated Models, and Additional Options sections: 876215-L21, 876215-B21.
27-Mar-2017	Version 5	Changed	Standard Features, Configuration Information – Factory Integrated Models, Additional Options, and Technical Specifications section were updated.
		Added	SKUs added in Configuration Information – Factory Integrated Models, Additional Options and Technical Specifications sections: 836220-B21, 809208-B21.
28-Nov-2016	Version 4	Changed	Service and Support section was updated
29-Jul-2016	Version 3	Changed	QuickSpecs updated.
		Removed	SKU deleted: 777434-B21
06-Jun-2016	Version 2	Changed	Standard Features, Optional Features, Service and Support, Configuration Information – Factory Integrated Models, Additional Options, and Technical Specifications sections were updated.
		Added	SKUs added in QuickSpecs: 834486-L21, 834488-L21, 834490-L21, 834492-L21, 834494-L21, 834496-L21, 834498-L21, 834500-L21, 834501-L21, 834503-L21, 860824-L21, 805347-B21, 805349-B21, 805351-B21, 805353-B21, 805358-B21, 794538-B21, 777430-B21, 777434-B21, 758801-B21, 759557-B21, 815173-B21, 782958-B21, 814069-B21, 777452-B21, 834486-B21, 834488-B21, 834490-B21,

Summary of Changes

			834492-B21, 834494-B21, 834496-B21, 834498-B21, 834500-B21, 834501-B21, 834503-B21, 860824-B21, 488069-B21, 745823-B21, 737953-B21, 726116-B21, 700139-B21, 741279-B21.
1-Dec-2015	Version 1	Created	New QuickSpecs



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

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