RETIRED: This document has been officially retired, and the base products listed herein are now considered obsolete and are no longer available for sale. Consequently, the information contained within may no longer be current. This document is provided exclusively for reference and informational purposes.

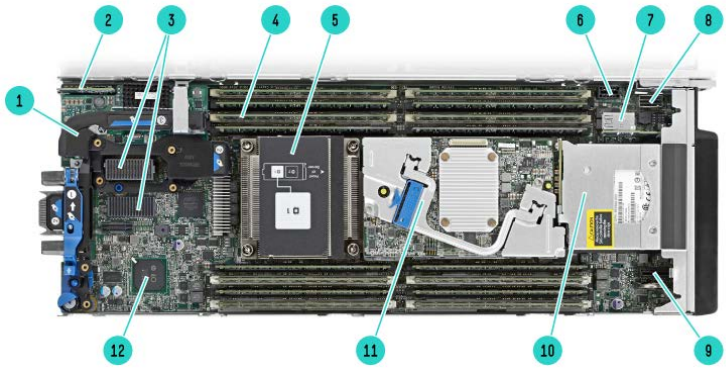
Overview

HPE ProLiant WS460c Gen9 Graphics Server Blade



HPE ProLiant WS460c Gen9 Graphics Server Blade – External View

1. Local I/O Connector (covered)
2. Small form factor (SFF) drive bays
3. HPE ProLiant WS460c Gen9 Graphics Server Blade base system (single-width model)
4. PCIe Gen3 x16 slot 1
5. PCIe Gen3 x16 slot 2
6. HPE ProLiant WS460c Graphics Server Blade with graphics expansion (double-width model)



HPE ProLiant WS460c Gen9 Graphics Server Blade – Internal View

1. FlexibleLOM adapter
2. Nand Flash & Micro SD
3. Mezzanine Slots (x16 PCI 3.0)
4. Sixteen (16) DDR4 DIMM memory slots (8 per processor)
5. Up to two (2) Intel® Xeon® E5-2600 v3 or v4 family processors
7. USB 3.0 and TPM
8. Embedded SATA Connector
9. Solid State Device Connector
10. Two hot-plug drive bays
11. HPE Smart Array P244br Controller with 1GB FBWC

Overview

6. HPE BLc 12W Smart Storage Battery connector
12. iLO Management Engine

What's New

- New Graphics options, including the NVIDIA Tesla M60 and Quadro M3000SE
- NVMe SFF Solid State Disk (SSD) support
- Support for 2400MT/s DDR4 memory
- Support for the Intel E5-2600 v3 or v4 Product Family

Standard Features

NOTE: This document covers the HPE ProLiant WS460c Gen9 server blade only. For information on HPE BladeSystems c-Class Enclosures and HPE BladeSystem c-Class Interconnect and Mezzanine Components, please see the following:
HPE BladeSystem c-Class Enclosures QuickSpecs:

- HPE BladeSystem c3000 Enclosure QuickSpecs at
  https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04123379
  NOTE: The c3000 HPE c-Class enclosures have full backwards and forwards compatibility, existing server blades are supported in the new enclosures and any future server blades will be supported in the existing enclosures.
- HPE BladeSystem c7000 Enclosure QuickSpecs at
  https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04229580
  NOTE: The c7000 HPE c-Class enclosures have full backwards and forwards compatibility, existing server blades are supported in the new enclosures and any future server blades will be supported in the existing enclosures.
- HPE BladeSystem c-Class Interconnect and Mezzanine Components at
  https://www.hpe.com/h20195/V2/Getdocument.aspx?docname=c04284204

NOTE: For optimal cooling and system performance the WS460c Gen9 Server Blade requires the c7000 enclosure to be configured with 10 fans and the c3000 enclosure to be configured with 6 fans.
NOTE: For proper BladeSystem operation, the minimum required versions of HPE Onboard Administrator and HPE Virtual Connect are required and available via the HPE Service Pack for ProLiant, please see
http://support.hpe.com/hpsc/swd/public/detail?swItemId=MTX_daf13fa88aa0461d8178f0acd3

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

Processor One of the following depending on selection	**E5-2600 v4 series Processors** HPE BL460c Gen9 Intel® Xeon® E5-2690v4 (2.6GHz/14-core/35MB/135W) HPE BL460c Gen9 Intel® Xeon® E5-2683v4 (2.1GHz/16-core/40MB/120W) HPE BL460c Gen9 Intel® Xeon® E5-2680v4 (2.4GHz/14-core/35MB/120W) HPE BL460c Gen9 Intel® Xeon® E5-2660v4 (2.0GHz/14-core/35MB/105W) HPE BL460c Gen9 Intel® Xeon® E5-2650v4 (2.2GHz/12-core/30MB/105W) HPE BL460c Gen9 Intel® Xeon® E5-2650Lv4 (1.7GHz/14-core/35MB/65W) HPE BL460c Gen9 Intel® Xeon® E5-2640v4 (2.4GHz/10-core/25MB/90W) HPE BL460c Gen9 Intel® Xeon® E5-2630v4 (2.2GHz/10-core/20MB/85W) HPE BL460c Gen9 Intel® Xeon® E5-2630Lv4 (1.8GHz/10-core/25MB/55W) HPE BL460c Gen9 Intel® Xeon® E5-2623v4 (2.6GHz/4-core/10MB/85W) HPE BL460c Gen9 Intel® Xeon® E5-2620v4 (2.1GHz/8-core/20MB/85W) HPE BL460c Gen9 Intel® Xeon® E5-2609v4 (1.7GHz/8-core/20MB/85W) HPE BL460c Gen9 Intel® Xeon® E5-2603v4 (1.7GHz/6-core/15MB/85W) HPE BL460c Gen9 Intel® Xeon® E5-2699v4 (2.2GHz/22-core/55MB/145W) HPE BL460c Gen9 Intel® Xeon® E5-2698v4 (2.2GHz/20-core/50MB/135W) HPE BL460c Gen9 Intel® Xeon® E5-2697v4 (2.3GHz/18-core/45MB/145W) HPE BL460c Gen9 Intel® Xeon® E5-2697Av4 (2.6GHz/16-core/40MB/145W) HPE BL460c Gen9 Intel® Xeon® E5-2695v4 (2.1GHz/18-core/45MB/120W) HPE BL460c Gen9 Intel® Xeon® E5-2667v4 (3.2GHz/8-core/25MB/135W) HPE BL460c Gen9 Intel® Xeon® E5-2643v4 (3.4GHz/6-core/20MB/135W) HPE BL460c Gen9 Intel® Xeon® E5-2637v4 (3.5GHz/4-core/15MB/135W)

Standard Features

E5-2600 v3 series Processors

HPE BL460c Gen9 Intel® Xeon® E5-2690v3 (2.6GHz/12-core/30MB/135W)
HPE BL460c Gen9 Intel® Xeon® E5-2680v3 (2.5GHz/12-core/30MB/120W)
HPE BL460c Gen9 Intel® Xeon® E5-2670v3 (2.3GHz/12-core/30MB/120W)
HPE BL460c Gen9 Intel® Xeon® E5-2660v3 (2.6GHz/10-core/25MB/105W)
HPE BL460c Gen9 Intel® Xeon® E5-2650v3 (2.3GHz/10-core/25MB/105W)
HPE BL460c Gen9 Intel® Xeon® E5-2640v3 (2.6GHz/8-core/20MB/90W)
HPE BL460c Gen9 Intel® Xeon® E5-2683v3 (2GHz/14-core/35MB/120W)
HPE BL460c Gen9 Intel® Xeon® E5-2630v3 (2.4GHz/8-core/20MB/85W)
HPE BL460c Gen9 Intel® Xeon® E5-2620v3 (2.4GHz/6-core/15MB/85W)
HPE BL460c Gen9 Intel® Xeon® E5-2623v3 (3GHz/4-core/10MB/105W)
HPE BL460c Gen9 Intel® Xeon® E5-2609v3 (1.9GHz/6-core/15MB/85W)
HPE BL460c Gen9 Intel® Xeon® E5-2603v3 (1.6GHz/6-core/15MB/85W)
HPE BL460c Gen9 Intel® Xeon® E5-2650Lv3 (1.8GHz/12-core/30MB/65W)
HPE BL460c Gen9 Intel® Xeon® E5-2698v3 (2.3GHz/16-core/40MB/135W)
HPE BL460c Gen9 Intel® Xeon® E5-2630Lv3 (1.8GHz/8-core/20MB/55W)
HPE BL460c Gen9 Intel® Xeon® E5-2695v3 (2.3GHz/14-core/35MB/120W)
HPE BL460c Gen9 Intel® Xeon® E5-2637v3 (3.5GHz/4-core/15MB/135W)
HPE BL460c Gen9 Intel® Xeon® E5-2697v3 (2.6GHz/14-core/35MB/145W)
HPE BL460c Gen9 Intel® Xeon® E5-2667v3 (3.2GHz/8-core/20MB/135W)
HPE BL460c Gen9 Intel® Xeon® E5-2643v3 (3.4GHz/6-core/20MB/135W)
HPE BL460c Gen9 Intel® Xeon® E5-2699v3 (2.3GHz/18-core/45MB/145W)

NOTE: DIMM slots 4 and 5 are not accessible when the E5-2699 v4, E5-2697 v4, E5-2697A v4, E5-2667 v4, E5-2643 v4, E5-2637 v4,E5-2699 v3, the E5-2697 v3, the E5-2643 v3, the E5-2637 v3, or the E5-2667 v3 is used. In a 2 processor configuration, there are twelve (12) total available DIMM slots.
NOTE: For the maximum supported memory speeds for each processor listed above, please reference the 'Memory Speed by Processor Model' table in the Memory section of the QuickSpecs.
NOTE: All processors support Intel® Hyper-Threading and Intel® Turbo Boost Technologies except the E5-2609 v4, E5-2603 v4, E5-2603 v3 and E5-2609 v3
NOTE: DDR4 speed is the maximum memory speed of the processor. Actual memory speed may depend on the quantity and type of DIMMs installed.
NOTE: Supports 1 or 2 processors. Mixing different processor models is not supported.
NOTE: For the Intel® C610 Chipset E5-2600 v3 and v4 Series, the letter preceding the model number indicates the Product Line (E3, E5, E7); 2600x, 2 = number of CPUs in a Node, 6 is socket/segment designation, 00 = Processor SKU, and x = L for low power SKUs.
NOTE: Two processors must be installed on the WS460c Gen9 to use the graphics options.
NOTE: All processors within the server must be identical.
NOTE: The letter "L" following the model number indicates denotes lower wattage.

Cache Memory
One of the following depending on processor

55MB (1x55MB) L3 cache
NOTE: For Twenty two-core processors.
50MB (1x50MB) L3 cache
NOTE: For Twenty-core processors.
45MB (1x45MB) L3 cache
NOTE: For Eighteen-core processors.
40MB (1x40MB) L3 cache
NOTE: For Sixteen-core processors.

Standard Features

35MB (1x35MB) L3 cache
NOTE: For Fourteen-core processors.
30MB (1x30MB) L3 cache
NOTE: For Twelve-core processors.
25MB (1x25MB) L3 cache
NOTE: For Ten or Eight-core processors.
20MB (1x20MB) L3 cache
NOTE: For Six, Eight, or Ten-core processors.
15MB (1x15MB) L3 cache
NOTE: For Quad or Six-core processors.
10MB (1x10MB) L3 cache
NOTE: For Quad-core processors.

Chipset

Intel® C610 Series Chipset
Intel® E5-2600 v3 or v4 Processor Family
NOTE: For more information regarding Intel chipsets, please see the following: **http://www.intel.com/products/server/chipsets/**.

Upgradeability

Upgradeable to two (2) processors

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: **https://www.hpe.com/h20195/v2/GetPDF.aspx/c04154343.pdf**

Memory Protection

Advanced ECC
Memory Online Spare Mode (Rank Spare Mode)

Memory
One of the following depending on selection

Type	HPE SmartMemory DDR4 Load Reduced (LRDIMM), or Registered (RDIMM)
Maximum (LRDIMM)	1TB (16 x 64GB) up to 2400MT/s at 1.2V
Maximum (RDIMM)	512GB (16 x 32GB) up to 2133MT/s at 1.2V

NOTE: HPE memory from previous generation servers (DDR3) is not compatible with this server. 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 server.
NOTE: Depending on the memory configuration and processor model, the memory speed may run at 2400MT/s, 2133MT/s, or 1866MT/z. Please see Memory Population Table or the Online Memory Configuration Tool at: **https://h22195.www2.hpe.com/ddr4memoryconfig/home/legal**.

Network Controller
One of the

One (1) 20Gb 2-port FlexFabric FLB, 10Gb 2-port HPE FlexFabric FLB, or 10Gb 2-port Ethernet FLB
NOTE: Windows 7, 8.1 directly presiding on system (i.e. “OS on bare-metal”), is supported only with HPE

Standard Features

following depending on selection	Flex-10 10Gb 2-port 536FLB with basic network functions only. All other adapters supported with use on server OS or hypervisor environment only. **NOTE:** FlexFabric supported only with server OS and/or in a virtualized environment using hypervisors. **NOTE:** Supports FCoE, , TCP/IP offload engine, hardware-based accelerated iSCSI, iSCSI boot, and autosensing 10Gb/1Gb Ethernet. **NOTE:** Each port is autosensing the speed, and can interoperate with 1Gb HPE BladeSystem c-Class interconnect components. Both ports will operate at the same speed. **NOTE:** FlexFabric capabilities require the use of an HPE Virtual Connect FlexFabric or Flex10/10D module. **NOTE:** Fibre Channel over Ethernet (FCoE) is supported with HPE interconnects. Learn more at: **https://www.hpe.com/h20195/v2/GetPDF.aspx/4AA4-8302ENW.pdf** One (1) HPE FlexFabric 10Gb 2-port 536FLB FlexibleLOM One (1) HPE FlexFabric 10Gb 2-port 560FLB FlexibleLOM One (1) HPE FlexFabric 20Gb 2-port 630FLB FlexibleLOM One (1) HPE FlexFabric 20Gb 2-port 650FLB FlexibleLOM **NOTE:** FlexibleLOMs are not compatible with prior generation c-Class server blades Standard iLO Network Controller: One (1) 10/100 Mbps port for the HPE iLO 4 to Onboard Administrator link. The Onboard Administrator (with 10/100/1000 Mbps) to BladeSystem link is 1Gbps
Expansion Slots	Two (2) I/O expansion mezzanine slots: (One occupied and second not available when 2nd slot enablement kit is installed with expansion blade) • x16 PCIe 3.0 Type A (supports Type A mezzanine cards) (expansion slot 1). **NOTE:** Slot is occupied and not available with double-width model. • x16 PCIe 3.0 Type B (supports Type A and Type B mezzanine cards (expansion slot 2). **NOTE:** This expansion slot supports NVIDIA Quadro M3000SE **NOTE:** A second processor must be installed (in processor slot 2) to have access to the second expansion slot (expansion slot 2). **NOTE:** When NVIDIA Quadro M3000SE card is installed in Mezz slot 2, no other card may be installed in Mezz slot 1. **NOTE:** This expansion slot supports dual-port and quad-port mezzanine cards. For dual-port cards, one port is routed to interconnect module bay 5 and the other to bay 6. For quad-port cards, one port is routed to interconnect module bay 5, one to bay 6, one to bay 7, and one to bay 8. **NOTE:** A second processor must be installed (in processor slot 2) to have access to the second expansion slot (expansion slot 2).Two (2) Full-size PCIe expansion slots (available with expansion blade only). • x16 PCIe 3.0 full-size, full-length PCIe card expansion slot **NOTE:** Supported only with qualified select HPE PCIe cards listed in this document Mezzanine card options include: • Dual-port 20Gb FlexFabric, Dual-port 10Gb FlexFabric, 10GbE options for additional network ports. • Dual-port 16Gb Fibre Channel HBA for SAN connectivity. • QDR and FDR InfiniBand for low latency and high bandwidth server interconnectivity.
HPE Server 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), to continue operation to the operating system.

Standard Features

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 ProLiant 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).

NOTE: For further information, please refer to the HPE RBSU (ROM based setup utility) user guide: **https://support.hpe.com/hpsc/doc/public/display?docId=c00191707**

HPE Server UEFI /Legacy ROM

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 Gen9 platform defaults to UEFI and can be factory or field configured for Legacy BIOS Boot Mode.

NOTE: Windows 7 on "bare-metal" supported with Legacy BIOS mode only.

NOTE: Citrix XenServer supported with Legacy BIOS mode only.

NOTE: The UEFI System Utilities function is analogous to the HPE ROM-Based Setup Utility (RBSU) of legacy BIOS. For more information, please visit **https://support.hpe.com/hpsc/doc/public/display?docId=c04398276**

UEFI enables numerous new capabilities specific to HPE ProLiant servers such as:

- Secure Boot
- 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 HPE RESTful API
- PXE boot support for IPv6 networks
- Boot support for option cards that only support a UEFI option ROM

NOTE: For more information please visit **http://www.hpe.com/servers/uefi**

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

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

Maximum Internal Storage
One of the following depending on Model

Hot Plug SFF SAS	4.0TB	2 x 2.0TB
Hot Plug SFF SATA	4.0TB	2 x 2.0TB
Hot Plug SFF SAS SSD	7.68TB	2 x 3.84TB
Hot Plug SFF SATA SSD	7.68TB	2 x 3.84GB
Hot Plug SFF NVMe SSD	4.0TB	2 x 2.0TB

NOTE: For NVMe support, please select the NVMe FIO setting (825555-B21) available on CTO models only.

NOTE: The ProLiant WS460c Gen9 server includes the HPE hot plug small form factor (SFF) SmartDrive carrier for enhanced management and reduced maintenance errors. HPE drives from previous generation servers (prior to Gen8) are not compatible with the ProLiant WS460c Gen9 drive bays.

Interfaces

Micro SDHC Slot	One (1) internal Micro Secure Digital High Capacity (Micro SDHC) card slot
USB 3.0 Port	One (1) internal USB 3.0 connector for USB flash media drive keys

Standard Features

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

Industry Standard Compliance

ACPI 2.0
Microsoft® Logo certifications
USB 3.0 Support
IPMI 2.0
Secure Digital 2.0
TPM 1.2 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
FIPS 140-2 Level-2 certification pending

Operating Systems and Virtualization Software Support for ProLiant Servers

Client Operating Systems:
Microsoft ® Windows 7® Professional (64-bit), Enterprise (64-bit)
NOTE: Windows 7 is supported only with Legacy BIOS mode
Microsoft ® Windows 8.1® Professional (64-bit), Enterprise (64-bit)
Microsoft® Windows 10® Professional (64-bit, Enterprise (64-bit)
Red Hat Enterprise Linux (RHEL) Desktop 6.5 or later (64-bit only)

Server Operating Systems:

- Microsoft Windows Server 2016 (64-bit) Standard and DataCenter editions (Citrix XenApp)
- Microsoft Windows Server 2012 R2 (64-bit) Standard, Enterprise and DataCenter editions (Citrix XenApp)
  Red Hat Enterprise Linux (RHEL) 6.5 or later (64-bit only)
- **VMware** Horizon View 6 or later, vSphere 5.5 or later
- Citrix XenDesktop 7 or later, XenServer 6.5 or later
  NOTE: Citrix XenServer supported only with Legacy BIOS mode

NOTE: For more information on the HPE Certified and Supported ProLiant Servers for OS and Virtualization Software and latest listing of software drivers available for your server, please visit our Support Matrix at: **http://h17007.www1.hpe.com/us/en/enterprise/servers/supportmatrix/windows.aspx#.Wd5xR1tSyK_** and our driver download page: **http://www.hpe.com/us/en/product-catalog/servers/proliant-servers/pip.hpe-proliant-ws460c-gen9-server-blade.7829634.html**

Enclosures

Hewlett Packard Enterprise offers two different c-Class server blade enclosures to meet your individual needs:

- The HPE BladeSystem c7000 rack enclosure is 10U high and holds up to sixteen (16) ProLiant WS460c Gen9 servers plugged vertically or (8) HPE ProLiant WS460c Gen9 Blades paired with (8) HPE WS460c Gen9 Graphics Expansion modules plugged vertically.
- The HPE BladeSystem c3000 rack enclosure is 6U high and holds up to eight (8) HPE ProLiant WS460c Gen9 servers plugged horizontally or (4) HPE ProLiant WS460c Gen9 Blades paired with (4) HPE WS460c Gen9 Graphics Expansion modules plugged horizontally.

Server blades, interconnect modules, power supplies, fans, and redundant Onboard Administrator modules are all designed to fit into the c3000 and c7000 enclosures.

Standard Features

NOTE: For additional enclosure information, please see: **http://www.hpe.com/us/en/product-catalog/storage/disk-enclosures/pip.hpe-bladesystem-c7000-enclosures.1844065.html**

Graphics	Integrated Matrox G200eh video controller • 1600 x 1200 (32 bpp) • 1920 x 1200 (16 bpp) HPE iLO Management On System Management Memory • 16 MB Flash Video Memory • 256 MB DDR 3 with ECC (112 MB after ECC and video)	
Form Factor	HPE ProLiant WS460c Gen9 and WS460c Gen9 Graphics Expansion Blade are both half-height server blades that plug into the HPE BladeSystem c3000 and c7000 enclosures.	
Embedded Management	**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**
	HPE RESTful API	RESTful API is an application programming interface. RESTful Web Service API served by iLO's web server.**http://www.hpe.com/servers/resttool**
	Intelligent Provisioning	Provision servers by discovering and deploying 1 to few servers with Intelligent Provisioning. Learn more at **http://www.hpe.com/servers/intelligentprovisioning**
Server Utilities	**HPE Smart Update**	Optimize firmware and driver updates with HPE Smart Update solutions. Learn more at **http://www.hpe.com/info/smartupdate**
	HPE Systems Insight Manager (HPE SIM)	HPE SIM allows you to monitor the health of your HPE ProLiant Servers and HPE Integrity Servers, and also provides you with basic support for non-Hewlett Packard Enterprise servers. SIM also integrates with HPE SUM to provide quick and seamless firmware updates. Learn more at **http://www.hpe.com/servers/hpsim**
	Scripting Tool Kit and Windows PowerShell	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://www.hpe.com/servers/proliant/stk** or **http://www.hpe.com/servers/powershell**
	HPE RESTful Interface Tool	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 **http://www.hpe.com/servers/resttool**
	HPE iLO Mobile Application	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**.
	HPE Insight Online	HPE Insight Online, available at no additional cost as part of your Hewlett Packard Enterprise warranty, Care Pack or contractual support agreement with Hewlett Packard Enterprise, is a personalized dashboard for simplified tracking of IT operations and support information from anywhere, anytime. Learn more

Standard Features

at **https://www.hpe.com/us/en/services/get-connected.html**

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) 2.0 option
- Advanced Encryption Standard (AES)
- Intel® Advanced Encryption Standard-New Instructions (AES-NI)
- FIPS 140-2 Level-2 certification pending

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

- Support for one (1) FlexibleLOM, providing two (2) (i.e. redundant) Ethernet ports
- Multiple mezzanine I/O expansion slots 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

- Two (2) Small Form Factor hot-plug SAS/SATA HDD/SSD of NVMe SSD drive bays.
- Choice of the HPE Smart Array P244br Controller with 1GB FBWC/HPE, Smart HBA H244br, or the HPE B140i (chipset SATA). RAID 0 and 1 support for all three storage controller offerings.,
- Optional dual-port Fibre Channel mezzanine card(s) for redundant SAN connections.

NOTE: For NVMe support, please select the NVMe FIO setting (825555-B21) available on CTO models only.

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

Standard Features

subsequent boot.

Server Blade Enclosure Infrastructure

- Pooled power for true N+N power redundancy through up to six (6) hot-plug, high-efficiency, common slot enclosure-based power supplies (configuration dependent).
- Up to ten (10) enclosure-based hot-plug HPE Active Cool fans that scale to meet future demands, optimize airflow, reduce power draw, and improve acoustic performance.
- Dual grid power providing redundant rack enclosure power feeds to the server blade enclosure.
- HPE Dynamic Power Saver Mode monitors the total enclosure power consumption in real time and automatically adjusts with change in demand for improved efficiency and reliability. HPE Dynamic Power Capping safely limits power usage without impacting performance by capping peak usage instead of average power usage, removes risk to electrical infrastructure with a fast-acting, hardware-based capping algorithm, and reclaims more power by dynamically controlling power limits based on workload demand.
- Up to eight interconnect modules per server blade enclosure providing four simultaneous redundant fabrics for FlexFabric, Virtual Connect Ethernet, Fibre Channel, InfiniBand, Pass Thru Ethernet, etc.
- Enclosure crosslinks between adjacent enclosures to provide interconnect module-to-module connections or as Virtual Connect module stacking links.
- Optional enclosure redundant Onboard Administrator system management module.

Warranty

This product is covered by a global limited warranty and supported by HPE 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 Pointnext operational services or customized service agreements. Certain restrictions and exclusions apply. Hard drives have either a one year or three year warranty; refer to specific hard drive QuickSpecs for details.

NOTE: Server 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 Enterprise replace Optional CSR parts at no charge. Additional information regarding worldwide limited warranty and technical support is available at **https://support.hpe.com/hpsc/doc/public/display?docId=c02978487**.

Optional Features

Graphics Adapter

Mezzanine Graphics Adapters for single-width model:

- NVIDIA Quadro M3000SE MXM server graphics
  - Workstation class performance for high-end professional 3D graphics
  - 4 GB GDDR5 memory
  - Supports bare metal and passthrough
  - Support less than 1 TB of RAM
  - Single Mezzanine and Graphics Expansion Blade with the Multi GPU adapter options
  - Supports Environments (Refer to "Technical Specification" section at end of document for full listing per graphics adapter)
    - Bare Metal Client Operating System – Non Virtualized
      - Microsoft ® Windows 7® SP1, Windows 10®
      - Red Hat Enterprise Linux 6.8+ / 7.2+
    - Server / Hypervisor
      - VMware® ESXi® version 6.0, Citrix® XenServer® 6.5+

- NVIDIA Tesla M6 graphics
  - Workstation class performance for ultra high end professional 3D graphics, or VDI acceleration delivering true PC graphics experience.
  - 8GB (GDDR5) memory
  - Supports shared graphics, pass-through and hardware GPU virtualization
  - Support less than 1 TB of RAM
  - Supported Environments (Refer to "Technical Specification" section at end of document for full listing per graphics adapter)
    - Bare Metal Client Operating System – Non Virtualized
      - Red Hat enterprise Linux 6.8+ / 7.2+
    - Server / Hypervisor
      - Citrix XenServer 6.5 or later
      - VMware vSphere5.5 or later
      - Microsoft® Windows Server 2012 R2 (64-bit)

    NOTE: NVIDIA Grid 2.0+ workstation license required, including for a single bare metal user support only

NOTE: GRID license for use with NVIDIA Tesla M6 and M60 can be purchased directly from HPE.

Full-size PCI Express Graphics Adapters for double-width model (Expansion Blade):

- NVIDIA Tesla M60 GPU adapter
  - Virtulized graphics card intended for high-end design VDI applications like 3D CAD
  - Two high-end NVIDIA GM204 GPUs
  - 8GB (GDDR5) memory per GPU, total of 16GB
  - Support less than 1 TB of RAM
  - Supports shared graphics, pass-through and NVIDIA Grid
  - PCIe Gen3, x16 double-width card (One per Graphics Expansion Blade)
  - Supported Environments (Refer to "Technical Specification" section at end of document for full listing per graphics adapter)
    - Bare Metal Client Operating System – Non Virtualized
      - Not Supported
    - Server / Hypervisor
      - Citrix XenServer 6.5 or later
      - VMware vSphere5.5 or later
      - Microsoft® Windows Server 2012 R2 (64-bit)
      - Microsoft® Windows Server 2016 (64-bit)

  NOTE: NVIDIA Grid 2.0+ workstation license required for full functionality

- NVIDIA Quadro P6000 (double-width PCIe x16 in PCIe Expansion Module)

Optional Features

- For professional ultra-high-end 3D graphics and VDI acceleration
- Two P6000 are supported with a virtualized SY 480 Compute Module
- 24GB (GDDR5)
- One GP102 GPU (3,840 CUDA cores)
- Supports up to four 4K displays
- Supported Environments
  - Bare Metal Client Operating System – Non Virtualized
  - Microsoft ® Windows 10
  - Red Hat Enterprise Linux (RHEL) 6.9 or 7.3 (64 bit only)
  - Server / Hypervisor
  - VMware vSphere5.5 or later
  - Microsoft® Windows Server 2012 R2 (64-bit)
  - Microsoft® Windows Server 2016 (64-bit)
  - Citrix XenServer 7.2

- HPE MultiGPU with two NVIDIA Tesla M6
  - Two NVIDIA Tesla M6 per HPE Multi GPU carrier adapter. Can be configured with one or two sets of HPE Multi GPU cards for total two or four NVIDIA Tesla M6 GPUs respectively
  - Support less than 1 TB of RAM
  - For VDI acceleration through shared graphics, pass-through, or hardware GPU virtualization with Citrix XenServer and VMware vSphere
  - PCIe-xx16, Gen2
  - Supported Environments (Refer to “Technical Specification” section at end of document for full listing per graphics adapter)
    - Bare Metal Client Operating System – Non Virtualized
      - Not Supported
    - Server / Hypervisor
      - Citrix XenServer 6.5 or later
        VMware vSphere5.5 or later
      - Microsoft® Windows Server 2012 R2 (64-bit)

- HPE MultiGPU with three NVIDIA Quadro M3000SE
  - Three NVIDIA Quadro M3000SE per HPE Multi GPU carrier adapter. Can be configured with one or two sets of HPE Multi GPU cards for total three or six NVIDIA Quadro M3000SE GPUs respectively
  - Support less than 1 TB of RAM
  - For VDI acceleration in pass-through mode with Citrix XenServer and VMware vSphere
  - PCIe-x16, Gen2
  - Supported Environments (Refer to “Technical Specification” section at end of document for full listing per graphics adapter)
    - Bare Metal Client Operating System – Non Virtualized
      - Not Supported
    - Server / Hypervisor
      - Citrix XenServer 6.5 or later
        VMware vSphere 5.5 or later
      - Microsoft® Windows Server 2012 R2 (64-bit)

NOTE: GRID license for use with NVIDIA Tesla M6 and M60 can be purchased directly from HPE.

Fibre Channel Support	One optional Fibre Channel mezzanine HBA is supported on the HPE ProLiant WS460c Gen9 where vacant mezzanine slot is available.
Compatible SAN	HPE ProLiant BL460c/WS460c Gen9 server blades are optimized for HPE MSA, EVA, 3PAR and XP.

Optional Features

HPE ProLiant BL460c/WS460c Gen9 server blades are compatible with select 3rd party SANs. Please see blade storage page for more details at **https://www.hpe.com/us/en/integrated-systems/bladesystem.html**.

HPE Virtual Connect		HPE Virtual Connect is an interconnect option for c-Class BladeSystem that simplifies server connectivity to data and storage networks, and reduces costs. Unique HPE Flex-10 technology makes maximum use of network bandwidths, provide dynamic tuning and enable extreme flexibility to meet individual server and infrastructure requirements by allocating up to 4 network connections per server port. Virtual Connect FlexFabric modules extend those capabilities to allocate one function per port to storage connections (FCoE). HPE OneView's software-defined approach to infrastructure management enables central console to administer network connections and workloads for thousands of servers, see **https://www.hpe.com/us/en/integrated-systems/management-software.html** For more information on Virtual Connect Ethernet, Fibre Channel, Converged Network and management options, see **https://www.hpe.com/us/en/integrated-systems/virtual-connect.html**
Embedded Management	**iLO Advanced for BladeSystem**	HPE iLO Advanced for BladeSystem licenses offer smart remote functionality without compromise, for all HPE ProLiant servers. 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. You can also activate the enhanced security and power management functionality. Learn more about HPE iLO Advanced at t **https://www.hpe.com/us/en/servers/integrated-lights-out-ilo.html**
Server Management	**HPE Insight Control**	HPE Insight Control, lets you deploy, migrate, monitor, remote control, and optimize your IT infrastructure through a single, simple management console. For more information, see **https://www.hpe.com/us/en/product-catalog/detail/pip.3312156.html**
	HPE OneView	Powerful converged management of servers, storage, and network for IT service automation and infrastructure simplicity, see **https://www.hpe.com/us/en/integrated-systems/management-software.html**
High Performance Clusters	**HPE Cluster Platforms**	HPE Cluster Platforms are specifically engineered, factory-integrated large-scale ProLiant clusters optimized for High Performance Computing, with a choice of servers, networks and software. Operating system options include specially priced offerings for Red Hat Enterprise Linux and SUSE Linux Enterprise Server, as well as Microsoft Windows HPC Server. A Cluster Platform Configurator simplifies ordering.
	HPE HPC Interconnects	High Performance Computing (HPC) interconnect technologies are available for this server as part of the HPE Cluster Platform portfolio. These high-speed InfiniBand and Gigabit interconnects are fully supported by Hewlett Packard Enterprise when integrated within an HPE cluster. Flexible, validated solutions can be defined with the help of configuration tools. **https://www.hpe.com/us/en/product-catalog/servers/server-interconnects.hits-24.html** and **https://www.hpe.com/hk/en/product-catalog/servers/server-switches/pip.switches.5227035.html**

Optional Features

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 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. This server model starting November 2013, includes a limited license for HPE StoreVirtual VSA software with 1TB of capacity. To download the license key and StoreVirtual VSA software, visit: **https://www.hpe.com/us/en/storage/storevirtual.html** .
  NOTE: You will need your server serial number in order to complete the registration form. Fully functional, 1TB licenses are available. For more information and access to the 60-day free trial, visit: **https://h20392.www2.hpe.com/portal/swdepot/displayProductInfo.do?productNumber=VSA1TB-S**

NOTE: For more information available Storage Software including QuickSpecs, please see: **https://www.hpe.com/us/en/product-catalog/storage/storage-software.hits-24.html**.

HPE Insight Online

HPE Insight Online is part of the HPE Support Center for one stop, secure access to product and HPE support information personalized to your IT environment. Insight Online can automatically display devices remotely monitored by HPE Remote Support tools. With Insight Online's easy navigation you can efficiently track your IT support contracts and device status from anywhere and at anytime. **https://www.hpe.com/us/en/services/remote-it-support.html**

Get connected to HPE

To get the most from your investment in Hewlett Packard Enterprise servers, get connected to Hewlett Packard Enterprise using our innovative remote support technology which provides system health monitoring, pre-failure alert notification and more. For details, visit **https://h41360.www4.hpe.com/**

Optional Features

Factory Express Portfolio for Servers and Storage

HPE Factory Express offers configuration, customization, integration and deployment services for Hewlett Packard Enterprise servers and storage products. Customers can choose how their factory solutions are built, tested, integrated, shipped and deployed.

Factory Express offers service packages for simple configuration, racking, installation, complex configuration and design services as well as individual factory services, such as image loading, asset tagging, and custom packaging. Hewlett Packard Enterprise products supported through Factory Express include a wide array of servers and storage: HPE Integrity, HPE ProLiant, HPE ProLiant Server Blades, HPE BladeSystem, HPE 9000 servers as well as the MSAxxxx, VA7xxx, EVA, XP, rackable tape libraries and configurable network switches.

For more information on Factory Express services on your specific server model please contact your sales representative or go to: **https://www.hpe.com/us/en/services/factory-express.html**

HPE Simple Configurator

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, please contact the HPE Customer Business Center or an Authorized Partner for assistance. **https://h22174.www2.hpe.com/SimplifiedConfig/Welcome**

Services and Support

Service and Support

Protect your business beyond warranty with HPE Support Services

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 HPE Support Services enable you to choose the right service level, length of coverage and response time as you purchase your new server, giving you full entitlement for the support for need for your IT and business.

Connect your devices

Unlock all of the benefits of your technology investment by connecting your products to HP Enterprise. Achieve up to 77%[1] reduction in down time, near 100%[2] diagnostic accuracy and a single consolidated view of your environment. By connecting, you will receive 24x7monitoring, pre-failure alerts, automatic call logging, and automatic parts dispatch. HPE Proactive Care Service and HPE Datacenter Care Service customers will also benefit from proactive activities to help prevent issues and increase optimization. All of these benefits are already available to you with your server storage and networking products, securely connected to Hewlett Packard Enterprise support.

1 – IDC

2 – HP CSC reports 2014 – 2015

Optimized Support recommendation

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

This services helps achieve a higher return on your product investment with personalized support from a local assigned Account Support Manager who will share best practice advice and personalized recommendations designed to help improve availability and performance to increase stability and reduce unplanned downtime. Leverage your system's ability to connect to Hewlett Packard Enterprise for pre-failure alerts, automatic call logging and parts dispatch. For business critical incidents, this service offers critical event management to reduce mean time to resolution. This recommendation provides 24x7 coverage with four-hour response for hardware and collaborative support that offers two-hour callback for supported software issues. Collaborative software management is included with independent software vendors unless you have your software support from Hewlett Packard Enterprise where we own all cases from start through to resolution.

https://www.hpe.com/h20195/V2/GetDocument.aspx?docname=4AA5-3259ENW&cc=us&lc=en

Standard Support recommendation

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

HPE Proactive Care gives customers an enhanced call experience plus helps preventing problems and maintains IT stability by utilizing personalized proactive reports with recommendations and advice when your products are connected to Hewlett Packard Enterprise. This Service combines three years' proactive reporting and advice with our 24x7 coverage, four hour hardware response time when there is a problem. In addition, this service includes collaborative software support for Independent Software Vendors (ISVs), (Red Hat, VMWare, Microsoft, etc) running on your HPE servers.

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

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.

Services and Support

Related Services

HPE Server Hardware Installation

Provides for the basic hardware installation of HPE branded servers, storage devices and networking options to assist you in bringing your new hardware into operation in a timely and professional manner. **https://www.hpe.com/h20195/V2/GetPDF.aspx/5981-9356EN.pdf**

Data Center Care Services

HPE Datacenter Care helps improve IT stability and security, increase the value of IT, and enable agility and innovation. It is a structured framework of repeatable, tested, and globally available services "building blocks." You can deploy, operate, and evolve your datacenter wherever you are on your IT journey. With HPE Datacenter Care, you benefit from a personalized relationship with Hewlett Packard Enterprise via a single point of accountability for HPE and others' products. For more information, visit **https://www.hpe.com/us/en/services/datacenter-care-options.html**

Data Privacy Services

Protect your data through better media management. HPE Data privacy services help manage and protect sensitive data to reduce the risk of unauthorized access to private information and help meet compliance requirements. Our retention services allow you to keep drives and other devices upon failure with Defective Media Retention and Comprehensive Defective Material Retention, our removal services provide convenient data sanitization and our recovery services allow you to safely retire IT assets and capture any remaining value from the hardware.
https://h20195.www2.hpe.com/V2/getpdf.aspx/4AA5-0163ENW

HPE Education Services

Keep your IT staff trained making sure they have the right skills to deliver on your business outcomes. Book on a class today and learn how to get the most from your technology investment. **http://h10076.www1.hpe.com/ww/en/training/index.html**

For more information: **https://www.hpe.com/us/en/services.html**

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 server). 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 server blades must start with a CTO Blade Server.
NOTE: FIO indicates that this option is only available as a factory installable option.
NOTE: All Factory Integrated Models will be populated with sufficient hard drive blanks based on the number of initial hard drives ordered with the server.

Step 1: Base Server Blade Configuration (Select a configurable Blade)

Models	HPE ProLiant WS460c Gen9 E5-v4 Configure-to-order Expansion Blade	836738-B21
	NOTE: Base unit comes only with Slot1 of the expansion blade enabled. To enable Slot2, optional Slot2 Enablement FIO Kit (PN 775168-B21) is required. This kit is available at time of initial purchase only.	
	Configurable Models ship with:	
	One (1) FlexibleLOM connector providing a choice for one (1) of the supported 10Gb/20Gb FlexibleLOMs (see Step 2) Two (2) HPE small form factor hot-plug SAS/SATA/ HDD or SSD hard drive bays Two (2) x16 PCIe I/O expansion slots (one Type A, one Type A/B) One (1) integrated USB connector and one (1) MicroSDHC connector One (1) TPM connector HPE iLO Management (standard)	

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

HPE Processors	**NOTE:** All configure-to-order processor kits (i.e. xxxxxx-L21) contain one (1) processor. **NOTE:** If two processors are desired, select one xxxxxx-L21 here in Step 2 and one xxxxxx-B21 in Step 4.	
	E5-2600 v3 series Processors	
	HPE BL460c Gen9 Intel Xeon E5-2690v4 (2.6GHz/14-core/35MB/135W) FIO Processor Kit	819852-L21
	HPE BL460c Gen9 Intel Xeon E5-2683v4 (2.1GHz/16-core/40MB/120W) FIO Processor Kit	819851-L21
	HPE BL460c Gen9 Intel Xeon E5-2680v4 (2.4GHz/14-core/35MB/120W) FIO Processor Kit	819842-L21
	HPE BL460c Gen9 Intel Xeon E5-2650v4 (2.2GHz/12-core/30MB/105W) FIO Processor Kit	819840-L21
	HPE BL460c Gen9 Intel Xeon E5-2640v4 (2.4GHz/10-core/25MB/90W) FIO Processor Kit	819839-L21
	HPE BL460c Gen9 Intel Xeon E5-2630v4 (2.2GHz/10-core/25MB/85W) FIO Processor Kit	819845-L21
	HPE BL460c Gen9 Intel Xeon E5-2620v4 (2.1GHz/8-core/20MB/85W) FIO Processor Kit	819838-L21
	HPE BL460c Gen9 Intel Xeon E5-2680v4 (2.4GHz/14-core/35MB/120W) FIO Processor Kit	819842-L21
	HPE BL460c Gen9 Intel Xeon E5-2698v4 (2.2GHz/20-core/50MB/135W) FIO Processor Kit	819855-L21
	HPE BL460c Gen9 Intel Xeon E5-2697v4 (2.3GHz/18-core/45MB/145W) FIO Processor Kit	819854-L21
	HPE BL460c Gen9 Intel Xeon E5-2697Av4 (2.6GHz/16-core/40MB/145W) FIO Processor Kit	819857-L21
	HPE BL460c Gen9 Intel Xeon E5-2695v4 (2.1GHz/18-core/45MB/120W) FIO Processor Kit	819853-L21
	HPE BL460c Gen9 Intel Xeon E5-2667v4 (3.2GHz/8-core/25MB/135W) FIO Processor Kit	819850-L21
	E5-2600 v3 series Processors	

Configuration Information - Factory Integrated Models

	HPE BL460c Gen9 Intel Xeon E5-2660v4 (2.0GHz/14-core/35MB/105W) FIO Processor Kit	819841-L21
	HPE BL460c Gen9 Intel Xeon E5-2650Lv4 (1.7GHz/14-core/35MB/65W) FIO Processor Kit	819849-L21
	HPE BL460c Gen9 Intel Xeon E5-2623v4 (2.6GHz/4-core/10MB/85W) FIO Processor Kit	819844-L21
	HPE BL460c Gen9 Intel Xeon E5-2699v4 (2.2GHz/22-core/55MB/145W) FIO Processor Kit	819856-L21
	HPE BL460c Gen9 Intel Xeon E5-2643v4 (3.4GHz/6-core/20MB/135W) FIO Processor Kit	819848-L21
	HPE BL460c Gen9 Intel Xeon E5-2637v4 (3.5GHz/4-core/15MB/135W) FIO Processor Kit	819847-L21

HPE Memory

NOTE: HPE memory from previous generation servers (DDR3) is not compatible with this server. 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 server.
NOTE: Depending on the memory configuration and processor model, the memory speed may run at 2400MT/s, 2133MT/s, or 1866MT/s. Please see **Memory Population Table** or the Online Memory Configuration Tool at:
https://h22195.www2.hpe.com/DDR4memoryconfig/Home/LEGAL

HPE SmartMemory

	Registered DIMMs (RDIMMs) - E5-2600 v4 series Processors	
	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
	Registered DIMMs (RDIMMs) - E5-2600 v4 series Processors	
	HPE 8GB (1x8GB) Single Rank x8 DDR4-2400 CAS-17-17-17 Registered Memory Kit	805347-B21
	HPE 16GB (1x16GB) Dual Rank x4 DDR4-2400 CAS-17-17-17 Registered Memory Kit	836220-B21
	Load Reduced DIMMs (LRDIMMs) - E5-2600 v4 series Processors	
	HPE 64GB (1x64GB) Quad Rank x4 DDR4-2400 CAS-17-17-17 Load Reduced Memory Kit	805358-B21
	Load Reduced DIMMs (LRDIMMs) - E5-2600 v4 series Processors	
	HPE 32GB (1x32GB) Dual Rank x4 DDR4-2400 CAS-17-17-17 Load Reduced Memory Kit	805353-B21
	Registered DIMMs (RDIMMs) - E5-2600 v3 series Processors	
	HPE 8GB (1x8GB) Single Rank x4 DDR4-2133 CAS-15-15-15 Registered Memory Kit	726718-B21
	HPE 16GB (1x16GB) Dual Rank x4 DDR4-2133 CAS-15-15-15 Registered Memory Kit	726719-B21
	HPE 32GB (1x32GB) Dual Rank x4 DDR4-2133 CAS-15-15-15 Registered Memory Kit	728629-B21
	Load Reduced DIMMs (LRDIMMs) - E5-2600 v3 series Processors	
	HPE 64GB (1x64GB) Quad Rank x4 DDR4-2133 CAS-15-15-15 Load Reduced Memory Kit	726724-B21

NOTE: All DDR4 memory option kits consist of one DIMM per kit. For detailed memory configuration rules and guidelines, please use the Online DDR4 Memory Configuration Tool.
NOTE: Depending on the memory configuration and processor model, 2133MHz memory may operate at a lower speed. Please see the see the "Memory" section later in this document for details.
NOTE: For additional memory rules and guidelines, see the "Memory" section later in this document.

Configuration Information - Factory Integrated Models

Step 3: Choose Additional Factory Integration Options

HPE Graphics Adapters	**NOTE:** Choose from following graphics mezzanine cards for use with the single-width HPE ProLiant WS460c Gen9 model	
	HPE Graphics Adapters	
	HPE NVIDIA Quadro M3000SE FIO PCIe3 Mezzanine Graphics Kit	867583-B21
	NOTE: Choose one of the following standard PCIe graphics card for use with the double-width HPE ProLiant WS460c Gen9 (P/N 752427-B21).	
	HPE NVIDIA Quadro P6000 Graphics Accelerator	Q0V76A
	HPE Multi-GPU Carrier with 3 NVIDIA M3000SE FIO Graphics Kit	867584-B21
	HPE WS460c Gen9 Expansion Blade Slot2 Enablement FIO Kit	775168-B21
	NOTE: This part number includes one HPE MultiGPU Carrier Card with three Quadro M3000SE graphics loaded. May be configured with single or dual carriers. **NOTE:** Requires Expansion Blade Gen9 Slot2 Enablement FIO Kit (PN 775168-B21)	
	NOTE: This optional kit is available at time of initial system purchase only. This kit is required when supporting two HPE MultiGPU Carrier cards.	
	HPE NVIDIA Tesla M6 Mezzanine Graphics FIO Adaptor	805132-B21
	NOTE: When AMD FirePro S7100X, NVIDIA Quadro K3100M, or Tesla M6 card is installed in Mezz slot 2, no other card may be installed in Mezz slot 1. **NOTE:** GRID license for use with NVIDIA Tesla M6 must be purchased separately through HPE.	
	NOTE: Tesla M60 requires a NVIDIA Grid workstation license	
	HPE NVIDIA Quadro M5000 Graphics Accelerator	M9R60A
	HPE MultiGPU Carrier with 2 NVIDIA Tesla M6 GPU FIO Adapter	805133-B21
	NOTE: This part number includes one HPE MultiGPU Carrier Card with two Tesla M6 graphics loaded. May be configured with single or dual carriers. **NOTE:** GRID license for use with NVIDIA Tesla M6 must be purchased separately available from HPE. **NOTE:** Requires Expansion Blade Gen9 Slot2 Enablement FIO Kit (PN 775168-B21)	
HPE Insight Software	HPE Insight Control including 1yr 24x7 Support ProLiant ML/DL/BL-bundle Single Server FIO LTU	C6N36A
Converged Infrastructure Management Software	**HPE OneView with iLO Advanced - Server hardware required on same purchase order**	
	HPE OneView including 3yr 24x7 Support Flexible Quantity E-LTU	E5Y35AAE
	HPE OneView for Blade Server including 3yr 24x7 Support FIO Bundle Physical 1-server LTU	F6Q89A
HPE Storage Controllers	**HPE Storage Controllers**	
	HPE Smart Array P246br/1GB FBWC 12Gb 4-ports Int SAS Controller	726793-B21
	HPE Storage Controllers	
	HPE H244br 12Gb 2-ports Int Smart Host Bus Adapter	726809-B21
	HPE Smart Array P246br/1GB FBWC 12Gb 4-ports Int FIO SAS Controller	749975-B21
	HPE FIO Enable Smart Array SW RAID	784308-B21
	HPE BL460c G9 Broadwell NVMe FIO Setting	825555-B21
	NOTE: The HPE Gen9 Broadwell NVMe FIO Setting (825555-B21) is required to support SFF NVMe SSDs within the system. This option is not compatible with the HPE Smart Array P244br, HPE Smart Array P246br, or HPE Smart HBA H244br. HPE recommends the use of a dual M.2 solid state drive kit for boot when using this option.	

Configuration Information - Factory Integrated Models

NOTE: The HPE Smart Array B140i Controller (chipset SATA) comes standard with the HPE WS460c Gen9 10Gb/20Gb FLB CTO Blade (727021-B21). If neither the HPE Smart Array P244br nor the HPE H244br controllers are chosen, a SATA cable will be provided to support SATA devices for the two internal drives. If RAID is required when using the B140i, please choose 'HPE FIO B140i RAID Enable Kit - BIOS Setting' (784308-B21).
NOTE: When using the NVIDIA Quadro M3000SE GPU, the HPE Storage Controllers are installable in mezzanine slot 2. This is not the case for all other GPU options.

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, including server blade enclosures interconnect, mezzanine options and power subsystem options; please see the Core Options and Additional sections below; or the following:

- HPE BladeSystem c3000 Enclosure QuickSpecs:
  https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04123379
  NOTE: The c3000 HPE c-Class enclosures have full backwards and forwards compatibility, existing server blades are supported in the new enclosures and any future server blades will be supported in the existing enclosures.
- HPE BladeSystem c7000 Enclosure QuickSpecs:
  https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04229580
  NOTE: The c7000 HPE c-Class enclosures have full backwards and forwards compatibility, existing server blades are supported in the new enclosures and any future server blades will be supported in the existing enclosures.
- HPE BladeSystem c-Class Interconnect and Mezzanine Components:
  https://www.hpe.com/h20195/v2/getpdf.aspx/4aa4-8125enw.pdf

NOTE: For optimal cooling and system performance the WS460c Gen9 Server Blade requires the c7000 enclosure to be configured with 10 fans and the c3000 enclosure to be configured with 6 fans.

Core Options

HPE Networking

NOTE: A 10 Gigabit Ethernet adapter supports linking at 1Gbps or 10Gbps when connected to an interconnect module with 10Gb Ethernet downlinks.
NOTE: A 10 Gigabit Ethernet adapter supports linking at only 1Gbps when connected to an interconnect module with 1Gb Ethernet downlinks.
NOTE: The 10 Gigabit Ethernet adapters on each server blade connect to a 10Gb interconnect in bays 3-6 (HPE BladeSystem c7000 Enclosure) or bays 2-4 (HPE BladeSystem c3000 Enclosure).

20 Gigabit Ethernet Mezzanine Cards – Recommended

HPE FlexFabric 20Gb 2-port 630M Adapter 700076-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at **https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04312720**

HPE FlexFabric 20Gb 2-port 650M Adapter 700767-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at **https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04347342**

10 Gigabit Ethernet Mezzanine Cards – Recommended

HPE FlexFabric 10Gb 2-port 534M Adapter 700748-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at: **https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04111368**

HPE Ethernet 10Gb 2-port 560M Adapter 665246-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at: **https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04111406**.

1 Gigabit Ethernet Mezzanine Cards

HPE Ethernet 1Gb 4-port 366M Adapter 615729-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at: **https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04111456**

FlexibleLOM Adapters

NOTE: The server supports one (1) FlexibleLOM that is installed in the FlexibleLOM connectors and is already included in the pre-configured models. However, it must be added in Step 2 for Configure-to-Order Models. The FlexibleLOM options below are used to change these original FlexibleLOMs.

20Gb FlexibleLOM Adapters

HPE FlexFabric 20Gb 2-port 650FLB Adapter 700763-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at **https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04347341**

HPE FlexFabric 20Gb 2-port 630FLB Adapter 700065-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at **https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04312719**

10Gb FlexibleLOM Adapters

HPE FlexFabric 10Gb 2-port 536FLB Adapter 766490-B21

NOTE: FlexFabric supported only with server OS and/or in a virtualized environment using hypervisors.
NOTE: Please see QuickSpecs for technical specifications and additional information at **https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04347246**

Core Options

	HPE Ethernet 10Gb 2-port 560FLB Adapter	655639-B21
	NOTE: Please see QuickSpecs for technical specifications and additional information at **https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04111516**	
	HPE Infiniband Mezzanine Adapters	
	NOTE: When an InfiniBand adapter is installed in mezzanine slot 1, only one port is active (regardless of operating mode). When installed in mezzanine slot 2, both ports are active.	
	NOTE: InfiniBand QDR and FDR speeds are only supported on the HPE BladeSystem c7000 Enclosure. For additional information, please see the HPE BladeSystem c7000 Enclosure and InfiniBand QuickSpecs at: **https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04126044** **https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04154440**	
	HPE InfiniBand FDR/Ethernet 10Gb/40Gb 2-port 544+M Adapter	764283-B21
	NOTE: The FDR InfiniBand adapter must be installed in mezzanine slot 1 for FDR mode and may be installed in either mezzanine slot if operated in any other mode.	
	HPE InfiniBand FDR 2-port 545M Adapter	702213-B21
HPE Fibre Channel	**HPE Fibre Channel Adapters**	
	HPE LPe1605 16Gb Fibre Channel HBA for BladeSystem c-Class	718203-B21
	NOTE: Please see QuickSpecs for technical specifications and additional information at **https://www.hpe.com/us/en/product-catalog/options/pip.server-host-bus-adapters.5816290.html**	
	HPE QMH2672 16Gb Fibre Channel Host Bus Adapter	710608-B21
	NOTE: Please see QuickSpecs for technical specifications and additional information at **https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04126962**	
HPE Processors	**E5-2600 v4 series Processors**	
	HPE BL460c Gen9 Intel Xeon E5-2690v4 (2.6GHz/14-core/35MB/135W) Processor Kit	819852-B21
	HPE BL460c Gen9 Intel Xeon E5-2683v4 (2.1GHz/16-core/40MB/120W) Processor Kit	819851-B21
	HPE BL460c Gen9 Intel Xeon E5-2680v4 (2.4GHz/14-core/35MB/120W) Processor Kit	819842-B21
	HPE BL460c Gen9 Intel Xeon E5-2650v4 (2.2GHz/12-core/30MB/105W) Processor Kit	819840-B21
	HPE BL460c Gen9 Intel Xeon E5-2640v4 (2.4GHz/10-core/25MB/90W) Processor Kit	819839-B21
	HPE BL460c Gen9 Intel Xeon E5-2630v4 (2.2GHz/10-core/25MB/85W) Processor Kit	819845-B21
	HPE BL460c Gen9 Intel Xeon E5-2620v4 (2.1GHz/8-core/20MB/85W) Processor Kit	819838-B21
	HPE BL460c Gen9 Intel Xeon E5-2698v4 (2.2GHz/20-core/50MB/135W) Processor Kit	819855-B21
	HPE BL460c Gen9 Intel Xeon E5-2697v4 (2.3GHz/18-core/45MB/145W) Processor Kit	819854-B21
	HPE BL460c Gen9 Intel Xeon E5-2697Av4 (2.6GHz/16-core/40MB/145W) Processor Kit	819857-B21
	HPE BL460c Gen9 Intel Xeon E5-2695v4 (2.1GHz/18-core/45MB/120W) Processor Kit	819853-B21
	HPE BL460c Gen9 Intel Xeon E5-2667v4 (3.2GHz/8-core/25MB/135W) Processor Kit	819850-B21
	E5-2600 v4 series Processors	
	HPE BL460c Gen9 Intel Xeon E5-2660v4 (2.0GHz/14-core/35MB/105W) Processor Kit	819841-B21
	HPE BL460c Gen9 Intel Xeon E5-2650Lv4 (1.7GHz/14-core/35MB/65W) Processor Kit	819849-B21
	HPE BL460c Gen9 Intel Xeon E5-2623v4 (2.6GHz/4-core/10MB/85W) Processor Kit	819844-B21
	HPE BL460c Gen9 Intel Xeon E5-2699v4 (2.2GHz/22-core/55MB/145W) Processor Kit	819856-B21
	HPE BL460c Gen9 Intel Xeon E5-2643v4 (3.4GHz/6-core/20MB/135W) Processor Kit	819848-B21
	HPE BL460c Gen9 Intel Xeon E5-2637v4 (3.5GHz/4-core/15MB/135W) Processor Kit	819847-B21

Core Options

HPE Memory

NOTE: HPE memory from previous generation servers (DDR3) is not compatible with this server. 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 server.
NOTE: Depending on the memory configuration and processor model, the memory speed may run at 2400MT/s, 2133MT/s, or 1866MT/s. Please see the Online Memory Configuration Tool at: **https://h22195.www2.hpe.com/ddr4memoryconfig/home/legal**

HPE SmartMemory

Registered DIMMs (RDIMMs) - E5-2600 v4 series Processors

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

Registered DIMMs (RDIMMs) - E5-2600 v4 series Processors

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

Load Reduced DIMMs (LRDIMMs) - E5-2600 v4 series Processors

HPE 64GB (1x64GB) Quad Rank x4 DDR4-2400 CAS-17-17-17 Load Reduced Memory Kit	805358-B21

Load Reduced DIMMs (LRDIMMs) - E5-2600 v4 series Processors

HPE 32GB (1x32GB) Dual Rank x4 DDR4-2400 CAS-17-17-17 Load Reduced Memory Kit	805353-B21

Registered DIMMs (RDIMMs) - E5-2600 v3 series Processors

HPE 8GB (1x8GB) Single Rank x4 DDR4-2133 CAS-15-15-15 Registered Memory Kit	726718-B21
HPE 16GB (1x16GB) Dual Rank x4 DDR4-2133 CAS-15-15-15 Registered Memory Kit	726719-B21
HPE 32GB (1x32GB) Dual Rank x4 DDR4-2133 CAS-15-15-15 Registered Memory Kit	728629-B21

Load Reduced DIMMs (LRDIMMs) - E5-2600 v3 series Processors

HPE 64GB (1x64GB) Quad Rank x4 DDR4-2133 CAS-15-15-15 Load Reduced Memory Kit	726724-B21

HPE Hard Drives

NOTE: The ProLiant WS460c Gen9 server includes 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 WS460c Gen9 drive bays.
NOTE: The mixing of standard SAS drives with SAS SSD is supported within the server, but limits the RAID configuration to two separate RAID 0 volumes. Mixing of other drives types is not supported.
NOTE: HPE hard drives have either a one year or three year warranty; refer to the specific hard drive QuickSpecs for details.
NOTE: The hard drive options are not required when configuring a drive-less model.

HPE NVMe PCIe Read Intensive SFF (2.5-inch) Solid State Drives

HPE 1.92TB NVMe x4 Lanes Read Intensive SFF (2.5in) SCN 3yr Wty Digitally Signed Firmware SSD	875591-B21

Core Options

HPE 960GB NVMe x4 Lanes Read Intensive SFF (2.5in) SCN 3yr Wty Digitally Signed Firmware SSD	875589-B21
HPE 480GB NVMe x4 Lanes Read Intensive SFF (2.5in) SCN 3yr Wty Digitally Signed Firmware SSD	875587-B21

HPE NVMe PCIe Mixed Use SFF (2.5-inch) Solid State Drives

HPE 400GB NVMe x4 Lanes Mixed Use SFF (2.5in) SCN 3yr Wty Digitally Signed Firmware SSD	875593-B21
HPE 800GB NVMe x4 Lanes Mixed Use SFF (2.5in) SCN 3yr Wty Digitally Signed Firmware SSD	875595-B21

HPE NVMe PCIe Mixed Use SFF (2.5-inch) Solid State Drives

HPE 1.6TB NVMe x4 Lanes Mixed Use SFF (2.5in) SCN 3yr Wty Digitally Signed Firmware SSD	875597-B21

6G SATA Hot Plug with SmartDrive SFF (2.5-inch) Midline Drives

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

NOTE: Please see the QuickSpecs for technical specifications and additional information at **https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04111725**.

12G SAS Hot Plug SFF (2.5-inch) SC HDD

HPE 2TB SAS 12G Midline 7.2K SFF (2.5in) SC 1yr Wty 512e HDD	765466-B21
HPE 1TB SAS 12G Midline 7.2K SFF (2.5in) SC 1yr Wty 512e Digitally Signed Firmware HDD	765464-B21
HPE 1TB SAS 12G Midline 7.2K SFF (2.5in) SC 1yr Wty Digitally Signed Firmware HDD	832514-B21

12G SAS Mixed Use SFF (2.5-inch) SC DS SSD

HPE 400GB SAS 12G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	872374-B21
HPE 800GB SAS 12G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	872376-B21
HPE 1.6TB SAS 12G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	872382-B21

12G SAS Mixed Use SFF (2.5-inch) SC DS SSD

HPE 3.2TB SAS 12G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	872386-B21

12G SAS Read Intensive SFF (2.5-inch) SC DS SSD

HPE 7.68TB SAS 12G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	870144-B21
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 480GB SAS 12G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	875311-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 960GB SAS 12G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P06584-B21

Core Options

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

6G SATA Hot Plug SFF (2.5-inch) SC HDD

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

12G SATA 2.5in MU SFF SC DS SSD

HPE 480GB SATA 6G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	875470-B21
HPE 960GB SATA 6G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	875474-B21
HPE 1.92TB SATA 6G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	875478-B21
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	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

12G SATA 2.5in RI SFF SC DS SSD

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 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	P04560-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	P04566-B21
HPE 3.84TB SATA 6G Read Intensive SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD	P04570-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

Core Options

HPE Graphic Options	HPE NVIDIA Quadro M5000 Graphics Accelerator	M9R60A

Additional Options

HPE Insight software	**HPE Insight Control**	
	HPE Insight Control including 1yr 24x7 Technical Support and Updates 1-server LTU	C6N27A
	NOTE: HPE Insight Management Media Kit contains DVDs without licenses. Contains HPE Systems Insight Manager, HPE Insight Control, HPE Matrix Operating Environment, and Virtual Connect Enterprise Manager software. Uses an integrated installer to perform quick and accurate software installation and updates.	
	NOTE: Electronic and Flexible-Quantity licenses can be used to purchase multiple licenses with a single activation key.	
	NOTE: Customer will receive a license entitlement certificate, which must be redeemed online or via fax in order to obtain the license activation key(s). Includes one year of 24 x 7 HPE Software Technical Support Service.	
	NOTE: Licenses ship without media. The HPE Insight Management Media Kit can be ordered separately, or can be downloaded at **http://www.hpe.com/info/insightmanagement**	
	NOTE: For additional license kits, please see the QuickSpecs at: **https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04123391**	
HPE iLO Advanced License	**HPE Integrated Lights-Out (iLO) Advanced for ProLiant BladeSystem Remote Management**	
	HPE iLO Advanced for BladeSystem Electronic License with 3yr Support on iLO Licensed Features	E6U63ABE
	HPE iLO Advanced for BladeSystem 1-server License with 3yr Support on iLO Licensed Features	BD502A
	HPE iLO Advanced for BladeSystem Electronic License with 1yr Support on iLO Licensed Features	E6U60ABE
	HPE iLO Advanced for BladeSystem 1-server License with 1yr Support on iLO Licensed Features	512488-B21
	NOTE: Customer will receive a license entitlement certificate, which must be redeemed online or via fax in order to obtain the license activation key(s). Includes one or three years of 24 x 7 HPE Software Technical Support Service. **NOTE:** For additional license kits, including electronic delivery options, please see the iLO QuickSpecs at **http://www.hpe.com/info/ilo**	
	NOTE: Customer will receive a license entitlement certificate, which must be redeemed online or via fax in order to obtain the license activation key(s). Includes one or three year of 24 x 7 HPE Software Technical Support Service. **NOTE:** For additional license kits, please see the QuickSpecs at: **https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04154343**	
Converged Infrastructure Management Software	**HPE OneView**	
	HPE OneView with iLO Advanced	
	HPE OneView including 3yr 24x7 Support Physical 1-server LTU	E5Y34A
	HPE OneView including 3yr 24x7 Support Flexible Quantity E-LTU	E5Y35AAE
	HPE OneView Physical Media Kit LTU	E5Y37A
	HPE OneView w/o iLO including 3yr 24x7 Support 1-server LTU	P8B24A
	HPE OneView w/o iLO including 3yr 24x7 Support Flexible Quantity E-LTU	P8B26AAE
	HPE OneView w/o iLO including 3yr 24x7 Support 1-server FIO LTU	P8B31A

Additional Options

NOTE: For additional license kits please see the QuickSpecs at **https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04111367**.

High Performance Clusters	**HPE Cluster Management Utility**	
	HPE Insight Cluster Management Utility 1yr 24x7 Flexible LTU	QL803B
	HPE Insight Cluster Management Utility 3yr 24x7 Flexible LTU	BD476A
	NOTE: These part numbers can be used to purchase one certificate for multiple licenses and support with a single activation key. Each license is for one node (server). Customer will receive a printed end user license agreement and license entitlement certificate via physical shipment. The license entitlement certificate must be redeemed online in order to obtain a license key. Customer also will receive a support agreement.	
	HPE Insight Cluster Management Utility Media	BD477A
	NOTE: For additional license kits please see the QuickSpecs at **https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04111735**.	
HPE Security	HPE Trusted Platform Module Option	488069-B21
	NOTE: The TPM (Trusted Platform Module) is a microcontroller chip that can securely store artifacts used to authenticate the server platform. These artifacts can include passwords, certificates and encryption keys. Windows® BitLocker™ Drive Encryption (BitLocker) is a data protection feature available in Windows Server® 2008 R2. BitLocker leverages the enhanced security capabilities of a Trusted Platform Module (TPM) version 1.2. The TPM works with BitLocker to help protect user data and to ensure that a server running Windows Server 2008 R2 has not been tampered with while the system was offline. **https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04939549** **NOTE:** ProLiant OS pre-installed units will come with the partition required for TPM deployment. **NOTE:** The TPM key is unique to every TPM deployed server and must be retained. Misplacing or losing the key could result in data loss.	
HPE Storage Controllers	HPE Smart Array P244br/1GB FBWC 12Gb 2-ports Int SAS Controller	749680-B21
	HPE H244br 12Gb 2-ports Int Smart Host Bus Adapter	726809-B21
	HPE BL460c G9 Broadwell NVMe FIO Setting	825555-B21
	NOTE: The HPE Gen9 Broadwell NVMe FIO Setting (825555-B21) is required to support SFF NVMe SSDs within the system. This option is not compatible with the HPE Smart Array P244br, HPE Smart Array P246br, or HPE Smart HBA H244br. Hewlett Packard Enterprise recommends the use of a dual M.2 solid state drive kit for boot when using this option.	
HPE InfiniBand Mezzanine Adapters	**HPE InfiniBand Mezzanine Adapters**	
	NOTE: When an InfiniBand adapter is installed in mezzanine slot 1, only one port is active (regardless of operating mode). When installed in any other mezzanine slot, both ports are active.	
	NOTE: InfiniBand QDR and FDR speeds are only supported on the HPE BladeSystem c7000 Enclosure. For additional information, please see the HPE BladeSystem c7000 Enclosure and InfiniBand QuickSpecs at: **https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04126044** **https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04154440**	
	HPE InfiniBand FDR/Ethernet 10Gb/40Gb 2-port 544+M Adapter	764283-B21

Additional Options

	NOTE: The FDR InfiniBand adapter must be installed in mezzanine slot 1 for FDR mode and may be installed in any mezzanine slot if operated in any other mode.	
	HPE InfiniBand FDR 2-port 545M Adapter	702213-B21
HPE Flash Media Kits for USB Drives	**HPE Flash Media Kits for USB Drives**	
	HPE Enterprise Mainstream Flash Media Kits for Memory Cards - Recommended	
	HPE 8GB Dual microSD Flash USB Drive	741279-B21
	HPE 8GB microSD Flash USB Drive	737953-B21
	HPE 8GB microSD Flash Memory Card	726116-B21
	HPE 32GB microSD Flash Memory Card	700139-B21
	NOTE: Please see the QuickSpecs for Technical Specifications and additional information: **https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04123175**	
HPE Pointnext operational Services	**Proactive Care Services**	
	HPE 3 year Proactive Care 24x7 WS460c Gen9 Service	U8BF0E
	HPE 3 year Proactive Care 24x7 with DMR WS460c Gen9 Service	U8BF1E
	HPE 3 year Proactive Care Advanced 24x7 WS460c Gen9 Service	U8BF3E
	HPE 3 year Proactive Care Advanced 24x7 with DMR WS460c Gen9 Service	U8BF4E
	HPE 3 year Proactive Care 24x7 BL4xxc Gen9 Service	U7BN8E
	HPE 3 year Proactive Care 24x7 with DMR BL4xxc Gen9 Service	U7BN9E
	HPE 3 year Proactive Care Advanced 24x7 BL4xxc Gen9 Service	U7BT6E
	HPE 3 year Proactive Care Advanced 24x7 with DMR BL4xxc Gen9 Service	U7CF8E
	Installation Services	
	HPE Install c-Class Server Blade Service	UE493E
	HPE Installation WS460c Workstation Blade Service	UR362E
	NOTE: Additional HPE Pointnext operational services can be found at: **http://ssc.hpe.com/portal/site/ssc/**	

Memory

For detailed memory configuration rules and guidelines, please use the Online DDR4 Memory Configuration Tool:
https://h22195.www2.hpe.com/ddr4memoryconfig/home/legal

Memory Subsystem Architecture
Each Intel® Xeon® E5-2600 v3 family or Intel® Xeon® E5-2600 v3 family processor socket contains four memory channels that support two DIMMs each for a total of eight (8) DIMM per installed processor or a grand total of sixteen (16) DIMMs for the server. Up to 64GB capacity DIMMs are supported for 1TB of memory (16 DIMM slots x 64GB per DIMM).
NOTE: 64GB DIMM support available in earl 2015.

Memory Population Rules and Guidelines:

- 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.
- DIMM sizes can be mixed in channel. 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 server. The majority of ProLiant Gen9 servers support RDIMM and LRDIMM.
- DIMMs of different speeds may be mixed in any order; the server will select a common optimal speed.
- 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 WS460c Gen9 Server Blade.
- To realize the performance memory capabilities listed in this document, HPE SmartMemory is required. For additional information, please see the HPE SmartMemory QuickSpecs at: **https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04111535**

Supported Memory Bandwidth on Intel® Xeon® E5-2600 v3 series Processors

DIMM Rank	Register DIMM (RDIMM)				Load Reduced (LRDIMM)		
	Single Rank (1R)	Dual Rank (2R)			Dual Rank (2R)	Quad Rank (4R)	Quad Rank (4R)
DIMM Capacity	8GB	16GB	8GB	32GB	16GB	32GB	64GB
Voltage	Std Voltage 1.2V	Std Voltage 1.2V	Std Voltage 1.2V	Std Voltage 1.2V	Std Voltage 1.2V	Std Voltage 1.2V	Std Voltage 1.2V
SLOTS THAT CAN BE POPULATED							
12 slot servers	12	12	12	12	12	12	12
16 slot servers	16	16	16	16	16	16	16
MAXIMUM CAPACITY (GB)*							
12 slot servers	96	192	96	384	192	384	NA
16 slot servers	128	256	128	512	256	512	1024
POPULATED DIMM SPEED (MT/s)							
1 DIMM Per Channel	2133	2133	2133	2133	2133	2133	2133
2 DIMM Per Channel	2133	2133	2133	2133	2133	2133	2133

Memory

*Maximum Capacity will vary based on individual serve platform qualification schedule

Memory Speed by E5-2600 v3 Series Processor Model

Processor Models	Supported Memory Speeds
E5-2690 v3, E5-2695 v3, E5-2697 v3, E5-2698 v3, E5-2699 v3, E5-2687W v3, E5-2683 v3, E5-2680 v3, E5-2670 v3, E5-2667 v3 , E5-2660 v3, E5-2650 v3, E5-2650L, E5-2643 v3, E5-2637 v3	2133MT/s
E5-2640 v3, E5-2630 v3, E5-2630L v3, E5-2623 v3, E5-2620 v3	1866MT/s
E5-2609 v3, E5-2603 v3	1600MT/s

Supported Memory Bandwidth on Intel® Xeon® E5-2600 v4 series Processors

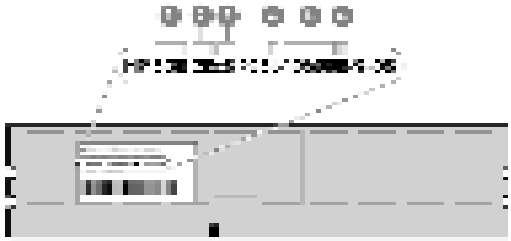
DIMM Rank	Register DIMM (RDIMM)				Load Reduced (LRDIMM)	
	Single Rank (1R)		Dual Rank (2R)		Dual Rank (2R)	Quad Rank (4R)
DIMM Capacity	8GB	16GB	16GB	32GB	32GB	64GB
Voltage	Std Voltage 1.2V	Std Voltage 1.2V	Std Voltage 1.2V	Std Voltage 1.2V	Std Voltage 1.2V	Std Voltage 1.2V
SLOTS THAT CAN BE POPULATED						
12 slot servers	12	12	12	12	12	12
16 slot servers	16	16	16	16	16	16
MAXIMUM CAPACITY (GB)*						
12 slot servers	96	192	192	384	384	768
16 slot servers	128	256	256	512	512	1024
POPULATED DIMM SPEED (MT/s)						
1 DIMM Per Channel	2400	2400	2400	2400	2400	2400
2 DIMM Per Channel	2133	2133	2133	2133	2400	2400
*Maximum Capacity will vary based on individual serve platform qualification schedule						

Memory Speed by E5-2600 v4 Series Processor Model

Processor Models	Supported Memory Speeds
E5-2690 v4, E5-2695 v4, E5-2697 v4, E5-2697A v4, E5-2698 v4, E5-2699 v4, E5-2683 v4, E5-2680 v4, E5-2667 v4 , E5-2660 v4, E5-2650 v4, E5-2650L v4, E5-2643 v4, E5-2637 v4	2400MT/s
E5-2640 v4, E5-2630 v4, E5-2630L v4, E5-2623 v4, E5-2620 v4	2133MT/s
E5-2609 v4, E5-2603 v4	1866MT/s

Memory options part number decoder

Memory



Item	Description	Definition
1	Capacity	8 GByte 16 GByte 32 GByte
2	Rank	1R = Single-rank 2R = Dual-rank 4R = Quad-rank
3	Data width	x4 = 4-bit x8 = 8-bit
4	Memory generation	DDR4
5	Max. Memory speed	2133MT/s
6	CasLatency	P = 15
6	DIMM type	R = RDIMM (registered) L = LRDIMM (load reduced)

Following are memory options available from Hewlett Packard Enterprise:

HPE Memory

NOTE: HPE memory from previous generation servers (DDR3) is not compatible with this server. 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 server.
NOTE: Depending on the memory configuration and processor model, the memory speed may run at 400MT/s, 12133MT/s, or 1866MT/s.

Registered DIMMs (RDIMMs) - E5-2600 v4 series Processors

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 8GB (1x8GB) Single Rank x8 DDR4-2400 CAS-17-17-17 Registered Memory Kit	805347-B21

Load Reduced DIMMs (LRDIMMs) - E5-2600 v4 series Processors

HPE 64GB (1x64GB) Quad Rank x4 DDR4-2400 CAS-17-17-17 Load Reduced Memory Kit	805358-B21

Load Reduced DIMMs (LRDIMMs) - E5-2600 v4 series Processors

HPE 32GB (1x32GB) Dual Rank x4 DDR4-2400 CAS-17-17-17 Load Reduced Memory Kit	805353-B21

Registered DIMMs (RDIMMs)

Registered DIMMs (RDIMMs) - E5-2600 v3 series Processors

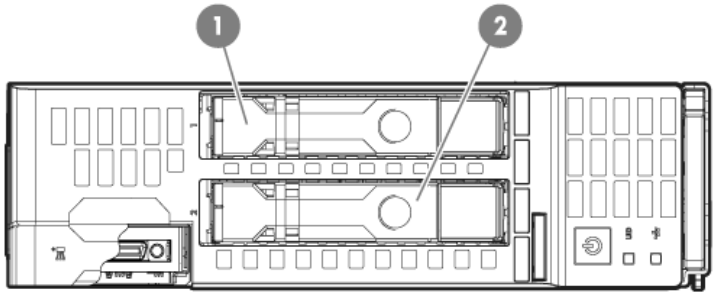
Memory

HPE 8GB (1x8GB) Single Rank x4 DDR4-2133 CAS-15-15-15 Registered Memory Kit	726718-B21
HPE 16GB (1x16GB) Dual Rank x4 DDR4-2133 CAS-15-15-15 Registered Memory Kit	726719-B21
HPE 32GB (1x32GB) Dual Rank x4 DDR4-2133 CAS-15-15-15 Registered Memory Kit	728629-B21

Load Reduced DIMMs (LRDIMMs) - E5-2600 v3 series Processors

HPE 64GB (1x64GB) Quad Rank x4 DDR4-2133 CAS-15-15-15 Load Reduced Memory Kit	726724-B21

Storage



1-2 2 x SFF hot-plug SAS, SATA, SAS SDD, and SATA SSD hard drives

Technical Specifications

System Unit	**Dimensions** (H x W x D) (with bezel)	Single-width model: 7.11 x 2.18 x 20.37 in (18.07 x 5.54 x 51.76 cm) Double-width model: 7.11 x 4.46 x 20.37 in (18.07 x 11.08 x 51.76 cm)	
	Weight (approximate)	**(Single-width type)**	
		Maximum: all processors, 16 DIMMs, hard drives, mezzanine cards, and two flash cache batteries installed)	14.00 lb (6.33 kg)
		Minimum: one processor and 2 DIMMs installed	10.50 lb (4.75 kg)
		(Double-width type)	
		Maximum: all processors, 16 DIMMs, hard drives, mezzanine cards, and two flash cache batteries installed), dual MultiGPU Carrier with eight Q1000M	22.25 lb (10.09 kg)
		Minimum: one processor and 2 DIMMs installed, expansion blade slot 1,2 enabled, both slots vacant	15.69 lb (7.12 kg)
	Power Specifications	For power specifications including input requirements, BTU rating, and power supply output, please see the: • HPE BladeSystem c3000 Enclosure QuickSpecs at **https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04123379** • HPE BladeSystem c7000 Enclosure QuickSpecs at **https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04229580** 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** **NOTE:** For optimal cooling and system performance the WS460c Gen9 Graphics Server Blade requires the c7000 enclosure to be configured with 10 fans and the c3000 enclosure to be configured with 6 fans.	
	System Inlet Temperature (Single-width model)	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 1,000 ft) above sea level to a maximum of 3,050 m (10,000 ft), no direct sustained sunlight. Maximum rate of change is 10°C/hr (18°F/hr). 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 or above 30°C (86°F).
		Non-operating	-30° to 60°C (-22° to 140°F). Maximum rate of change is 20°C/hr (36°F/hr).

Technical Specifications

	System Inlet Temperature (Double-width model)	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 1,000 ft) above sea level to a maximum of 3,050 m (10,000 ft), no direct sustained sunlight. Maximum rate of change is 10°C/hr (18°F/hr). 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 or above 30°C (86°F). If ambient temperature over 30°C (86°F), and GPU power load is consistently and significantly high, GPU frequency will throttle down, and in extreme cases, system may initiate a protection shutdown sequence**.**
		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	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) **NOTE:** Qualifications for extended ambient configurations are detailed at: **http://www.hpe.com/servers/ashrae**	
	Relative Humidity (non-condensing)	Operating	10 to 90% relative humidity (Rh), 28°C (82.4°F) maximum wet bulb temperature, non-condensing.
		Non-operating	5 to 95% relative humidity (Rh), 38.7°C (101.7°F) maximum wet bulb temperature, non-condensing.
	Altitude	Operating	3,050 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 (1,500 ft/min).
		Non-operating	9,144 m (30,000 ft). Maximum allowable altitude change rate is 457 m/min (1,500 ft/min).
	Acoustic Noise	For acoustic noise specifications, please see the HPE BladeSystem c-Class Enclosures QuickSpecs located at: • HPE BladeSystem c3000 Enclosure QuickSpecs: **https://h20195.www2.hpe.com/v2/GetDocument.aspx?docname=c04123379** • HPE BladeSystem c7000 Enclosure QuickSpecs: **https://h20195.www2.hpe.com/v2/GetDocument.aspx?docname=c04229580**	
HPE Smart Array P244br Controller	**Disk Drive Interface**	12Gb/s SAS (Serial Attached SCSI) 6Gb/s SATA (Serial ATA)	
	Server Interface	x8 5G PCIe 3.0 provides 8GB/s maximum bandwidth	
	Cache Memory	1GB flash backed write cache (FBWC) cache standard	
	Logical Drives Supported	64 (with included 1GB cache)	

Technical Specifications

	Host Memory Addressing	64-bit, supporting servers memory space greater than 4GB
	RAID Support	RAID 1 (mirroring), RAID 0 (striping), RAID 10
	Other	Upgradeable firmware with recovery ROM Online drive flash (with SAS drives)
HPE Smart HBA H244br Controller	**Disk Drive Interface**	12Gb/s SAS (Serial Attached SCSI) 6Gb/s SATA (Serial ATA)
	Server Interface	x8 5G PCIe 3.0 provides 8GB/s maximum bandwidth
	Cache Memory	None
	Logical Drives Supported	64
	Host Memory Addressing	64-bit, supporting servers memory space greater than 4GB
	RAID Support	RAID 1 (mirroring) and RAID 0 (striping)
	Other	Upgradeable firmware with recovery ROM Online drive flash (with SAS drives)
HPE Dynamic Smart Array B140i Controller	**Disk Drive Interface**	6Gb/s SATA (Serial ATA)
	Server Interface	Embedded x4 PCIe 2.0
	SAS Connectors **Cache Memory**	2 internal SATA ports None
	SAS Speed **Logical Drives Supported**	6Gb/s SATA links Up to 10 logical volumes (2 physical drives)
	Host Memory Addressing	64-bit, supporting greater than 4GB server memory space
	Hot Plug Support **RAID Support**	Yes RAID 1 (Mirroring) RAID 0 (Striping)
	Other	Upgradeable firmware with recovery ROM
HPE FlexFabric 10Gb 2-port 536FLB FlexibleLOM	**Type**	Integrated dual-port KR 10Gb FlexibleLOM with FlexFabric (Flex-10, FCoE, hardware-based iSCSI, iSCSI boot, TCP/IP offload engine, and autosensing 1Gb/10Gb Ethernet capability)
	Network Processor	QLogic 57840S with integrated MAC/PHY
	Data Transfer Method	x8 PCI Express 3.0
	Network Transfer Rate	Two ports, each at 20Gbps full duplex; 40Gbps aggregate full duplex theoretical bandwidth **NOTE:** Each port is autosensing 1Gb/10Gb, and can interoperate with 1Gb or 10Gb HPE BladeSystem c-Class interconnect components. Both ports will operate at the same speed. **NOTE:** Each port on the 554FLB adapter transmits from the server at 20Gbps (theoretical) full duplex.
	IEEE Compliance	802.1p, 802.1q, 802.1qau, 802.3ad, 802.3ae, 802.3ap (10GBase-KX4) and 802.3x
	Standard Features	Full hardware offload of iSCSI and FCoE storage protocol processing for highest performance converged Ethernet data and storage networks.

Technical Specifications

		Dual-port 10GbE Flex-10 FlexibleLOM network adapter that provides the flexibility to choose the type of LOM to meet growing infrastructure needs Industry-leading throughput and latency performance. Supports the HPE Flex-10 blade interconnect technology. User configurable bandwidth settings when combined with the 10Gb Flex-10 Virtual Connect module. From 100Mb/s to10Gb/s on up to four "Physical Function" NICs per port, in increments of 100Mb/s for NIC. The combined bandwidth of NICs cannot exceed port bandwidth i.e. 10 Gb. Up to 40Gb/s bi-directional near line rate throughput Hardware acceleration and offloads for stateless TCP/IP, TCP Offload Engine (TOE) Improved small packet performance Support for Preboot eXecution Environment (PXE) Integrated PHY and MAC Supports for SR-IOV Support for Network Partitioning (NPAR)
HPE FlexFabric 20Gb 2-port 650FLB FlexibleLOM	**Type**	Integrated dual-port KR2 20Gb FlexibleLOM with FlexFabric (Flex-20, FCoE, RoCE, Tunnel Offload with VXLAN/NVGRE, hardware-based iSCSI, iSCSI boot, TCP/IP offload engine, and autosensing Ethernet speed capability)
	Network Processor	Emulex XE-104
	Data Transfer Method	x8 PCI Express 3.0
	Network Transfer Rate	Two ports, each at 40 Gbps bi-directional; 80 Gbps aggregate bi-directional theoretical bandwidth
	IEEE Compliance	802.3ae, 802.1Q, 802.3x, 802.1p, 802.3ad/LACP, 802.1AB(LLDP), 802.1Qbg, 802.1Qbb, 802.1Qaz, 802.3ap
	Standard Features	Dual 20Gb ports provide up to 80Gb bi-directional per adapter Multi-speed adapter operates at either 20GbE or 10GbE Converges FCoE or RoCE with LAN traffic on a single Ethernet wire Tunnel Offload support for VXLAN and NVGRE RDMA over Converged Ethernet (RoCE) for greater server efficiency and lower latency (6125XLG only) Advanced storage offload processing freeing up valuable CPU cycles Supports UEFI and legacy boot options Mixed Storage – supports NIC + FCoE on one port, and NIC + iSCSI on the other Concurrent Storage – concurrently supports NIC, FCoE, and iSCSI storage functions on the same port (NIC + FCoE + iSCSI) Industry-leading throughput and latency performance Supports the HPE Flex-20 blade interconnect technology Over eight million small packets/s, ideal for web/mobile applications, mobile messaging, and social media User configurable bandwidth settings when combined with the 20Gb Flex-20 Virtual Connect module. From 100Mb/s to10Gb/s on up to four "Physical Function" NICs per port, in increments of 100Mb/s for NIC. The combined bandwidth of NICs cannot exceed port bandwidth i.e. 20 Gb/s. Greater bandwidth with PCIe 3.0 Jumbo Frames support Supports Wake On LAN (WOL) Support for Preboot eXecution Environment (PXE) Support for Microsoft Windows SMB Direct Optimized host virtualization density with SR-IOV support
	I/O Interface	PCIe Gen3 x16

Technical Specifications

HPE MultiGPU Carrier card (single, carrier only)	**Size**	Full-size, full-length PCIe card
	MXM Connector	Four MXM v.3.0 connectors (follows MXM specifications) Accepts three (3) MXM-B or four (4) MXM-A cards
	MXM Interface	PCIe Gen3 x8
	Supported MXM adapters	NVIDIA Quadro M3000SE (three per carrier card)
	Weight	1.60 lb (0.724 kg) - Single, vacant with no MXM graphics
NVIDIA Quadro M3000SE graphics adapter	**Memory size**	4GB
	Memory type	GDDR-5
	Memory interface	256-bit
	Card type	MXM-v.3.0
	I/O interface	PCIe (x16) Gen3
	Max power consumption	75W (average)
	API	DirectX 12, Shader Model 5.0; OpenGL 4.5; OpenCL 1.2; CUDA 5.2
	Upgradeable Firmware	For firmware and driver versions please see the Quick Start Guide.
	Operating Systems	Microsoft ® Windows 7® SP1 Pro (64-bit), Enterprise (64-bit) Microsoft® Windows Server 2012 R2 (64-bit) Standard, Enterprise and DataCenter editions (Citrix XenApp) Citrix XenServer 6.5 or later (Pass-Through GPU) VMware vSphere6.0 or later (vDGA) Red Hat Enterprise Linux (RHEL) 6.5 or later (64-bit only)
NVIDIA Tesla M6 graphics adapter	**Memory size**	8GB
	Memory type	GDDR-5
	Memory interface	256-bit
	Card type	MXM-v.3.0
	I/O interface	PCIe (x16) Gen3
	Max power consumption	100W
	API	DirectX 12, Shader Model 5.0; OpenGL4.5, CUDA, DirectCompute, OpenCL
	Operating Systems	Microsoft® Windows Server 2012 R2 (64-bit) Standard, Enterprise and DataCenter editions (Citrix XenApp) Citrix XenServer 6.5 or later (Pass-Through GPU) VMware vSphere5.5 or later (vDGA)
NVIDIA Quadro P6000 graphics adapter	**Memory size**	24GB
	Memory type	GDDR-5
	Memory interface	256-bit
	I/O interface	PCIe (x16) Gen3
	Max power consumption	250W
	API	DirectX 12, Shader Model 5.0; OpenGL4.5, CUDA, DirectCompute, OpenCL

Technical Specifications

	Operating Systems	Microsoft ® Windows 7® SP1 Pro (64-bit), Enterprise (64-bit) Microsoft ® Windows 8.1® Pro (64-bit), Enterprise (64-bit) Microsoft® Windows 10 Enterprise (64-bit) Citrix XenServer 6.5 or later (Pass-Through GPU) VMware vSphere5.5 or later (vDGA) Red Hat Enterprise Linux (RHEL) 6.5 or later (64-bit only)
NVIDIA Tesal M60 GPU adapter	**Number of GPU**	2 High-end Kepler GPUs
	Memory size	8.0 GB per GPU (16GB total)
	Memory type	GDDR-5
	I/O interface	PCIe (x16) Gen 3 (Gen 2 compatible)
	Max power consumption	100W
	API	DirectX 11, Shader Model 5.0; OpenGL4.3 (Varies by virtualization mode) GRID virtual GPU support (XenServer only)
	Operating Systems	Microsoft ® Windows 7® SP1 Pro (64-bit), Enterprise (64-bit) Microsoft ® Windows 8.1® Pro (64-bit), Enterprise (64-bit) Microsoft® Windows Server 2012 R2 (64-bit) Standard, Enterprise and DataCenter editions (Hyper-V RemoteFX, XenApp) Citrix XenServer 6.5 or later (Pass-Through GPU, vGPU) VMware vSphere5.5 or later (vDGA, vSGA, vGPU)
Environment-friendly Products and Approach	**End-of-life Management and Recycling**	Hewlett Packard Enterprise offers end-of-life Hewlett Packard Enterprise 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
01-Oct-2018	Version 22	Changed	Configuration Information and Core Options sections were updated.
		Added	SKUs added in Core Options sections: P06584-B21, P06586-B21, P06588-B21, P06590-B21, P07922-B21, P07926-B21, P07930-B21, P04474-B21, P04476-B21, P04478-B21, P04480-B21, P04482-B21.
		Removed	Obsolete SKUs were deleted: 836737-B21
06/Aug-2018	Version 21	Changed	Configuration Information - Factory Integrated Models, Core Options, Additional Options, and Memory sections were updated.
		Added	SKU added: 726793-B21
		Removed	Obsolete SKUs were removed: 761871-B21, 761878-B21, 819846-L21, 819837-L21, 726987-L21, 726988-L21, 726989-L21, 726990-L21, 726991-L21, 726992-L21, 726993-L21, 726994-L21, 726995-L21, 726996-L21, 726997-L21, 726999-L21, 727000-L21, 727001-L21, 727002-L21, 727003-L21, 765268-L21, 767049-L21, 773123-L21, 773124-L21, 779795-L21, 845803-B21, 872629-B21, 730874-B21, 845804-B21, 819846-B21, 819837-B21, 819843-B21, 726987-B21, 726988-B21, 726989-B21, 726990-B21, 726991-B21, 726992-B21, 726993-B21, 726994-B21, 726995-B21, 726996-B21, 726997-B21, 726999-B21, 727000-B21, 727001-B21, 727002-B21, 727003-B21, 765268-B21, 767049-B21, 773123-B21, 773124-B21, 779795-B21, M9R60A.
04-Jun-2018	Version 20	Changed	Core Options section was updated.
		Added	SKUs added: P04556-B21, P04560-B21, P04564-B21, P04566-B21, P04570-B21.
		Removed	Obsolete SKUs were deleted: 700066-B21, 700764-B21, 766491-B21, 684214-B21, 726722-B21, 765453-B21.
07-May-2018	Version 19	Changed	Configuration Information - Factory Integrated Models section was updated.
02-Apr-2018	Version 18	Changed	Optional Features, Core Options, Additional Options, and Memory sections were updated.
		Added	SKU added in QuickSpecs: Q0V76A.
		Removed	Obsolete SKUs were deleted: 845803-B21, 730874-B21, 752426-B21, 752427-B21, 759934-B21, 726720-B21, 764282-B21, 652605-B21, 791034-B21, 781518-B21, 785069-B21, 781516-B21, 785067-B21, 804631-B21, 832414-B21, 804587-B21, 748387-B21, 759208-B21, 759210-B21, 759212-B21.
06-Nov-2017	Version 17	Changed	QuickSpecs was updated.
		Removed	Obsolete SKUs were deleted: 785918-B21, 734206-B21, 764908-B21, 764906-B21, 764904-B21, 765044-B21, 765038-B21, 765036-B21, 765034-B21, 764892-B21, 736939-B21, 736936-B21, 802891-B21, 802586-B21, 802578-B21, 802891-B21, 816576-B21, 822567-B21, 822555-B21, 804605-B21, 804593-B21, 804575-B21, 764927-B21, 779176-B21, 779164-B21, 779168-B21, 779172-B21, 762261-B21, 734206-B21.
25-Sep-2017	Version 16	Changed	QuickSpecs was updated.
14-Aug-2017	Version 15	Added	SKUs added: 875470-B21, 875474-B21, 875478-B21, 875483-B21, 870144-B21, 875311-B21, 875313-B21, 875326-B21, 875330-B21, 875503-B21, 875509-B21, 875511-B21, 875513-B21.
		Removed	Obsolete SKUs were deleted: 775588-B21, 846430-B21, 846432-B21, 846436-B21, 792278-B21, 846497-B21, 846495-B21, 846434-B21.
12-Jun-2017	Version 14	Added	New SKUs added in Core Options sections:
		Removed	Obsolete SKUs were deleted: C6N28ABE, C6N36ABE, 810907-B21, 652572-B21, 652745-B21, 804599-B21, 804581-B21, 838404-B21, 838406-B21, 838408-B21, 838410-B21, 838412-B21, 785233-B21, 802582-B21,

Summary of Changes

			804677-B21, 804671-B21, 804665-B21, 804639-B21, 804625-B21, 804613-B21, 762263-B21.
27-Mar-2017	Version 13	Changed	Overview, Standard Features, Optional Features, Configuration Information - Factory Integrated Models,and Technical Specifications sections were updated.
		Removed	Obsolete SKUs were deleted: 730876-B21, J0G92A, 718162-B21, 652583-B21, 652564-B21, 652611-B21, 816909-B21, 817011-B21, 816995-B21, 816985-B21, 764923-B21, 764925-B21, 764929-B21.
13-Feb-2016	Version 12	Changed	Overview, Standard Features, Optional Features, and Technical Specifications sections were updated.
		Added	SKU added: 872629-B21, 867583-B21.
		Removed	Obsolete SKUs deleted from Configuration Information - Factory Integrated Models, Core Options, and Additional Options sections: 729851-B21, 789145-B21, 717965-B21, 757339-B21, 739898-B21, 717971-B21, 691868-B21, 691866-B21, 691862-B21, 730876-B21, 729851-B21, 854845-B21, 652749-B21, 786051-B21.
28-Nov-2016	Version 11	Changed	Standard Features, Optional Features, Configuration Information - Factory Integrated Models, Core Options, and Technical Specifications sections were updated. Note deleted from entire document: Use of GPU options is limited to a 30C operating environment when using NVMe on the WS460c Gen9.
		Added	Added the M3000SE
		Removed	Obsolete SKUs were deleted: 655708-B21. Turn off SKUs were deleted: 816562-B21, 816568-B21, 816572-B21, 816879-B21, 816883-B21, 816889-B21, 816893-B21, 816899-B21, 816903-B21, 816913-B21, 816919-B21, 816923-B21, 816965-B21, 816969-B21, 816975-B21, 816979-B21, 817015-B21, 822559-B21, 822563-B21.
07-Oct-2016	Version 10	Removed	Obsolete SKUs were deleted: 734360-B21, 717973-B21, 739888-B21, 717969-B21, 756657-B21, 756636-B21, BD883A, 655708-B21, 652745-B21, 789145-B21, 734360-B21, 717973-B21, 739898-B21, 717971-B21, 739888-B21, 717969-B21, 691868-B21, 691866-B21, 691862-B21, 756657-B21, 756636-B21, BD883A.
06-Jun-2016	Version 9	Changed	Overview, Optional Features, Configuration Information - Factory Integrated Models, and Technical Specifications sections were updated.
		Added	SKUs added in Configuration Information - Factory Integrated Models and in Additional Options Sections: 854845-B21, 845804-B21.
		Removed	Obsolete SKUs were deleted: 756601-B21, 691864-B21, 756621-B21.
31-Mar-2016	Version 8	Changed	Overview, Standard Features, Optional Features, Reccomended Support Services for WS460, Confirguration Information - Factory Integrated Models,Core Options, Additional Options, Memory, and Technical Specifications sections were updated.
		Added	SKUs added to QuickSpecs:836737-B21, 836738-B21, 819852-L21, 819851-L21, 819842-L21, 819841-L21, 819840-L21, 819849-L21, 819839-L21, 819845-L21, 819846-L21, 819844-L21, 819838-L21, 819837-L21, 819856-L21, 819855-L21, 819854-L21, 819857-L21, 819853-L21, 819850-L21, 819848-L21, 819847-L21, 805347-B21, 805349-B21. 836220-B21, 805351-B21, 805353-B21. 805358-B21, 845803-B21, 825555-B21, 819852-B21, 819851-B21, 819842-B21, 819841-B21, 819840-B21, 819849-B21, 819839-B21, 819845-B21, 819846-B21. 819844-B21, 819838-B21, 819837-B21, 819843-B21, 819856-B21, 819855-B21, 819854-B21, 819857-B21, 819853-B21, 819850-B21, 819848-B21, 819847-B21, 775588-B21, 785233-B21, 846497-B21, 846495-B21, 764908-B21, 764906-B21, 764904-B21, 765044-B21, 765038-B21, 765036-B21, 765034-B21, 764892-B21, 736939-B21, 736936-B21, 802891-B21, 846430-B21, 846432-B21, 846434-B21, 846436-B21, 816879-B21, 838404-B21, 838406-B21, 838408-B21, 838410-B21, 838412-B21.

Summary of Changes

		Removed	Obsolete SKUs were deleted: 730870-B21, 730872-B21, 775588-B21, 785233-B21, 846497-B21, 846495-B21.
16-Feb-2016	Version 7	Changed	Information was updated in different sections.
		Added	SKU added in Core Options section: 832514-B21, 846497-B21, 846495-B21.
		Removed	Obsolete SKU was deleted: 789135-B21
11-Dec-2015	Version 6	Changed	Configuration Information - Factory Integrated Models, Core Options, Additional Options, and Memory sections were updated
		Added	SKUs added: 816576-B21, 816572-B21, 816568-B21, 816562-B21, 822567-B21, 822563-B21, 822559-B21, 822555-B21, 804677-B21, 804671-B21, 804665-B21, 804639-B21, 804631-B21, 804625-B21, 832414-B21, 804613-B21, 804605-B21, 804599-B21, 804593-B21, 804587-B21, 804581-B21, 804575-B21, 816929-B21, 816919-B21, 816909-B21, 816899-B21, 816889-B21, 816879-B21, 817011-B21, 816995-B21, 816985-B21, 816975-B21, 816965-B21, J0X21A.
		Removed	Obsolete SKU deleted: 789155-B21, E5Y38A, E5Y39AAE, D8S85AAE, D8S84A
28-Sep-2015	Version 5	Changed	Overview, Optional Features, Core Options, Configuration Information, and Technical Specifications sections were updated.
		Added	SKUs added: 805132-B21, 785918-B21, M9R60A, J0G92A, P8B24A, P8B26AAE, P8B31A
		Removed	Obsolete SKUs were deleted: F6Q89AAE, 741155-B21
01-Jun-2015	Version 4	Changed	Information in Configuration Information- Factory Integrated models sections was updated.
		Added	SKUs added to Hard Drives: 748387-B21, 728629-B21, 726724-B21, 791034-B21, 781518-B21, 785069-B21, 781516-B21, 785067-B21, 802891-B21, 802586-B21, 802582-B21, 802578-B21, 765466-B21, 765464-B21, 765455-B21, 765453-B21, 789155-B21, 789145-B21, 789135-B21
		Removed	Obsolete SKUs removed: 741142-B21, 741138-B21
06-Apr-2015	Version 3	Changed	Standard Features section was updated
		Removed	SKU deleted: 718935-B21
03-Apr-2015	Version 2	Added	SKUs added on carepack section: U8BF0E, U8BF1E, U8BF3E, U8BF4E, UR362E
30-Mar-2015	Version 1	Created	New QuickSpecs

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