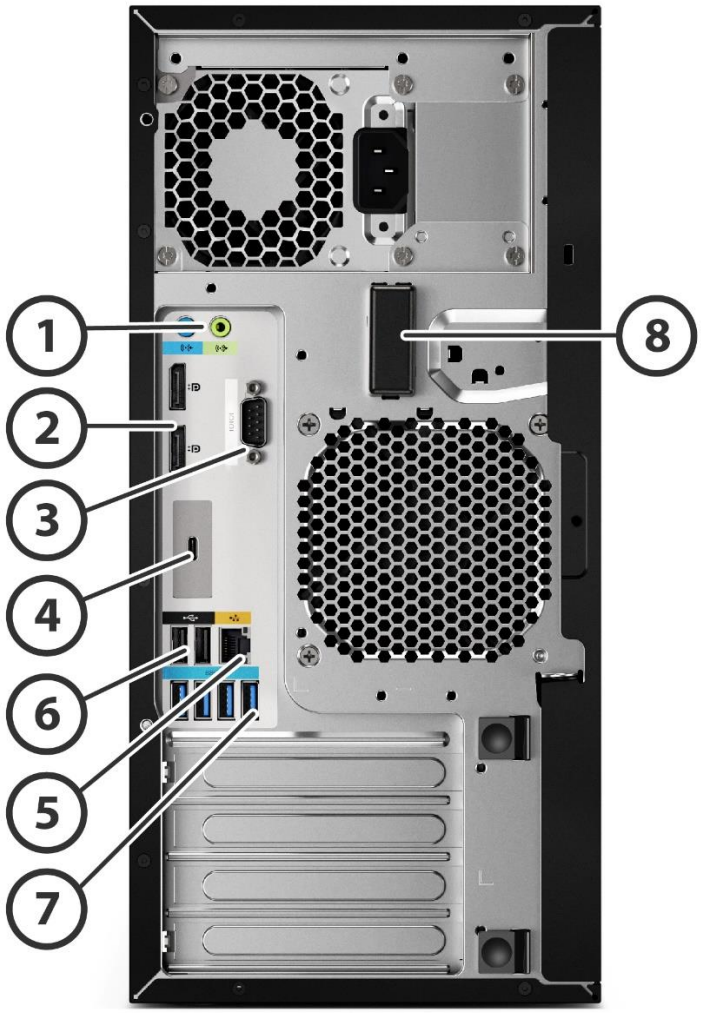
Overview

HP Z2 Tower G4 Workstation

1. Power Button
2. Headphone/Microphone
3. 1 USB 3.0 port
4. 1 USB 3.0 Battery Charging Port
5. (Optional) 1 USB 3.1 Gen2 Type-C™ Battery Charging Port
6. Optional SD Card Reader
7. External 5.25” bay

Overview



1. 1 Audio Line In, 1 Audio Line Out,
2. 2 DisplayPort™ (DP 1.2) output from Intel® UHD graphics (available on selected processors only)
3. Optional Serial Port
4. 1 flex IO module for 2nd LAN/VGA/HDMI/DP/ USB-C 3.1 Gen2 Charging Port with Alt mode /Thunderbolt™ 3.0 (Thunderbolt™ requires x4 PCIe Add in card)
5. RJ-45 to integrated GBe
6. 2 USB 2.0
7. 4 USB 3.0
8. Optional WLAN/BT Antenna

Overview

Form Factor Minitower

Operating Systems

Preinstalled:

- Windows 10 Home 64*
- Windows 10 Pro 64*
- Windows 10 Pro (National Academic License)*
- Windows 10 Pro for Workstations – HP recommends Windows 10 Pro *
- HP Linux®-ready

Supported:

- Red Hat® Enterprise Linux® Workstation (1 year paper license available; Preinstall not available)

* Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. Windows 10 is automatically updated, which is always enabled. ISP fees may apply and additional requirements may apply over time for updates. See http://www.microsoft.com.

NOTE: For detailed OS/hardware support information for Linux, see: http://www.hp.com/support/linux_hardware_matrix

Processors

Name	Cores	Clock Speed (GHz)	Intel® Turbo Boost Technology[3]	Cache (MB)	Memory Speed (MT/s)	Hyper-Threading	Integrated Graphics	Featuring Intel® vPro™ Technology[4]	16GB Intel® Optane™ memory[2,]	TDP (W)
Intel® Xeon® processor E-2286G[1]	6	4.0	4.9	12	2666	Y	Intel® UHD Graphics P630	Y	N	80W
Intel® Xeon® processor E-2278G[1]	8	3.4	5.0	16	2666	Y	Intel® UHD Graphics P630	Y	N	80W
Intel® Xeon® processor E-2276G[1]	6	3.8	4.9	12	2666	Y	Intel® UHD Graphics P630	Y	N	80W
Intel® Xeon® processor E-2274G[1]	4	4.0	4.9	8	2666	Y	Intel® UHD Graphics P630	Y	N	80W
Intel® Xeon® processor E-2244G[1]	4	3.8	4.8	8	2666	Y	Intel® UHD Graphics P630	Y	N	80W
Intel® Xeon® processor E-2236[1]	6	3.4	4.8	12	2666	Y	N/A	Y	N	80W
Intel® Xeon® processor E-2226G[1]	6	3.4	4.7	12	2666	Y	Intel® UHD Graphics P630	Y	N	80W
Intel® Xeon® processor E-2224G[1]	4	3.4	4.6	8	2666	Y	Intel® UHD Graphics P630	Y	N	80W
Intel® Xeon® processor E-2176G[1]	6	3.7	4.7	12	2666	Y	Intel® UHD Graphics P630	Y	N	80W
Intel® Xeon® processor E-2174G[1]	4	3.8	4.7	8	2666	Y	Intel® UHD Graphics P630	Y	N	71W
Intel® Xeon® processor E-2144G[1]	4	3.6	4.5	8	2666	Y	Intel® UHD Graphics P630	Y	N	71W
Intel® Xeon® processor E-2136[1]	6	3.3	4.5	12	2666	Y	N/A	Y	N	80W

Overview

Intel® Xeon® processor E-2126G[1]	6	3.3	4.5	12	2666	N	Intel® UHD Graphics P630	Y	N	80W
Intel® Xeon® processor E-2124G[1]	4	3.4	4.3	8	2666	N	Intel® UHD Graphics P630	Y	N	71W
Intel® Xeon® processor E-2104G[1]	4	3.2	N/A	8	2666	N	Intel® UHD Graphics P630	Y	N	65W
Intel® Core™ i9-9900K processor[1,2]	8	3.6	5.0	16	2666	Y	Intel® UHD Graphics 630	Y	Y	95W
Intel® Core™ i9-9900 processor[1,2]	8	3.1	5.0	16	2666	Y	Intel® UHD Graphics 630	Y	Y	95W
Intel® Core™ i7-9700K processor[1,2]	8	3.6	4.9	12	2666	Y	Intel® UHD Graphics 630	Y	Y	95W
Intel® Core™ i7-9700 processor[1,2]	8	3.0	4.7	12	2666	Y	Intel® UHD Graphics 630	Y	Y	95W
Intel® Core™ i5-9600 processor[1,2]	6	3.1	4.6	9	2666	Y	Intel® UHD Graphics 630	Y	Y	95W
Intel® Core™ i5-9500 processor[1,2]	6	3.0	4.4	9	2666	Y	Intel® UHD Graphics 630	Y	Y	95W
Intel® Core™ i3-9100 processor[1]	4	3.6	4.2	8	2666	Y	Intel® UHD Graphics 630	Y	N	95W
Intel® Core™ i7-8700K processor[1,2]	6	3.7	4.7	12	2666	Y	Intel® UHD Graphics 630	Y	Y	95W
Intel® Core™ i7-8700 processor[1,2]	6	3.2	4.6	12	2666	Y	Intel® UHD Graphics 630	Y	Y	65W
Intel® Core™ i5-8600 processor[1,2]	6	3.1	4.2	9	2666	N	Intel® UHD Graphics 630	Y	Y	65W
Intel® Core™ i5-8500 processor[1,2]	6	3.0	4.0	9	2666	N	Intel® UHD Graphics 630	Y	Y	65W
Intel® Core™ i3-8100 processor[1]	4	3.6	N/A	6	2400	N	Intel® UHD Graphics 630	N	N	65W
Intel® Pentium™ G5400 processor[1]	2	3.7	N/A	4	2400	Y	Intel® UHD Graphics 610	N	N	54W

[1]Multicore is designed to improve performance of certain software products. Not all customers or software applications will necessarily benefit from use of this technology. Performance and clock frequency will vary depending on application workload and your hardware and software configurations. Intel's numbering, branding and/or naming is not a measurement of higher performance.

[2]Intel® Optane™ memory system acceleration does not replace or increase the DRAM in your system.

[3]The specifications shown in the Intel® Turbo Boost Technology column represent the maximum turbo frequency with one core active. Turbo boost stepping occurs in 100MHz increments. Processors that do not have turbo functionality are denoted as N/A. Intel® Turbo Boost performance varies depending on hardware, software and overall system configuration. See http://www.intel.com/technology/turboboost for more information.

[4]vPro. Some functionality of this technology, such as Intel® Active management technology and Intel® Virtualization technology, requires additional 3rd party software in order to run. Availability of future "virtual appliances" applications for Intel vPro technology is dependent on third-party software providers. Compatibility of this generation of Intel vPro technology-based hardware with future "virtual appliances" is yet to be determined.

Overview

NOTES	Integrated Intel® UHD graphics P630 is supported on the select Intel® Xeon E processors. Intel® Xeon® E, Intel® Core™ i3 and Intel® Pentium processors can support either ECC or non-ECC memory; Intel® Core i5/i7 processors only support non-ECC memory. Processor numbers differentiate features within each processor family, not across different processor families. See: http://www.intel.com/products/processor_number/ for details. **NOTE:** In accordance with Microsoft's support policy, HP does not support the Windows 8 or Windows 7 operating system on products configured with Intel and AMD 7th generation and forward processors or provide any Windows 8 or Windows 7 drivers on http://www.support.hp.com.
Color	Black
Expansion Slots (see system board section for more details)	1 PCIe Gen3 x16 slot 1 PCIe Gen3 x4 slot /x16 connector 1 PCIe Gen3 x1 slot/x4 connector 1 PCIe Gen3 x1 slot/x4 connector 2 M.2 storage (PCIe Gen3 x4)* 1 M.2 Wlan (PCIe Gen3 x1+ intel CNVI)* **NOTE:** The PCIe Gen 3 x16 slot is meant for HP qualified cards, configured or after market. HP does not provide warranty support for 3rd party cards. * M.2 storage supports compatible devices up to 110mm
Expansion Bays (see storage section for more details)	2 external Half Height 5.25" Bays 2 internal 3.5" Drive Bays
Front I/O	1 USB 3.0, 1 USB 3.0 Charging Data Port, 1 Headphone/Microphone. 1 USB3.1 Gen2 Type-C Charging Data Port (Optional), 1 SD Card Reader (Optional).
Internal I/O	1 USB 3.0 and 2 USB 2.0 ports available as 2 separate 2x6 (3.0 x1, 2.0 x1) and 1x6 (2.0 x1) header: supports one HP Internal USB 2.0 Port Kit and one USB 3.0 Media Card Reader.
Rear I/O	2 DisplayPort™ (DP 1.2) outputs from Intel® UHD Graphics (available on specific processors only); 4 USB 3.0 ports, 2 USB 2.0 ports, 1 serial port (optional), 1 parallel port (optional), 2 PS/2 (optional), RJ-45 (LOM), 1 Flex IO port (3rd DisplayPort™/HDMI/VGA/2nd 1GbE LAN/ USB-C 3.1 Gen2 Charging Port with Alt mode/Thunderbolt™ 3.0-Thunderbolt™ 3.0 PCIe card utilizes Flex IO option) , (1 Audio Line-in, and 1 Audio Line-out.
Interfaces Supported	SD Media Card Reader (optional) USB-C 3.1 Gen2 Charging Port (optional)
Chassis Dimensions (H x W x D)	Standard minitower orientation: 356 mm x 169 mm x 435 mm (14.0 x 6.7 x 17.1 in)
Weight	Exact weights depend upon configuration: Minimum: 7.0 kg (15.43 lb) Typical*: 8.2 kg (18.03 lb) Maximum: 11.4 kg (25.18 lb) Supported Weight (desktop orientation): 35 kg (77 lb) Packaging (H x W x D): 599 x499 x 295 mm(23.58 x 19.65 x 11.6 in)

Overview

	Shipping Weight: 11.47 kg(25.26 lb) * Typical weight when configured with 1 3.5" hard drives, 1 optical drive, 2 DIMMs and 1 NVIDIA® Quadro® P1000 graphics card
Power Supply	650W wide-ranging, active Power Factor Correction, 90% Efficiency. 500W wide-ranging, active Power Factor Correction, 90% Efficiency. 250W wide-ranging, active Power Factor Correction, 92% Efficiency. **NOTE:** The Power Supply Efficiency Report for the 650W 90% Efficiency, 500W 90% Efficiency and 250W 92% Efficiency Power Supply may be found at the following links: 650W PSU: https://www.plugloadsolutions.com/80PlusPowerSuppliesDetail.aspx?id=0&type=2 500W PSU: https://www.plugloadsolutions.com/80PlusPowerSuppliesDetail.aspx?id=0&type=2 250W PSU: https://www.plugloadsolutions.com/80PlusPowerSuppliesDetail.aspx?id=0&type=2
Backup Devices	For a complete listing of compatible DAT tape drives, LTO tape drives and RDX Removable Disk Backup System offerings, please visit http://www.hp.com/go/connect
Chipset	Intel® C246 chipset
Memory	4 DIMM slots, supporting up to 128GB ECC/non-ECC, DDR4 2666 MT/s speed depending on the CPU selection.

Supported Components

Processors	Factory Configured	Option Kit
Intel® Xeon® processor E-2100 family[2]		
Intel® Xeon® processor E-2286G	Y	N
Intel® Xeon® processor E-2278G	Y	N
Intel® Xeon® processor E-2276G	Y	N
Intel® Xeon® processor E-2274G	Y	N
Intel® Xeon® processor E-2244G	Y	N
Intel® Xeon® processor E-2236	Y	N
Intel® Xeon® processor E-2226G	Y	N
Intel® Xeon® processor E-2224G	Y	N
Intel® Xeon® processor E-2176G	Y	N
Intel® Xeon® processor E-2174G	Y	N
Intel® Xeon® processor E-2144G	Y	N
Intel® Xeon® processor E-2136	Y	N
Intel® Xeon® processor E-2126G	Y	N
Intel® Xeon® processor E-2124G	Y	N
Intel® Xeon® processor E-2104G	Y	N
9th generation Intel® Core™ processor family		
Intel® Core™ i9-9900K 3.6 2666 8C CPU	Y	N
Intel® Core™ i9-9900 3.1 2666 8C CPU	Y	N
Intel® Core™ i7-9700K 3.6 2666 8C CPU	Y	N
Intel® Core™ i7-9700 3.0 2666 8C CPU	Y	N
Intel® Core™ i5-9600 3.1 2666 6C CPU	Y	N
Intel® Core™ i5-9500 3.0 2666 6C CPU	Y	N
Intel® Core™ i3-9100 3.6 2666 4C CPU	Y	N
8th generation Intel® Core™ processor family[3]		
Intel® Core™ i7-8700K 3.7 2666 6C CPU	Y	N
Intel® Core™ i7-8700 3.2 26666 6C CPU	Y	N
Intel® Core™ i5-8600 3.1 2666 6C CPU	Y	N
Intel® Core™ i5-8500 3.0 2666 6C CPU	Y	N
8th generation Intel® Core™ i3/Pentium processor family[2]		
Intel® Core™ i3-8100 3.6 2400 4C CPU	Y	N
Intel® Pentium® G5400 3.7 2400 2C CPU	Y	N

NOTE 1: Intel® Integrated P630 Graphics for select Xeon E processors supports workstation-specific graphics drivers for improved compatibility and performance on select professional applications, compared to Intel® UHD Graphics 630.
NOTE 2: These processors support either ECC or non-ECC memory
NOTE 3: These processors support only non-ECC memory
NOTE 4: Intel® Optane™ memory system acceleration does not replace or increase the DRAM in your system.

Monitors / Displays	Factory Configured	Option Kit	Option Kit Part Number

Supported Components

	HP Z Display Z27n G2 27-inch IPS LED Backlit Monitor	**Y**	1JS10AA
	HP Z Display Z24n G2 24-inch IPS LED Backlit Monitor	**Y**	1JS09AA
	HP Z Display Z24nf G2 23.8-inch IPS Backlit Monitor	**Y**	1JS07AA
	HP Z Display Z23n G2 23-inch IPS LED Backlit Monitor	**Y**	1JS06AA
	HP Z Display Z22n G2 21.5-inch IPS LED Backlit Monitor	**Y**	1JS05AA
	Supported by all Operating Systems available from HP Screen Size Diagonally Measured		

SATA Hard Drives		**Factory Configured**	**Option Kit**	**Option Kit Part Number**
	500GB SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	LQ036AA
	1TB SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	LQ037AA
	2TB SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	QB576AA
	4TB SATA 7200 rpm 6Gb/s 3.5” HDD	Y	Y	K4T76AA
	6TB SATA 7200 rpm 6Gb/s 3.5” HDD	Y	Y	3DH90AA
	500GB SATA 7.2K SED SFF HDD	Y	N	(N/A as AMO)
	1TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	Y	Y	W0R10AA
SATA Solid State Drives	HP 256GB SATA 6Gb/s SSD	Y	Y	A3D26AA
	HP 512GB SATA 6Gb/s SSD	Y	Y	D8F30AA
	HP 1TB SATA 6Gb/s SSD	Y	Y	F3C96AA
	HP 2TB SATA 6Gb/s SSD	Y	Y	Y6P08AA
	HP 256GB SATA 6Gb/s SED Opal 2 SSD	Y	Y	G7U67AA
	HP Enterprise Class 240GB SATA SSD	Y	Y	T3U07AA
	HP Enterprise Class 480GB SATA SSD	Y	Y	T3U08AA
	Storage Acceleration			
	16GB Intel® Optane™ memory*	Y	Y	2EB68AA

*Intel® Optane™ memory (cache) is sold separately. Intel® Optane™ memory system acceleration does not replace or increase the DRAM in your system. Available for HP commercial desktops and notebooks and for select HP workstations (HP Z2 Tower/SFF/Mini G4, ZBook Studio, 15 and 17 G5) and requires a SATA HDD, 7th Gen or higher Intel® Core™ processor or Intel® Xeon® processor E3-1200 V6 product family or higher, BIOS version with Intel® Optane™ supported, Windows 10 version 1703 or higher, M.2 type 2280-S1-B-M connector on a PCH Remapped PCIe Controller and Lanes in a x2 or x4 configuration with B-M keys that meet NVMe™ Spec 1.1, and an Intel® Rapid Storage Technology (Intel® RST) 16.5 driver.

PCIe SSDs	**PCIe SSDs for HP Workstations**			
	HP Z Turbo Drv G2 1TB TLC PCIe SSD **	Y	Y	6EU84AA/AT
	HP Z Turbo Drv G2 2TB TLC PCIe SSD **	Y	Y	3KP45AA
	HP Z Turbo Drv G2 256GB TLC PCIe SSD **	Y	Y	6EU82AA/AT
	HP Z Turbo Drv G2 512GB TLC PCIe SSD **	Y	Y	6EU83AA/AY
	HP Z Turbo Drv G2 256GB SED TLC PCIe SSD **	Y	Y	TBD
	HP Z Turbo Drv G2 512GB SED TLC PCIe SSD **	Y	Y	TBD
	Intel® 905p Series SSD (Opatane SSD)			
	Intel® Optane SSD 905p 280GB AiC*	Y	Y	2SC47AA

Supported Components

Intel® Optane SSD 905p 480GB AiC*	Y	Y	2SC48AA

* PCIe card installed in standard PCIe x4 slot
** Installed in native M.2 storage slot Z2 G4

NOTE: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36GB (for Windows 10) of system disk is reserved for system recovery software.

NOTE: The HP Z2 Tower G4 Workstation is capable of configuring up to 2 Z Turbo Drives. By default, the Z Turbo Drive configured will be installed in the M.2 storage slot on the system's motherboard.

Hard Drive Controllers

	Factory Configured	Option Kit
Integrated SATA Controller (Z2 G4)		
Integrated SATA Controller, RAID 0,1 supported: 4x 6 Gb/s ports	Y	N
Factory integrated RAID on motherboard for SATA drives		
RAID 0 Data Configuration	Y	N
RAID 1 Data Configuration	Y	N
Factory integrated RAID on motherboard for Z Turbo Drive		
RAID 0 Boot or Data Configuration	Y	N
RAID 1 Boot or Data Configuration	Y	N

NOTE: SATA hardware RAID is not supported on Linux® systems. The Linux® kernel, with built-in software RAID, provides excellent functionality and performance. It is a good alternative to hardware-based RAID. All drives must be identical in type and capacity. Boot volume/RAID array must be less than 2 TB
NOTE 1: Requires identical drives (speeds, capacity, and interface).

Graphics

	Factory Configured	Option Kit	Option Kit Part Number	Supported # of cards
Integrated Intel® UHD Graphics Media Accelerators (Z2 G4)				
Intel® UHD Graphics P630	Y	N		1
Intel® UHD Graphics 630	Y	N		1
Intel® UHD Graphics 610	Y	N		1
Graphics Cable Adapters				
HP DisplayPort™ to Dual Link DVI Adapter	N	Y	NR078AA	1
HP DisplayPort™ To DVI-D Adapter (4-Pack)	N	N		1
HP DisplayPort™ To DVI-D Adapter (2-Pack)	Y	N		1
HP DisplayPort™ To DVI-D Adapter	Y	Y	FH973AA	1
HP DisplayPort™ To VGA Adapter	N	Y	AS615AA	1

Supported Components

HP Display to HDMI Adapter	N	Y		
HP miniDP to DP Adapter	N	Y		
HP USB-C to VGA Adapter	N	Y		
HP USB-C to HDMI Adapter	N	Y		
HP USB-C to DP Adapter	N	Y		
Entry 3D				
AMD Radeon™ Pro WX 3100 4GB Graphics	Y	Y	2TF08AA	2
NVIDIA® Quadro® P400 2GB Graphics	Y	Y	1ME43AA	2
NVIDIA® Quadro® P620 2GB Graphics	Y	Y	3ME25AA	1
Mid-range 3D				
AMD Radeon™ Pro WX 4100 4GB Graphics	N	Y	Z0B15AA	1
NVIDIA® Quadro® P1000 4GB Graphics	Y	Y	1ME01AA	2
NVIDIA® Quadro® P2000 5GB Graphics	Y	Y	1ME41AA	1
High End 3D				
AMD Radeon™ Pro WX 7100 8GB Graphics*	Y	Y	Z0B14AA	1
NVIDIA® Quadro® P4000 8GB Graphics*	Y	Y	1ME40AA	1
NVIDIA® Quadro® P5000 16GB Graphics*	Y	Y	1ME40AA	1
NVIDIA® Quadro® RTX 4000 8GB Graphics*	Y	Y	5JV89AA	1
NVIDIA® Quadro® RTX 5000 16GB Graphics*	Y	Y	5JH81AA	1
NVIDIA® Quadro® RTX6000 24GB Graphics**	Y	Y	5JH80AA	1

* Requires 500W PSU. Not supported with 250W PSU.
**Requires 650W. Not supported with 250W or 500W PSU

NOTE 1: Intermixing integrated Intel® UHD graphics and discrete graphics cards in order to drive more than three displays can be enabled using the Computer (F10) Setup Utility. However, HP recommends using only discrete graphics when four or more displays are required to be supported.

Memory

DDR4-2666 ECC Unbuffered DIMMs - CTO

8GB DDR4-2666 ECC (1x8GB) RAM

16GB DDR4-2666 ECC (2x8GB) RAM

32GB DDR4-2666 ECC (4x8GB) RAM

Supported Components

32GB DDR4-2666 ECC (2x16GB) RAM
64GB DDR4-2666 ECC (4x16GB) RAM
64GB DDR4-2666 ECC (2x32GB) RAM
128GB DDR4-2666 ECC (4x32GB) RAM

DDR4-2666 non-ECC Unbuffered DIMMs – CTO

4GB DDR4-2666 nECC (1x4GB) RAM
8GB DDR4-2666 nECC (2x4GB) RAM
8GB DDR4-2666 nECC (1x8GB) RAM
16GB DDR4-2666 nECC (2x8GB) RAM
32GB DDR4-2666 nECC (2x16GB) RAM
32GB DDR4-2666 nECC (4x8GB) RAM
64GB DDR4-2666 nECC (4x16GB) RAM
64GB DDR4-2666 nECC (2x32GB) RAM
128GB DDR4-2666 nECC (4x32GB) RAM

NOTES:

Intel® Xeon E, Intel® Core™ i3 and Intel® Pentium processors can support either ECC or non-ECC memory; Intel® Core™ i5/i7 processors only support non-ECC memory.

Two channels of DDR4 memory are supported. To realize full performance at least one DIMM must be inserted into each channel.

Max transfer rates up to 2666 MT/s

AMO	Option Kit Part Number
DDR4-2666 ECC Unbuffered DIMMs – AMO	
HP 8GB (1x8GB) DDR4-2666 ECC Unbuffered RAM	3TQ39AA
HP 16GB (1x16GB) DDR4-2666 ECC Unbuffered RAM	3TQ40AA
HP 32GB (1x32GB) DDR4-2666 ECC Unbuffered RAM	6FR92AA
DDR4-2666 non-ECC Unbuffered DIMMs – AMO	
HP 4GB (1x4GB) DDR4-2666 nECC Unbuffered RAM	3TQ31AA
HP 8GB (1x8GB) DDR4-2666 nECC Unbuffered RAM	3PL81AA
16GB (1x16GB) DDR4-2666 nECC Unbuffered RAM	3PL82AA
HP 32GB (1x32GB) DDR4-2666 nECC Unbuffered RAM	6FR91AA

NOTE: Only unbuffered DDR4 DIMMs are supported.
The CPUs determine the speed at which the memory is clocked. If a 2400 MHz capable CPU is used in the system, the maximum speed the memory will run at is 2400 MHz regardless of the specified speed of the memory.

Multimedia and Audio Devices	Factory Configured	Option Kit	Option Kit Part Number
Integrated Conexant CX20632 5.1 HDA codec	Y	N	

Supported Components

Optical and Removable Storage	Factory Configured	Option Kit	Option Kit Part Number
HP 9.5mm Slim DVD Writer	Y	Y	K3R64AA
HP 9.5mm Slim DVD-ROM Drive	Y	Y	K3R63AA
HP 9.5mm Slim BDXL Blu-Ray Writer	Y	Y	K3R65AA
HP SD Media Card Reader	Y	N	N/A
HDD Frame/Carriers			
HP DX175 Removable HDD Carrier	N	Y	1ZX72AA
HP DX175 Removable HDD Frame/Carrier	N	Y	1ZX71AA

Actual speeds may vary. Does not permit copying of commercially available DVD movies or other copyright protected materials. Intended for creation and storage of your original material and other lawful uses. Double Layer discs can store more data than single layer discs. However, double-layer discs burned with this drive may not be compatible with many existing single-layer DVD drives and players. With Blu-ray, certain disc, digital connection, compatibility and/or performance issues may arise, and do not constitute defects in the product. Flawless playback on all systems is not guaranteed. In order for some Blu-ray titles to play, they may require a DVI or HDMI digital connection and your display may require HDCP support. HD-DVD movies cannot be played on this workstation.

Networking and Communications	Factory Configured	Option Kit	Option Kit Part Number
Integrated Intel® I219LM PCIe GbE Controller (Intel® vPro™ with Intel® AMT 12.0)	Y	N	
Intel® X710-DA2 2-Port 10GbE SFP+ NIC	Y	Y	1QL47AA
HP 10GbE SFP+ SR Transceiver	Y	Y	C3N53AA
Intel® X550-T2 2-Port 10GbE NIC	Y	Y	1QL46AA
Intel® 9560 802.11 a/b/g/n/ac with Bluetooth® 5 M.2	Y	N	
Intel® I350-T2 2-Port 1GbE(3) NIC	Y	Y	V4A91AA
Intel® I350-T4 4-Port 1GbE(3) NIC	N	Y	W8X25AA
Aquantia AQN-108 1-Port 5GbE NIC	Y	Y	1PM63AA

NOTE 1: The integrated network connection is required to support Intel® vPro™ Technology.
NOTE 2: If AMT is provisioned, then network teaming with the integrated LAN port is not possible.
NOTE 3: "Gigabit" Ethernet indicates compliance with IEEE standard 802.3ab for Gigabit Ethernet, and does not connote actual operating speed of 1 Gb/sec. For high speed transmission, connection to a Gigabit Ethernet server and network infrastructure is required.

Racking and Physical Security	Factory Configured	Option Kit	Option Kit Part Number
HP Z4/6 Depth Adjustable Fixed Rail Rack Kit	N	Y	2HW42AA
HP Solenoid Lock and Hood (TWR) Sensor	Y	Y	E0X96AA
HP Business PC Security Lock Kit	N	Y	PV606AA
HP UltraSlim Cable Lock Kit	N	Y	T1A62AA

Supported Components

Input Devices	Factory Configured	Option Kit	Option Kit Part Number
HP USB Optical Mouse	Y	Y	QY777AA
HP PS/2 Mouse	N	Y	QY775AA
HP USB Hardened Mouse	Y	Y	P1N77AA
HP USB Premium Mouse	Y	Y	
HP Premium Wireless Mouse	Y	Y	
3Dconnexion CADMouse	N	Y	M5C35AA
HP USB Business Slim CCID SmartCard Keyboard	Y	Y	
HP USB Business Slim Keyboard	Y	Y	N3R87AA
HP PS/2 Business Slim Keyboard	N	Y	
HP USB Premium Keyboard	Y	Y	Z9N40AA
HP Premium Wireless Keyboard	Y	Y	Z9N41AA
HP Wireless Business Slim Keyboard & Mouse	Y	Y	

Other Hardware	Factory Configured	Option Kit	Option Kit Part Number
HP Power Cord Kit	N	Y	DM293A
HP Workstation Mouse Pad (Japan only)	Y	N	
HP Serial Port Adapter	Y	Y	3TK82AA
HP Serial + PS/2 Adapter	Y	Y	1VD82AA
HP ENERGY STAR® Certified Configuration	Y	N	
HP eSATA PCI Cable Kit	Y	Y	FH966AA
HP Z2 Tower G4 Bezel w/ Dust Filter option	N	Y	4KY89AA
HP PCIe x1 Parallel Port Card	N	Y	N1M40AA
Z2 Tower G4 Dust Filter (filter only)	N	Y	3TQ24AA
HP Z2 G4 TWR Front Card Guide Kit	Y	Y	4KY82AA
HP Thunderbolt™ 3 PCIe x4 single port I/O Card (single port)	Y	Y	4CX35AA

Flex Module (Rear IO)	Factory Configured	Option Kit	
HP Flex IO module (VGA)	Y	Y	3TK80AA
HP Flex IO module (HDMI)	Y	Y	3TK74AA
HP Flex IO module (DP)	Y	Y	3TK72AA
HP Flex IO module (USB-C™)*	Y	Y	4KY84AA
HP Flex IO module (1 Gbe LAN)	Y	Y	3TQ26AA

*The DP alt mode will not function if the CPU does not support integrated graphics or if integrated graphics is disabled.

Software	Factory Configured	Option Kit	Support Notes
HP Performance Advisor	Y	N	Note 1
HP Velocity	Y	N	
HP Remote Graphics Software (RGS) 7.x	Y	N	
HP PC Hardware Diagnostics UEFI	Y	N	Note 2
HP Client Security Software	Y	N	

Supported Components

NOTE 1: Supports, and preinstalled with Windows 10 only. Also available as a free download from http://www.hp.com/go/performanceadvisor
NOTE 2: Windows OS only

Operating Systems

Windows 10 Home 64
Windows 10 Pro 64
Windows 10 Pro (National Academic License)
Windows 10 Pro for Workstations – HP recommends Windows 10 Pro
Red Hat® Enterprise Linux® (RHEL) Workstation – Paper License (1yr)

NOTE: For detailed OS/hardware support information for Linux, see:
http://www.hp.com/support/linux_hardware_matrix
http://www.microsoft.com/windows/windows-7/

Supported Components

HP BIOS

Key features of the HP BIOS include:

- Deployment and manageability – HP BIOS provides several technologies that help integrate the HP Z2 G4 Workstation into the enterprise, such as PXE, remote recovery, remote configuration, remote control, and BIOS (F10) Setup support for 14 languages.
- Network firmware updates – Update your BIOS via the cloud or standardize on a BIOS version hosted on an Enterprise network.
- Stability – HP BIOS supports the HP stable product roadmap by releasing only critical BIOS changes to the factory and advanced change notification.
- UEFI specification version 2.6
- Absolute Persistence agent – For tracking and tracing services, available in select countries, separate software and purchase of a subscription is required.
- Thermal and power management – The HP BIOS provides and enables thermal and power management technologies so component temperatures are managed for high reliability and to assist in operating the HP Workstation computer in any enterprise environment.
- Acoustic performance – Industry leading acoustic emissions across the range of operating conditions.
- Serviceability – HP BIOS provides diagnostic and detailed service information.
- Upgrades and recovery – HP BIOS provides numerous ways to upgrade HP Workstation computers, including BIOS updates from within Windows (HP Firmware Update and Recovery), HP Client Manager, and fail-safe recovery. In addition, the HP BIOS Configuration Utility enables replication of BIOS settings within Windows while the Replicated Setup feature provides the same capability within BIOS (F10) Setup. The BIOS Configuration Utility is available from the HP support website.
- HP BIOS uses PKI signing of the BIOS for trusted BIOS upgrades and recovery.

Additional HP BIOS Features:

- Power-On password – Helps prevent an unauthorized user from powering on the system.
- Administrator password – Also known as the BIOS Setup password, this helps prevent unauthorized changes to the system configuration. If the administrator password is not known, the BIOS cannot be updated and changes cannot be made to BIOS settings using BIOS Setup or under the OS.
- S4/S5 Maximum Power Savings setting supports EU Lot6 requirement and allows the computer to power down below 0.5W in S4/S5 (when turned off). When S4/S5 Maximum Power Savings feature is enabled below features are turned off:
  -Power to expansion connectors / slots
  -Wake events other than power buttons (such as wake on LAN)
  -USB charging ports

HP Sure Start Gen4 Start

- BIOS Integrity checking – Sure Start protection ensures that only trusted BIOS code is executed and not rootkits, viruses and malware. Verification is done upon boot up, shutdown and while the system is on.
- Sure Start is set by default to automatically repair the BIOS if corrupted or compromised but is policy driven for better manageability. Start is set by default to automatically repair the BIOS if corrupted or compromised but is policy driven for better manageability.
- Protecting beyond BIOS – Integrity checking and repair is extended to other data that should be protected such as network configuration parameters, platform specific information (i.e. system IDs), secure boot credentials, and other code the system needs to boot.

- Audit enabled – System Audit via Sure Start Event Logs capture data such as incident, repair date and time for troubleshooting and investigating

HP Sure Start Gen4 is available on HP Workstation products equipped with Intel® 8th generation processors. HP Sure Start Gen4 is available on HP Workstation products equipped with Intel® 8th generation processors.

SOFTWARE COMPONENTS AND APPLICATIONS WITH WINDOWS

BIOS
HP BIOSphere Gen4[17]
HP DriveLock & Automatic DriveLock
BIOS Update via Network
Master Boot Record Security
Power On Authentication Authentication
Secure Erase [18]
Absolute Persistence Module[19]
Pre-boot Authentication
HP Wireless Wakeup

Software
HP Hotkey Support
HP Performance Advisor
HP Velocity
HP Remote Graphics Software (RGS) 7.x

Manageability Features
HP Driver Packs[22]
HP System Software Manager (SSM)
HP BIOS Config Utility (BCU)
HP Client Catalog
HP Manageability Integration Kit Gen2[23]

Client Security Software
HP Client Security Suite Gen4[25] including:
HP Security Manager[26] (including Credential Manager, HP Password Manager, HP Spare Key)
HP Device Access Manager
HP Power On Authentication Authentication
Microsoft Defender[27]

Security Management
Secure Erase[18]
TPM 2.0 Embedded Security Chip shipped with Windows 10 (Common Criteria EAL4+ Certified)[32]
SATA port disablement (viaBIOS)
RAID configurations[33]
Serial, USB enable/disable (viaBIOS)
Power-on password (viaBIOS)
Setup password (viaBIOS)
Support for chassis padlocks and cable lock devices
Integrated hood sensor
HP Sure Click[37]
HP Sure Start Gen4[30]
HP Sure Run[35]

Supported Components

HP Sure Recover[36]

17. HP BIOSphere Gen4 requires Intel® or AMD 8th Gen processors. Features may vary depending on the platform and configurations.
18. For the methods outlined in the National Institute of Standards and Technology Special Publication 800-88 "Clear" sanitation method. HP Secure Erase does not support platforms with Intel® Optane™.
19. Absolute agent is shipped turned off, and will be activated when customers activate a purchased subscription. Subscriptions can be purchased for terms ranging multiple years. Service is limited, check with Absolute for availability outside the U.S. The Absolute Recovery Guarantee is a limited warranty. Certain conditions apply. For full details visit: http://www.absolute.com/company/legal/agreements/ computrace-agreement. Data Delete is an optional service provided by Absolute Software. If utilized, the Recovery Guarantee is null and void. In order to use the Data Delete service, customers must first sign a Pre-Authorization Agreement and either obtain a PIN or purchase one or more RSA SecurID tokens from Absolute Software. Delete service, customers must first sign a Pre-Authorization Agreement and either obtain a PIN or purchase one or more RSA SecurID tokens from Absolute Software.
22. HP Driver Packs not preinstalled, however available for download at http://www.hp.com/go/clientmanagement.
23. HP Manageability Integration Kit can be downloaded from http://www8.hp.com/us/en/ads/clientmanagement/overview.html
25. HP Client Security Suite Gen 4 requires Windows and Intel® or AMD 8th generation processors.
26. HP Password Manager requires Internet Explorer or Chrome or FireFox. Some websites and applications may not be supported. User may need to enable or allow the add-on / extension in the internet browser.
27. Microsoft Defender Opt in and internet connection required for updates.
30. HP Sure Start Gen4 is available on HP Workstation products equipped with Intel® 8th generation processors
32. Firmware TPM is version 7.6. Hardware TPM is v2.0.
33. RAID configuration is optional and does require a second hard drive.
35. HP Sure Run is available on HP Workstation products equipped with 8th generation Intel® or AMD® processors.
36. HP Sure Recover is available on HP Elite PCs with 8th generation Intel® or AMD processors and requires an open, wired network connection. Not available on platforms with multiple internal storage drives, Intel® Optane™. You must back up important files, data, photos, videos, etc. before use to avoid loss of data.
38. HP Sure Click is available on most HP PCs and supports Microsoft® Internet Explorer, Google Chrome, and Chromium™. Supported attachments include Microsoft Office (Word, Excel, PowerPoint) and PDF files in read only mode, when Microsoft Office or Adobe Acrobat are installed.

System Technical Specifications

System Board

System Board Form Factor	ATX 24.89 x 24.38 mm (9.8 x 9.6 inches)
Processor Socket	Single LGA-1151
CPU Bus Speed	DMI
Chipset	Intel® PCH C246
Memory Expansion Slots	4 DDR4 memory slots
Memory Type Supported	DDR4, UDIMM (Unbuffered), ECC& non-ECC
Memory Modes	Non-Interleaved for single channel. Interleaved when both channels are populated.
Memory Speed Supported	2666MT/s DDR4
Memory Protection	ECC available on data
Maximum Memory	128GB
Memory Configuration (Supported)	4GB, 8GB 16GB and 32GB non-ECC/8GB, 16GB and 32GB ECC unbuffered DIMMs are supported. ECC and non-ECC memory DIMMs cannot be mixed on the same system. **NOTE**: * Maximum memory capacities assume 64-bit operating systems, such as Genuine Windows® 10 Professional 64 bit, Red Hat Linux 64-bit. 32-bit Windows Operating Systems support up to 4 GB.
PCI Express Connectors	• 1 PCI Express Gen3 slot x16 mechanical/ x16 electrical (full height, full length) • 1 PCI Express Gen3 slot x4 mechanical/ x1 electrical (full height, full length) • 1 PCI Express Gen3 slot x4 mechanical/ x1 electrical (full height, full length) • 1 PCI Express Gen3 slot x16 mechanical/ x4 electrical (full height, full length) • 2 M.2 Storage (PCIe Gen3 x4)[1] • 1 M.2 WLAN (PCIe Gen3 x1+ Intel CNVi) In the PCIe Gen3 (x16 electrical/x16 mechanical) slot, it intent to supported HP certified added in card. **Note1:** M.2 storage supports compatible devices up to 110mm

Supported Drive Interfaces	**SATA**	Integrated (4) Serial ATA interfaces (6Gb/s SATA). One port can optionally be used for eSATA. Intel® RST RAID 0, 1, 5, and 10 supported on Windows 10 OS. Intel® RST RAID 5 not recommended with drives larger than 500GB. Factory integrated Intel® RST RAID options on Microsoft Windows OS are RAID 0 and RAID 1.
	Serial Attached SCSI	None
	Integrated RAID	**NOTE:** Requires identical hard drives (speeds, capacity, interface)
	Integrated Graphics	Intel® UHD Graphics 630 (on Core i3/i5/i7-8xxx processors); Intel® Integrated Graphics P630 for Xeon processors Based on Unified Memory Architecture (UMA) - a region of system memory is reserved and dedicated to the graphics display. Support for Microsoft DirectX 12, OpenGL 4.4 and OpenCL 2.0 on Intel® UHD Graphics P630; 3 DP 1.2 graphics ports integrated in motherboard; Supports up to three simultaneous displays across DP & DVI-D outputs.

System Technical Specifications

		Max. resolution supported on DP 1.2 ports: 3840x2160 @60Hz
	Network Controller	Integrated Ethernet PHY Connection I219LM. Management capabilities: WOL, PXE 2.1 and AMT 12
	External SATA (eSATA)	1 port eSATA capable (SATA 3)
	IDE connector	No
	Floppy connector	No
	Serial	1 internal header (requires optional Serial Port Adapter Kit)
	2nd Serial	requires optional Serial Port Adapter Kit
	HD Integrated Audio	Yes
USB Connector(s)	**Front**	1 USB-A 3.0, 1 USB-A 3.0 Charging Data Port and 1 USB-C 3.1 Gen2 Charging Data Port (Optional).
	Rear	4 USB-A 3.0, 2 USB-A 2.0, and 1 USB-C 3.1 Gen2 Charging Port with Alt mode (Optional via Flex module).
	Internal	1 USB 3.0 and 2 USB 2.0 ports available as 2 separate 2x6(3.0 x1,2.0 x1) and 1x6(2.0 x1) headers: one USB 3.0 SD Card Reader.
HD Integrated Audio	Yes	
Flash ROM	Yes	
CPU Fan Header	Yes	
Chassis Fan Header	1 Rear System Chassis Fan Header	
Front Control Panel/Speaker Header	Yes	
CMOS Battery Holder - Lithium	Yes	
Integrated Trusted Platform Module	Integrated TPM 2.0 Convertible to FIPS 140-2 Certified mode through firmware v7.80 The TPM module disabled where restricted by law, i.e. Russia.	
Power Supply Headers	Yes	
Power Switch, Power LED & Hard Drive LED Header	Yes	
Clear Password Jumper	Yes	
Keyboard/Mouse	USB or PS/2 (option)	
Power Supply		

System Technical Specifications

System Configurations								
Z2 G4 TWR Configuration #1 (TBD)	**Processor Info**	1x Intel® Core™ i3-8100 3.6 6MB 65W CPU						
	Memory Info	8GB (1x 8GB) 2666 MHz DDR4 non-ECC						
	Graphics Info	Intel® UHD Integrated Graphics 630						
	Disks/Optical/Floppy	1x SATA 1 TB 7.2k rpm/ 1x 9.5mm Slim ODD						
	PSU	250W 92%						
	Other							
Energy Consumption (Watts)		115 VAC		230 VAC		100 VAC		
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	
	Windows long Idle (S0)	12.587		12.670		12.739		
	Windows short Idle (S0)	12.896		13.661		13.364		
	Windows Busy Typ (S0)	69.975		69.728		71.296		
	Windows Busy Max (S0)	80.448		90.18		91.721		
	Sleep (S3)	1.100	1.031	1.192	1.099	1.213	1.117	
	Off (S5)	0.605	0.568	0.594	0.567	0.602	0.583	
	Zero Power Mode (EuP)	0.273		0.277		0.276		
Heat Dissipation (Btu/hr)		115 VAC		230 VAC		100 VAC		
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	
	Windows Idle (S0)	42.946		43.230		43.465		
	Windows short Idle (S0)	44.001		46.611		45.598		
	Windows Busy Typ (S0)	238.755		237.912		243.262		
	Windows Busy Max (S0)	274.489		307.694		312.952		
	Sleep (S3)	3.753	3.518	4.067	3.750	4.139	3.811	
	Off (S5)	2.064	1.938	1.873	1.965	2.054	1.989	
	Zero Power Mode (EuP)	0.931		0.954		0.942		
Z2 G4 TWR Configuration #2 (TBD) typical® CERTIFIED	**Processor Info**	1x Intel® Core™ i7-8700 3.212MB 65W CPU						
	Memory Info	16GB (2x 8GB) 2666 MHz DDR4 non-ECC						
	Graphics Info	1x NVIDIA® Quadro® P1000 4GB Graphics						
	Disks/Optical/Floppy	1x SATA 1 TB 7.2k rpm/ 1x9.5mm Slim ODD						
	PSU	500W 90%						
	Other							
Energy Consumption (Watts)		115 VAC		230 VAC		100 VAC		
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	
	Windows long Idle (S0)	20.826		19.160		21.173		
	Windows short Idle (S0)	23.431		20.143		22.574		
	Windows Busy Typ (S0)	163.787		159.623		162.867		
	Windows Busy Max (S0)	177.41		173.52		180.23		
	Sleep (S3)	1.435	1.321	1.424	1.301	1.360	1.273	
	Off (S5)	0.658	0.642	0.664	0.627	0.641	0.620	
	Zero Power Mode (EuP)	0.303		0.325		0.303		
Heat Dissipation (Btu/hr)		115 VAC		230 VAC		100 VAC		
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	
	Windows Idle (S0)	71.058		65.374		72.242		

System Technical Specifications

	Windows short Idle (S0)	79.947		68.728		77.022	
	Windows Busy Typ (S0)	558.841		544.634		555.702	
	Windows Busy Max (S0)	605.323		592.050		614.945	
	Sleep (S3)	4.896	4.507	4.589	4.439	4.640	4.343
	Off (S5)	2.245	2.191	2.266	2.139	2.187	2.115
	Zero Power Mode (EuP)	1.034		1.109		1.034	
Z2 G4 TWR Configuration #3 (TBD)	**Processor Info**	1x Intel® Xeon® E-2174 3.8 8MB 80W CPU					
	Memory Info	64GB (4x16GB) 2666 MHz DDR4 ECC					
	Graphics Info	1x AMD® Radeon Pro® WX 7100 8GB Graphics					
	Disks/Optical/Floppy	1x6 TB 7.2k rpm Enterprise SATA					
	PSU	500W 90%					
	Other						
Energy Consumption (Watts)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows long Idle (S0)	25.521		26.455		25.836	
	Windows short Idle (S0)	36.013		34.175		37.089	
	Windows Busy Typ (S0)	246.80		239.417		246.027	
	Windows Busy Max (S0)	266.71		263.79		272.09	
	Sleep (S3)	1.840	1.785	1.840	1.837	1.990	1.914 W
	Off (S5)	0.689	0.614	0.749	0.633	0.746	0.622
	Zero Power Mode (EuP)	0.299		0.331		0.300	
Heat Dissipation (Btu/hr)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	87.078		90.264		88.152	
	Windows short Idle (S0)	122.876		116.605		126.548	
	Windows Busy Typ (S0)	842.082		817.075		839.444	
	Windows Busy Max (S0)	910.014		900.051		928.371	
	Sleep (S3)	6.278	6.090	6.278	6.268 r	6.790	6.623
	Off (S5)	2.351	2.095	2.556	2.160	2.545	2.122
	Zero Power Mode (EuP)	1.020		1.129		1.024	
	650W Wide Ranging, Active PFC, 90% Efficient; 500W Wide Ranging, Active PFC, 90% Efficient; 250W Wide Ranging, Active PFC, 92% Efficient; The HP Z2 Tower G4 Workstation 650W, 500W and 250W PSU Efficiency Report can be found at this link: https://www.plugloadsolutions.com/80PlusPowerSuppliesDetail.aspx?id=0&type=2						

System Technical Specifications

Operating Voltage Range	90-269 VAC
Rated Voltage Range	100-240 VAC
Rated Line Frequency	50-60 Hz
Operating Line Frequency Range	47-66 Hz
Rated Input Current	6A @ 100-240V
Heat Dissipation	Typical: 444 btu/hr (112 kcal/hr) Maximum: 1484 btu/hr (374 kcal/hr)
Power Supply Fan	70mm x 70mm x 25mm 4-wire PWM
ENERGY STAR® certified (Config Dependent)	Yes
CECP Compliant @ 220V	Yes
FEMP Standby Power Compliant	Yes, with Wake-on-LAN disabled: <1W in S4/S5 - Power Off
Built-in Self Test (BIST) **LED**	Yes
Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)	Yes
Hood Lock Header	Yes
ErP Lot 6- Tier 1 Compliance @ 230V (<1W in S4/S5 - Power Off)	Yes
ErP Lot 6- Tier 2 Compliance @ 230V (<0.5W in S4/S5 - Power Off)	Yes

Declared Noise Emissions (Entry-level, Mid-level, and High-end configurations; tested on floor)			
System Configuration (Entry level)	**Processor Info**	Intel® Core™ i7-8700 3.2 26666 6C CPU	
	Memory Info	64GB DDR4-2666 nECC (4x16GB) RAM	
	Graphics Info	Intel® UHD	
	Disks/Optical	1 TB SATA 6Gb/s SSD / No Optical	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	3.2	13
	Hard drive Operating (random reads)	3.3	13
System Configuration (Mid-level)	**Processor Info**	Intel® Xeon® processor E-2136	
	Memory Info	64GB DDR4-2666 nECC (4x16GB) RAM	
	Graphics Info	NVIDIA® Quadro® P4000 8GB	
	Disks/Optical	2 x 2TB SATA 7200 rpm 6Gb/s 3.5" HDD / No Optical	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	3.6	18

System Technical Specifications

	Hard drive Operating (random reads)	3.8	22
System Configuration (High-end)	**Processor Info**	Intel® Core™ i7-8700K 3.7 2666 6C CPU	
	Memory Info	64GB DDR4-2666 nECC (4x16GB) RAM	
	Graphics Info	NVIDIA® Quadro® P4000 8GB	
	Disks/Optical	2 x 2TB SATA 7200 rpm 6Gb/s 3.5" HDD / No Optical	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	3.5	18
	Hard drive Operating (random reads)	3.7	21

Environmental Requirements	**Temperature**	Operating: 5° to 35° C (40° to 95° F) Above 1524 m (5,000 feet) altitude, the maximum operating temperature is reduced by 1° C (1.8° F) for every 305 m (1,000 feet) increase in elevation Non-operating: -40° to 60° C (-40° to 140° F) Maximum rate of change: 10°C/hr
	Humidity	Operating: 10% to 85% RH, non-condensing, 35° C maximum wet bulb Non-operating: 10% to 90% RH, non-condensing, 35° C maximum wet bulb
	Maximum Altitude	Operating (with Rotational Hard Drives): 3,048 m (10,000 feet) Operating (with only Solid-State Drives): 5,000 m (16,404 feet) Non-operating: 12,192 m (40,000 feet) Maximum operating temperature is reduced as altitude increases. See **Temperature** for details.
	Shock (non-repetitive)	Operating ½-sine: 40g, 2-3ms (~62 cm/sec) Non-operating ½-sine: 160 cm/s, 2-3 ms (~105 g) Non-operating square: 422 cm/s, 20 g
	Vibration	Operating random: 0.5 g (rms), 5-300 Hz, up to 0.0025 g^2/Hz Non-operating random: 2.0 g (rms), 5-500 Hz, up to 0.0150 g^2/Hz

Physical Security and Serviceability

Access Panel	Tool-less Includes system board and memory information
Optical Drive	Tool-less, except for Screw-In carrier
Hard Drives	Tool-less
Expansion Cards	Tool-less
Processor Socket	Tool-less, except for the processor heatsink
Blue User Touch Points	Yes, on tool-less internal chassis mechanisms
Color-coordinated Cables and Connectors	Yes
Memory	Tool-less
System Board	Screw-In
Dual Color Power and HD LED on Front of Computer	Yes
Configuration Record SW	Yes
Over-Temp Warning on Screen	Yes
Restore CD/DVD Set	Consists of an operating system DVD (OSDVD) and a driver DVD (DRDVD). OSDVD restores the original operating system. DRDVD will provide all drivers for the system. The DRDVD may also contain applications that originally shipped with the system for optional installation. Applications can also be

System Technical Specifications

	obtained from HP.com. OSDVD and DRDVD are orderable with the system and available from HP Support.
Dual Function Front Power Switch	Yes, causes a fail-safe power off when held for 4 seconds
Padlock Support	Yes (optional): Locks side cover and secures chassis from theft 0.22-in diameter padlock loop at rear of system
Cable Lock Support	Yes, Kensington Cable Lock (optional): Locks side cover and secures chassis from theft 3 mm x 7 mm slot at rear of system
Universal Chassis Clamp Lock Support	Yes (optional): Locks side cover and locks cables to chassis. Secures chassis from theft and allows multiple units to be chained together when used with optional cable Threaded feature at rear of system
Solenoid Lock and Hood Sensor	Yes (optional) The Solenoid Hood Lock eliminates the need for a physical key by making the chassis lockable through software and a password. You can also lock and unlock the chassis remotely over the network. The Sensor Kit detects when the access panel has been removed.
Rear Port Control Cover	Yes, locks rear IO cables to prevent cable theft
Serial, USB, Audio, Network, Enable/Disable Port Control	Yes, enables or disables serial, USB, audio, and network ports
Removable Media Write/Boot Control	Yes, prevents ability to boot from removable media on supported devices (and can disable writes to media)
Power-On Password	Yes, prevents an unauthorized person from booting up the workstation
Setup Password	Yes, prevents an unauthorized person from changing the workstation configuration
3.3V Aux Power LED on System PCA	Yes
NIC LEDs (integrated) (Green & Amber)	Yes
CPUs and Heatsinks	A T-15 Torx or flat blade screwdriver is needed to remove the CPU heatsink before the CPU can be removed. CPU removal is tool-less
Power Supply Diagnostic LED	Yes
Front Power Button	Yes, ACPI multi-function
Front Power LED	Yes, white (normal), red (fault)
Front Hard Drive Activity LED	Yes, white
Front ODD Activity LED	Yes
Internal Speaker	Yes
System/Emergency ROM Flash Recovery	Recovers corrupted system BIOS.
Cooling Solutions	Air cooled forced convection
Power Supply Fans	70mm x 70mm x 25mm 4-wire PWM (non-serviceable)
CPU Heatsink Fan	Mainstream (<=65W): 92 mm x 92 mm x 52.5 mm Performance (<=95W): 94mm x 100.2mm x 110mm
Chassis Fan	92mm x 92mm x 25mm 4-wire PWM (non-serviceable)
Memory Heatsink Fan	No
HP PC Hardware Diagnostics UEFI	HP PC Hardware Diagnostics (UEFI) enables hardware level testing outside the operating system on many components. The diagnostics can be invoked by pressing F2 at POST, and is available as a download from HP Support.
Access Panel Key Lock	No

System Technical Specifications

ACPI-Ready Hardware	Advanced Configuration and Power Management Interface (ACPI). • Allows the system to wake from a low power mode. • Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system.
Integrated Chassis Handles	Rear Recessed Handle; optional Optical Bay Front Handle available.
Power Supply	Requires T15 Torx or flat blade screwdriver
PCI Card Retention	Yes, rear (all), middle (optional), front (full-length cards with extender)
Flash ROM	Yes
Diagnostic Power Switch LED on board	Yes
Clear Password Jumper	Yes
Clear CMOS Button	Yes
CMOS Battery Holder	Yes
DIMM Connectors	Yes

Social and Environmental Responsibility

Eco-Label Certifications & Declarations

This product is low halogen except for power cords, cables and peripherals. Service parts obtained after purchase may not be Low Halogen:

- ENERGY STAR® (energy-saving features available on selected configurations-Windows only)
- US Federal Energy Management Program (FEMP)
- China Energy Conservation Program
- IT ECO declaration

Batteries

The battery in this product complies with EU Directive 2006/66/EC
Battery size: CR2032 (coin cell)
Battery type: Lithium Metal

The battery in this product does not contain:

- Mercury greater than 5ppm by weight
- Cadmium greater than 10ppm by weight
- Lead greater than 40ppm by weight

Restricted Material Usage

This product meets the material restrictions specified in HP's General Specification for the Environment. http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/gse.pdf
HP Inc. is committed to compliance with all applicable environmental laws and regulations, including the European Union Restriction of Hazardous Substances (RoHS) Directive. HP's goal is to exceed compliance obligations by meeting the requirements of the RoHS Directive on a worldwide basis.

End-of-Life Management and Recycling

HP Inc. offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner. This product is greater than 90% recyclable by weight when properly disposed of at end of life.

HP Inc. Corporate Environmental Information

For more information about HP's commitment to the environment:
Living Progress Report http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html

Eco-label certifications
http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html

ISO 14001 certificates:
http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html

Additional Information

- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive - 2002/96/EC.
- Plastic parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.
- This product is >90% recycle-able when properly disposed of at end of life
- EPEAT®2019 Gold registered in the United States*

*Based on US EPEAT® registration according to IEEE 1680.1-2018 EPEAT®. EPEAT® status varies by country. Visit www.epeat.net for more information.

Packaging

HP Workstation product packaging meets the HP General Specification for the Environment at http://www.hp.com/hpinfo/globalcitizenship/society/gen_specifications.html

- Does not contain restricted substances listed in HP Standard 011-1 General Specification for the Environment
- Does not contain ozone-depleting substances (ODS)
- Does not contain heavy metals (lead, mercury, cadmium or hexavalent chromium) in excess of 100 ppm sum total for all heavy metals listed
- Maximizes the use of post-consumer recycled content materials in packaging materials
- All packaging material is recyclable
- All packaging material is designed for ease of disassembly
- Reduced size and weight of packages to improve transportation fuel efficiency
- Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards formatting

Packaging Materials

Internal	Cushions made from fabricated recycled expanded-polyethylene (EPE) or recycled expanded-polypropylene (EPP). May also be made from recycled molded paper-pulp (MPP).
External	Carton made from corrugated fiberboard with at least 35% recycled content.

Manageability

Intel® Active Management Technology (AMT) v12	An advanced set of remote management features and functionality which provides network administrators the latest and most effective tools to remotely discover, heal, and protect networked client systems regardless of the system's health or power state. AMT 12 includes the following advanced management functions:

- Support for configuration of Intel AMT 12.0 new capabilities
- No reset after provisioning
- Support for Microsoft Windows Server 2012 R2
- Support for New Microsoft SQL Server Versions including Standard and Enterprise editions
- Support for Intel SSD Prop 2500 Series
- Support for Intel Enterprise Digital Fence
- The Platform Discovery Utility can now discover these additional Intel products:
- Intel SSD Pro 2500 Series; Enterprise Digital Fence
- Intel Identity Protection Technology with One Time Password; Public Key Infrastructure; Multi Factor Authentication
- Intel Identity Protection Technology with Intel WiGig
- New Profile Editor and Profile Editor Plugin Interface
- New Required Permissions for Solutions Framework

Intel® vPro™ Technology	The HP Z2 Tower G4 Workstations support Intel® vPro™ technology when purchased with a vPro™ technology capable CPU: Intel® Xeon® E-2100 processor family or 8th Generation Intel® Core™ i5/i7 processors with Intel® VT-d/VT-x and Intel® TXT technology
HP Image Assistant	Visit: http://ftp.hp.com/pub/caps-softpaq/cmit/HPIA.html
System Software Manager	Visit: http://www.hp.com/go/ssm
Service, Support, and Warranty	• Program to proactively communicate Product Change Notifications (PCNs) and CustomerAdvisories by email to customers, based on a user-defined profile. • PCNs provide advance notification of hardware and software changes to be implemented in the factory providing time to plan for transition.

- Customer Advisories provide concise, effective problem resolution, greatly reducing the need to call technical support

Stable & Consistent Offerings

As part of its commitment to hardware, software, and solution innovation, HP is proud to introduce this breakthrough platform configuration stability to HP Workstation customers. HP Stable & Consistent Offerings are built on the foundation of a carefully chosen set of hardware and software designed and tested to work with all HP Z Workstation platforms through their end of life. These components and their corresponding HP Workstation platform compatibility are outlined in this section. HP Stable & Consistent Offerings are available worldwide to all HP Workstation customers—no special programs, no additional cost—no kidding. Simply select your hardware and software components when you customize your HP Workstation and be assured that you'll be able to buy that same configuration throughout the lifecycle of the product.

Processors	Product #	Offering
		Intel® Xeon® E-2124 3.4 8M GT2 4C
		Intel® Xeon® E-2144 3.6 8M GT2 4C

Hard Drives	Product #	Offering
		512GB M.2 TLC 1st SSD
		1TB 7200 RPM SATA 1st HDD

Graphics	Product #	Offering
		NVIDIA® Quadro® P620 2GB
		NVIDIA® Quadro® P1000 2GB
		AMD Radeon™ Pro WX 3100 2GB

Technical Specifications - Processors

Intel® Xeon® Xeon® processor E-2100 family

Intel® Xeon® processor E-2286G
Intel® Xeon® processor E-2278G
Intel® Xeon® processor E-2276G
Intel® Xeon® processor E-2274G
Intel® Xeon® processor E-2244G
Intel® Xeon® processor E-2236
Intel® Xeon® processor E-2226G
Intel® Xeon® processor E-2224G
Intel® Xeon® E-2176G 6C 3.7/4.7 HT 80W CPU
Intel® Xeon® E-2174G 4C 3.8/4.7 HT 71W CPU
Intel® Xeon® E-2144G 4C 3.6/4.5 HT 71W CPU
Intel® Xeon® E-2136 6C 3.3/4.5 HT 80W CPU
Intel® Xeon® E-2126G 6C 3.3/4.5 nHT 80W CPU
Intel® Xeon® E-2124G 4C 3.4/4.5 nHT 71W CPU
Intel® Xeon® E-2104G 4C 3.2/3.2 nHT 65W CPU

9th generation Intel® Core™ processor family

Intel® Core™ i9-9900K 3.6 2666 8C CPU
Intel® Core™ i9-9900 3.1 2666 8C CPU
Intel® Core™ i7-9700K 3.6 2666 8C CPU
Intel® Core™ i7-9700 3.0 2666 8C CPU
Intel® Core™ i5-9600 3.1 2666 6C CPU
Intel® Core™ i5-9500 3.0 2666 6C CPU
Intel® Core™ i3-9100 3.6 2666 4C CPU

8th generation Intel® Core™ processor family

Intel® Core™ i7-8700K 3.7 2666 6C CPU
Intel® Core™ i7-8700 3.2 26666 6C CPU
Intel® Core™ i5-8600 3.1 2666 6C CPU
Intel® Core™ i5-8500 3.0 2666 6C CPU

8th generation Intel® Core™ i3/Pentium processor family

Intel® Core™ i3-8100 3.6 2400 4C CPU
Intel® Pentium® G5400 3.7 2400 2C CPU

Technical Specifications - Hard Drives

SATA Hard Drives for HP Workstations	**500GB SATA 7200 rpm 6Gb/s 3.5" HDD**	**Capacity**	500GB	
		Height	1 in; 2.54 cm	
		Width	**Media Diameter**	3.5 in; 8.9 cm
			Physical Size	4 in; 10.17 cm
		Interface	Serial ATA (6.0Gb/s), NCQ enabled	
		Synchronous Transfer Rate (Maximum)	Up to 600MB/s *	
		Buffer	32MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2 ms *
			Average	11 ms *
			Full Stroke	21 ms *
		Rotational Speed	7,200 rpm	
		Logical Blocks	976,773,168	
		Operating Temperature	41° to 131° F (5° to 55° C)	
		*Actual performance may vary.		
	1TB SATA 7200 rpm 6Gb/s 3.5" HDD	**Capacity**	1 Terabyte (1000 GB)	
		Height	1 in; 2.54 cm	
		Width	**Media Diameter**	3.5 in; 8.9 cm
			Physical Size	4 in; 10.17 cm
		Interface	Serial ATA (6.0Gb/s), NCQ enabled	
		Synchronous Transfer Rate (Maximum)	Up to 600 MB/s *	
		Buffer	64MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2 ms *
			Average	11 ms *
			Full Stroke	21 ms *
		Rotational Speed	7,200 rpm	
		Logical Blocks	1,953,525,168	
		Operating Temperature	41° to 131° F (5° to 55° C)	
		*Actual performance may vary.		
	2.0TB SATA 7200 rpm 6Gb/s 3.5" HDD	**Capacity**	2TB	
		Height	1 in; 2.54 cm	
		Width	**Media Diameter**	3.5 in; 8.9 cm
			Physical Size	4 in; 10.17 cm
		Interface	Serial ATA (6.0 Gb/s), NCQ Enabled	
		Synchronous Transfer Rate (Maximum)	Up to 600MB/s *	
		Buffer	64MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	1.0 ms *
			Average	11 ms *
			Full Stroke	18 ms *
		Rotational Speed	7,200 rpm	
		Logical Blocks	3,907,029,168	
		Operating Temperature	41° to 131° F (5° to 55° C)	

Technical Specifications - Hard Drives

*Actual performance may vary.

1TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	**Capacity**	1TB	
	Protocol	SATA	
	Form Factor	3.5"	
	Controller	AHCI	
	Reliability (MTBF)	2.0M hours	
	Rated Power On Hours	8760/yr	
	Annualized Failure Rate (based on Rated POH)	<0.62%	
	Rated for 24/7/365 operation	YES	
	Physical Size (Height)	1 in; 2.54 cm	
	Physical Size (Width)	4 in; 10.17 cm	
	Media Diameter	3.5 in; 8.9 cm	
	Interface	Serial ATA (6Gb/s), NCQ enabled	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s*	
	Buffer	128MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.32ms*
		Average	7.45ms*
		Full Stroke	14.2ms*
	Operating Temperature	41° to 140° F (5° to 60° C)	
	Performance	**Sequential Read**	up to 226MB/s*
		Sequential Write	up to 226MB/s*
	Enterprise Class Features	High Reliability	

*Actual performance may vary.

4TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	**Capacity**	4TB	
	Protocol	SATA	
	Form Factor	3.5"	
	Controller	AHCI	
	Reliability (MTBF)	2.0M hours	
	Rated Power On Hours	8760/yr	
	Annualized Failure Rate (based on Rated POH)	<0.62%	
	Rated for 24/7/365 Operation	YES	
	Physical Size (Height)	1 in; 2.54 cm	
	Physical Size (Width)	4 in; 10.17 cm	
	Media Diameter	3.5 in; 8.9 cm	
	Interface	Serial ATA (6Gb/s), NCQ enabled	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s*	
	Buffer	128MB	
		Single Track	0.7ms*

Technical Specifications - Hard Drives

	Seek Time (typical reads, includes controller overhead, including settling)	**Average**	8.5ms*
		Full Stroke	15.7ms*
	Operating Temperature	41° to 131° F (5° to 55° C)	
	Performance	**Sequential Read**	up to 226MB/s*
		Sequential Write	up to 226MB/s*
	Enterprise Class Features	High Reliability	
	*Actual performance may vary.		
6TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class	**Capacity**	6TB	
	Protocol	SATA	
	Form Factor	3.5"	
	Controller	AHCI	
	Reliability (MTBF)	2.0M hours	
	Rated Power On Hours	8760/yr	
	Annualized Failure Rate (based on Rated POH)	<0.44%	
	Rated for 24/7/365 Operation	YES	
	Physical Size (Height)	1 in; 2.54 cm	
	Physical Size (Width)	4 in; 10.17 cm	
	Media Diameter	3.5 in; 8.9 cm	
	Interface	Serial ATA (6Gb/s), NCQ enabled	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s*	
	Buffer	128MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.7ms*
		Average	8.5ms*
		Full Stroke	15.7ms*
	Operating Temperature	41° to 140° F (5° to 60°C)	
	Performance	**Sequential Read**	up to 226MB/s*
		Sequential Write	up to 226MB/s*
	Enterprise Class Features	High Reliability	
	*Actual performance may vary.		
500GB SATA 7.2K SED SFF HDD	**Capacity**	500GB	
	Height	0.275 in; 0.7 cm	
	Width	**Media Diameter**	2.5 in; 6.36 cm
		Physical Size	2.75 in; 6.99 cm
	Interface	Up to 600MB/s*	
	Synchronous Transfer Rate (Maximum)	128MB	
	Buffer	64MB	
	Seek Time (typical reads, includes controller	**Single Track**	1ms*
		Average	4.2ms*

Technical Specifications - Hard Drives

		overhead, including settling)	**Full Stroke**	25ms (typical)*
		Rotational Speed	7,200 rpm	
		Operating Temperature	32° to 140° F (0° to 60° C)	
		*Actual performance may vary.		
HP Solid State Drives (SSDs) for Workstations	**HP 256GB SATA 6Gb/s SSD**	**Capacity**	256GB	
		Height	0.28 in; 0.7 cm	
		Interface	SATA 6Gb/s	
		Synchronous Transfer Rate (Maximum)	Up to 500MB/s (Sequential Read)*	
		Operating Temperature	32° to 158° F (0° to 70° C)	
		*Actual performance may vary.		
	HP 256GB SATA 6Gb/s SED Opal 2 SSD	**Capacity**	256GB	
		Height	0.28 in; 0.7 cm	
		Width	**Physical Size**	
		Interface	6Gb/s SATA	
		Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)*	
		Operating Temperature	32° to 158° F (0° to 70° C)	
		*Actual performance may vary.		
	HP 512 GB SATA 6Gb/s SSD	**Capacity**	512GB	
		Height	0.28 in; 0.7 cm	
		Width	**Physical Size**	2.5 in; 6.36 cm
		Interface	SATA 6Gb/s	
		Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)*	
		Operating Temperature	32° to 158° F (0° to 70° C)	
		*Actual performance may vary.		
	HP 1TB SATA 6Gb/s SSD	**Capacity**	1TB	
		Height	0.28 in; 0.7 cm	
		Width	**Physical Size**	2.5 in; 6.36 cm
		Interface	6Gb/s SATA	
		Synchronous Transfer Rate (Maximum)	Up to 500MB/s (Sequential Read)*	
		Operating Temperature	32° to 158° F (0° to 70° C)	
		*Actual performance may vary.		
	HP 2TB SATA 6Gb/s SSD	**Capacity**	2TB	
		Protocol	SATA	
		Form Factor	2.5"	
		Controller	AHCI	
		NAND Type	3D TLC	
		Endurance	400TBW (TB Written)	
		Reliability (MTTF)	1.5M hours	
		Physical Size (Height)	0.28 in; 0.7 cm	

Technical Specifications - Hard Drives

		Physical Size (Width)	2.5 in; 6.36 cm	
		Interface	SATA 6Gb/s	
		Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)*	
		Operating Temperature	32° to 158° F (0° to 70° C)	
		Performance	**Sequential Read**	530 MB/s *
			Sequential Write	500 MB/s *
			Random Read	92K IOPS *
			Random Write	83K IOPS *
		*Actual performance may vary.		
PCIe SSDs for HP Workstations	**HP Z Turbo Drv G2 256GB TLC PCIe SSD (Z2 MB)**	**Capacity**	256GB	
		Protocol	PCIe	
		Form Factor	M.2 in native slot on motherboard	
		Controller	NVMe	
		NAND Type	3D TLC	
		Endurance	75TBW (TB Written)	
		Reliability (MTBF)	1.5M hours	
		Interface	PCI Express 3.0 x4 electrical x4 physical	
		Operating Temperature	32° to 158° F (0° to 70° C)	
		Performance	**Sequential Read**	2800 MB/s*
			Sequential Write	320 MB/s (1100 MB/s max/Turbo)*
			Random Read	250K IOPS*
			Random Write	180K IOPS*
		*Actual performance may vary.		
	HP Z Turbo Drv G2 512GB TLC PCIe SSD (Z2 MB)	**Capacity**	512GB	
		Protocol	PCIe	
		Form Factor	M.2 in native slot on motherboard	
		Controller	NVMe	
		NAND Type	3D TLC	
		Endurance	150TBW (TB Written)	
		Reliability (MTBF)	1.5M hours	
		Interface	PCI Express 3.0 x4 electrical x4 physical	
		Operating Temperature	32° to 158° F (0° to 70° C)	
		Performance	**Sequential Read**	2800 MB/s*
			Sequential Write	660 MB/s (1600 MB/s max/Turbo)*
			Random Read	260K IOPS*
			Random Write	260K IOPS*
		*Actual performance may vary.		
	HP Z Turbo Drv G2 1TB TLC PCIe SSD (Z2 MB)	**Capacity**	1TB	
		Protocol	PCIe	
		Form Factor	M.2 in native slot on motherboard	

		Controller	NVMe	
		NAND Type	3D TLC	
		Endurance	300TBW (TB Written)	
		Reliability (MTBF)	1.5M hours	
		Interface	PCI Express 3.0 x4 electrical x4 physical	
		Operating Temperature	32° to 158° F (0° to 70° C)	
		Performance	**Sequential Read**	3000 MB/s*
			Sequential Write	1150 MB/s (1700 MB/s max/Turbo)*
			Random Read	360K IOPS*
			Random Write	330K IOPS*
		*Actual performance may vary.		
	HP Z Turbo Drv G2 2TB TLC PCIe SSD (Z2 MB)	**Capacity**	2TB	
		Protocol	PCIe	
		Form Factor	M.2	
		Controller	NVMe	
		NAND Type	3D TLC	
		Endurance	600TBW (TB Written)	
		Reliability (MTBF)	1.5M hours	
		Interface	PCI Express 3.0 x4 electrical x4 physical	
		Operating Temperature	32° to 158° F (0° to 70° C)	
		Performance	**Sequential Read**	3000 MB/s*
			Sequential Write	1000 MB/s (2100 MB/s max/Turbo)*
			Random Read	320K IOPS*
			Random Write	265K IOPS*
		*Actual performance may vary.		
Intel® 905p Series AIC PCIe SSD	**Intel® 905p Series AIC 280GB PCIe SSD**	**Capacity**	280GB	
		Protocol	PCIe	
		Form Factor	PCIe Card, Half Height	
		Controller	NVMe	
		NVM Type	3DXPoint	
		Endurance	5.11 PBW (PB Written)	
		Reliability (MTBF)	1.6M hours	
		Operating Temperature	32° to 185° F (0° to 85° C)	
		Performance	**Sequential Read**	2730 MB/s*
			Sequential Write	2280 MB/s*
			Random Read	587K IOPS*
			Random Write	559K IOPS*
		*Actual performance may vary.		
		Capacity	480TB	

Technical Specifications - Hard Drives

Intel® 905p Series AIC 480GB PCIe SSD	**Protocol**	PCIe	
	Form Factor	PCIe Card, Half Height	
	Controller	NVMe	
	NVM Type	3DXPoint	
	Endurance	8.76 PBW (PB Written)	
	Reliability (MTBF)	1.6M hours	
	Operating Temperature	32° to 185° F (0° to 85° C)	
	Performance	**Sequential Read**	27100 MB/s*
		Sequential Write	2280 MB/s*
		Random Read	582K IOPS*
		Random Write	561K IOPS*

*Actual performance may vary.

Technical Specifications - Graphics

Integrated Intel® UHD Graphics (Z2 G4)	**Form Factor**	Integrated in select Intel® Xeon® E, Intel® Core™ i7, and Intel® Core™ i5 processors. Check specific platform specifications for selections.
	Graphics Controller	Intel® UHD Graphics
	Memory	Unified Memory Architecture (UMA) frame buffer. Graphics memory is shared with system memory. Size selectable between 64 MB to 1024 MB via BIOS setting. Default size is 64 MB. Additional memory is allocated for graphics as needed using Intel's Dynamic Video Memory Technology (Intel® DVMT 5.0), to provide an optimal balance between graphics and system memory use.
	Connectors	Check system platform specifications where Intel® UHD Graphics are available.
	Maximum Resolution	Display Port: 4096 x 2160 HDMI: 4096 x 2160 DVI: 1920x1200 VGA: 2048x1536 **NOTE:** For HDMI, DVI and VGA outputs, separate adapters may be required.
	Shading Architecture	Shader Model 5.0 (It's under confirmation with Intel® for the latest version, TBD)
	Supported Graphics APIs	OpenGL 4.4 DirectX 12
	Available Graphics Drivers	Windows 10

NVIDIA® Quadro® P400 2GB Graphics	**Form Factor**	Dimensions: 2.713" H x 5.7" L Single Slot, Low Profile Cooling: Active Weight: 129 grams
	Graphics Controller	NVIDIA® Quadro® P400 Graphics Card GP107 GPU 256 CUDA cores Max Power: 30 Watts
	Bus Type	PCI Express 3.0 x16
	Memory	Size: 2 GB GDDR5, 2000 MHz Memory Interface: 64-bit Memory Bandwidth: 32 GB/s
	Connectors	3mDP Outputs*
	Maximum Resolution	DisplayPort™ 1.4: - up to 3x 5120 x 2880 x 24 bpp @ 60Hz - supports Multi-Stream Transport (MST)
	Image Quality Features	10-bit internal display processing pipeline 10-bit scan-out support
	Display Output	3 mDP Connectors
	Shading Architecture	Full Microsoft DirectX 12 Shader Model 5.1
	Supported Graphics APIs	OpenGL 4.5

Technical Specifications - Graphics

		DirectX 12 Vulkan 1.0 API support includes: CUDA C, CUDA C++, DirectCompute , OpenCL
	Available Graphics Drivers	Microsoft Windows 10 Microsoft Windows 7 Linux®
		HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	*P400, P620 and P1000 only have mini-DisplayPort™ (mDP) video ports. **Note 1:** AMO kits for P400, P1000 and Adapters • Two mDP-to-DP Adapters are included in the P400 and P1000 AMO kits. • If mDP-to-DP Adapters are needed, Adapters can be ordered separately: - 2KW86A6 - HP (Bulk 4) miniDP-to-DP Adapter Cables - 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables
NVIDIA® Quadro® P620 2GB Graphics	**Form Factor**	Low Profile: 2.713 inches in height × 5.7 inches in length
	Graphics Controller	NVIDIA® Quadro™ P620 GP107 GPU Number of Cores: 512 CUDA® cores Max. Power: 40W Cooling Solution: Active fan heatsink
	Bus Type	PCI Express x16
	Memory	Size: 2GB DDR5 Clock: 2400Mhz Memory Bandwidth: 80GB/s
	Connectors	4 x mDP 1.4
	Maximum Resolution	DisplayPort™ 1.4: - up to 4x 5120 x 2880 x 24 bpp @ 60Hz - supports Multi-Stream Transport (MST)
	Image Quality Features	10-bit internal display processing pipeline 10-bit scan-out support
	Shading Architecture	Shader Model 5.1
	Supported Graphics APIs	DX11, OpenGL 4.3
	Available Graphics Drivers	Windows 7 Professional (64-bit and 32-bit) Linux®
		HP qualified drivers may be preloaded or the latest HP qualified drivers are available from the HP support Web site:

http://welcome.hp.com/country/us/en/support.html

	Notes	*P400, P620 and P1000 only have mini-DisplayPort™ (mDP) video ports. **Note 1:** AMO kits for P400, P620, P1000 and Adapters • Two mDP-to-DP Adapters are included in the P400, P620 and P1000 AMO kits. • If mDP-to-DP Adapters are needed, Adapters can be ordered separately: - 2KW86A6 - HP (Bulk 4) miniDP-to-DP Adapter Cables - 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables
AMD Radeon™ Pro WX 3100 4GB Graphics	**Form Factor**	Low Profile, half length (full-height bracket included)
	Graphics Controller	Architecture: Polaris 12 Lexa GL Number of Cores: 512 Stream Processors organized into 8 compute units Power: 50W Cooling Solution: Active Fan Heatsink
	Bus Type	PCI Express® x8, Generation 3.0
	Memory	Size: 4GB GDDR5 Bandwidth: 96 GB/s Interface: 128-bit
	Connectors	2x Mini-DisplayPort™ 1.4 1x DisplayPort™ 1.4 Factory Configured: No video cable adapter included After market option kit: No video cable adapter included Additional DisplayPort™-to-VGA or DisplayPort™-to-DVI adapters are available as Factory Configuration or Option Kit accessories.
	Maximum Resolution	DisplayPort™ 1.4: - up to 3x 5120 x 2880 x 24 bpp @ 60Hz - supports Multi-Stream Transport (MST)
	Image Quality Features	Advanced support for 8-bit, 10-bit, and 16-bit per RGB color component. High bandwidth scaler for high quality up and downscaling.
	Display Output	2x Mini-DisplayPort™ 1.4 1x DisplayPort™ 1.4
	Shading Architecture	Shader Model 6.0
	Supported Graphics APIs	OpenCL™ 2.0, DirectX® 12.0, OpenGL 4.5
	Available Graphics Drivers	Windows 10 64-bit Linux® HP qualified drivers may be preloaded or available from the HP support Web site:

		http://welcome.hp.com/country/us/en/support.html
	Notes	Depending on the card model, native DisplayPort™ connectors and/or certified DisplayPort™ active or passive adapters to convert your monitor's native input to your card's DisplayPort™ or Mini-DisplayPort™ connector(s) may be required. See www.amd.com/firepro for details.
AMD Radeon™ Pro WX 4100 4GB Graphics	**Form Factor**	Low Profile (full-height bracket included)
	Graphics Controller	Polaris 11 Baffin GL XT GPU: 1024 Stream Processors organized into 16 Compute Units Power: 50 Watts Cooling Solution: Active Fan Heatsink
	Memory	Size: 4GB GDDR5 Bandwidth: 96 GB/s Interface: 128-bit
	Connectors	4x Mini DisplayPort™ 1.4 – HDR ready connectors with HBR3 and MST support. Factory Configured: No mDP-to-DP cable adapters included After market option kit: No mDP-to-DP cable adapters included Additional DisplayPort™-to-VGA or DisplayPort™-to-DVI adapters are available as Factory Configuration or Option Kit accessories.
	Maximum Resolution	DisplayPort™ 1.4: - up to 4x 5120 x 2880 x 24 bpp @ 60Hz - supports Multi-Stream Transport (MST)
	Image Quality Features	Advanced support for 8-bit and 10-bit per RGB color component. High bandwidth scaler for high quality up and downscaling
	Display Output	4 Mini-DisplayPort™ 1.4 Outputs FreeSync support
	GPU Architecture	GCN 4th Generation
	Supported Graphics APIs	DirectX®12 OpenGL® 4.5 OpenCL™ 2.0 Vulkan™ 1.0
	Available Graphics Drivers	Windows 10 64-bit Linux® HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	1. HDR content requires that the system be configured with a fully HDR-ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support.

2. AMD PowerTune and AMD ZeroCore Power are technologies offered by certain FirePro™ and Radeon™ Pro products, which are designed to intelligently manage GPU power consumption in response to certain GPU load conditions.
3. As of September 2016, certified for DisplayPort™ 1.4 HBR3 and ready for DisplayPort™ 1.4 HDR based on independent verification by DisplayPort™ testing authority. HDR content requires that the system be configured with a fully HDR-ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support.

NVIDIA® Quadro® P1000 4GB Graphics	**Form Factor**	Dimensions:2.713" H x 5.7" L Single Slot, Low Profile Cooling: Active Weight: 129 grams
	Graphics Controller	NVIDIA® Quadro® P1000 Graphics Card GP107 GPU 640 CUDA cores Max Power: 47 Watts
	Bus Type	PCI Express 3.0 x16
	Memory	Size: 4 GB GDDR5, 2500 MHz Memory Interface: 128-bit memory interface Memory Bandwidth: 80 GB/s memory bandwidth
	Connectors	4mDP Outputs*
	Maximum Resolution	DisplayPort™ 1.4: - up to 4x 5120 x 2880 x 24 bpp @ 60Hz - supports Multi-Stream Transport (MST)
	Image Quality Features	10-bit internal display processing pipeline 10-bit scan-out support
	Display Output	4 mDP Connectors
	Shading Architecture	Full Microsoft DirectX 12 Shader Model 5.1
	Supported Graphics APIs	OpenGL 4.5 DirectX 12 Vulkan 1.0 API support includes: CUDA C, CUDA C++, DirectCompute , OpenCL
	Available Graphics Drivers	Microsoft Windows 10 Microsoft Windows 8.1 Microsoft Windows 7 Linux® HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	*P400, P620 and P1000 only have mini-DisplayPort™ (mDP) video ports. **Note 1:** AMO kits for P400, P620, P1000 and Adapters • Two mDP-to-DP Adapters are included in the P400, P620 and P1000 AMO kits.

- If mDP-to-DP Adapters are needed, Adapters can be ordered separately:
  - 2KW86A6 - HP (Bulk 4) miniDP-to-DP Adapter Cables
  - 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables

NVIDIA® Quadro® P2000 5GB Graphics	**Form Factor**	Dimensions: 4.4”Hx7.9”L Single Slot Cooling: Active Weight: 260 grams
	Graphics Controller	NVIDIA® Quadro® P2000 Graphics Card Power: 75 Watts
	Bus Type	PCI Express 3.0 x16
	Memory	Size: 5GB GDDR5 Memory Bandwidth: 140 GB/s Memory Width: 160-bit
	Connectors	4x DisplayPort™ 1.4 Factory Configured Option: No adapter included with card After Market Option: No video cable adapter included Additional DVI to VGA, DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories.
	Maximum Resolution	DisplayPort™: - up to 5120 x 2880 x 24 bpp @ 60Hz - supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST) DP 1.3 & 1.4 ready. DL-DVI(I) output: - up to 2560 x 1600 x 32 bpp @ 60 Hz Single Link-DVI(I) output: - up to 1920 x 1200 x 32 bpp @ 60Hz HDMI 2.0 (requires DP to HDMI adapter): 5120 x 2880 x 24 bpp @ 60Hz
	Image Quality Features	12-bit internal display pipeline (hardware support for 12-bit scanout on supported panels, applications and connection) Stereoscopic 3D display support including NVIDIA® 3D Vision™ technology, NVIDIA® Mosaic and nView.
	Display Output	Maximum number of displays - 4 direct attached monitors Maximum number of monitors across all available Quadro® P2000 outputs is 4.

Technical Specifications - Graphics

	Shading Architecture	Shader Model 5.1
	Supported Graphics APIs	OpenGL® 4.5 DirectX® 12 API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran software
	Available Graphics Drivers	Microsoft Windows 10 Microsoft Windows 7 Professional 64bit Linux - Full OpenGL implementation, complete with NVIDIA® and ARB extensions HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	1. Quadro P2000 offered as Factory Configured Option does not include a video cable adapter. Video cable adapters must be ordered separately. 2. Quadro P2000 offered as an After Market Option does not include video cables. Video cable adapters must be ordered separately.
AMD Radeon™ Pro WX 7100 8GB Graphics	**Form Factor**	Full-Height Single Slot (9.5” Length)
	Graphics Controller	Radeon™ Pro WX 7100 graphics GPU: 2304 Stream Processors organized into 36 Compute Units Power: 130 Watts Cooling Solution: Active Fan Heatsink
	Memory	Size: 8GB GDDR5 Bandwidth: 224 GB/s Interface: 256-bit
	Connectors	4x Display Port™ 1.4 – HDR ready connectors with HBR3 and MST support. Factory Configured: No video cable adapter included After market option kit: No video cable adapter included Additional DisplayPort™-to-VGA or DisplayPort™-to-DVI adapters are available as Factory Configuration or Option Kit accessories.
	Maximum Resolution	DisplayPort™ 1.4: - up to 4x 5120 x 2880 x 24 bpp @ 60Hz - supports Multi-Stream Transport (MST)
	Image Quality Features	Advanced support for 8-bit, 10-bit, and 16-bit per RGB color component. High bandwidth scaler for high quality up and downscaling
	Display Output	4 DisplayPort™ 1.4 Outputs FreeSync support

Technical Specifications - Graphics

	GPU Architecture	GCN 4th Generation
	Supported Graphics APIs	DirectX®12 OpenGL® 4.5 OpenCL™ 2.0 Vulkan™ 1.0
	Available Graphics Drivers	Windows 10 64-bit Linux® HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	4. HDR content requires that the system be configured with a fully HDR-ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support. 5. Radeon VR Ready Creator Products are select Radeon Pro and AMD FirePro™ GPUs that meet or exceed the Oculus Rift or HTC Vive recommended specifications for video cards/GPUs. Other hardware (including CPU) and system requirements recommended by Oculus Rift or HTC Vive should also be met in order to operate the applicable HMDs as intended. As VR technology, HMDs and other VR hardware and software evolve and/or become available, these criteria may change without notice. 6. AMD PowerTune and AMD ZeroCore Power are technologies offered by certain FirePro™ and Radeon™ Pro products, which are designed to intelligently manage GPU power consumption in response to certain GPU load conditions. 7. As of September 2016, certified for DisplayPort™ 1.4 HBR3 and ready for DisplayPort™ 1.4 HDR based on independent verification by DisplayPort™ testing authority. HDR content requires that the system be configured with a fully HDR-ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support.
NVIDIA® Quadro® P4000 8GB Graphics	**Form Factor**	Dimensions: 4.4”H x 9.5”L Single-slot, full-height Weight: 475 grams (without extender)
	Graphics Controller	NVIDIA® Quadro® P4000 Graphics Card GPU: GP104 with 1792 CUDA cores Power: 120 Watts
	Bus Type	PCI Express 3.0 x16
	Memory	Size: 8GB GDDR5 Memory Bandwidth: 243 GB/s Memory Width: 256-bit
	Connectors	4 x DisplayPort™ 1.4

Technical Specifications - Graphics

	3-pin mini-DIN connector via optional bracket 1 x 6-pin auxiliary power connector 4-pin header for stereo signal SYNC connector for Quadro® Sync II 2 x SLI connectors Factory Configured Option: No video cable adapter included After Market Option: No video cable adapter included Additional DisplayPort™-to-VGA, DisplayPort™-to-HDMI, or DisplayPort™-to- DVI adapters are available as accessories
Maximum Resolution	Dual-link internal TMDS (DVI 1.0): - up to 2560 x 1600 x 32 bpp @ 60 Hz Single-link internal TMDS (DVI 1.0): - up to 1920 x 1200 x 32 bpp @ 60 Hz HDMI™ 2.0b (requires DP to HDMI adapter): - up to 5120 x 2880 x 24 bpp @ 60Hz DisplayPort™: - up to 4096 x 2160 x 30 bpp @ 60Hz - up to 2560 x 1600 x 30 bpp @ 120 Hz - supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST) Using two DP outputs, the P4000 can drive one dual DP input display with 5120 x 2880 x 30 bpp @ 60Hz resolution.
Image Quality Features	Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component. HDCP 2.2 support over DisplayPort™, DVI, and HDMI connectors NVIDIA® 3D Vision™ and other 3D stereo technologies NVIDIA® Mosaic and nView
Display Output	Maximum number of displays - 4 direct attached monitors Maximum number of monitors across all available Quadro P4000 outputs is 4.
Shading Architecture	Shader Model 5.1
Supported Graphics APIs	OpenGL 4.5 DirectX 12 Vulcan 1.0 API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran
Available Graphics Drivers	Microsoft Windows 10 Microsoft Windows 7 Linux - Full OpenGL implementation, complete with NVIDIA® and ARB extensions HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html

Technical Specifications - Graphics

	Notes	1. Quadro P4000 offered as Factory Configured Option does not include a video cable adapter. Video cable adapters must be ordered separately. 2. Quadro P4000 offered as an After Market Option does not include video cables. Video cable adapters must be ordered separately.
NVIDIA® Quadro® P5000 8GB Graphics	**Form Factor**	Dimensions: 4.4”H x 10.5”L Dual-slot, full-height Weight: 815 grams
	Graphics Controller	NVIDIA® Quadro® P5000 Graphics Card GPU: GP104 2560 NVIDIA® CUDA® cores
	Bus Type	PCI Express 3.0 x16
	Memory	Size: 16GB GDDR5 Memory Bandwidth: 288 GB/s Memory Width: 256-bit ECC memory (disabled by default)
	Connectors	4 x DisplayPort™ 1.4 (HDR support) DL-DVI (D) 3-pin mini-DIN connector via optional bracket 1 x 8-pin auxiliary power connector 4-pin header for stereo signal SYNC connector for Quadro® Sync II 2 x SLI connectors Factory Configured Option: No video cable adapter included After Market Option: No video cable adapter included Additional DisplayPort™-to-VGA, DisplayPort™-to-HDMI, or DisplayPort™-to- DVI adapters are available as accessories
	Maximum Resolution	5K support @ 60Hz 1x single-cable 5K monitor, or 2x dual-cable 5k monitors
	Image Quality Features	Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component. HDCP 2.2 support over DisplayPort™, DVI, and HDMI connectors NVIDIA® 3D Vision™ and other 3D stereo technologies NVIDIA® Mosaic and nView Desktop Management
	Supported Graphics APIs	DirectX®12 , OpenGL® 4.5, OpenCL™ 1.0, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran
	Available Graphics Drivers	Windows 10 64-bit Windows® 7 64-bit Linux®

Technical Specifications - Graphics

		HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
NVIDIA® Quadro® RTX 4000 8GB Graphics	**Form Factor**	Full-Height Single Slot (4.4” Height x 9.5” Length) Weight: 550 grams / 1.21 lbs
	Graphics Controller	NVIDIA® Quadro® RTX 4000 Graphics lGPU: 2304 NVIDIA® CUDA® Parallel Processing Cores Power: 160 Watts Cooling: Active
	Memory	8GB GDDR6 memory Memory Bandwidth: Up to 416 GB/s Memory Width: 384 bit
	Connectors	3x DP 1.4a and VirtualLink Quadro Sync connector (compatible with Quadro II Sync) One 8-pin auxiliary power connector Factory configured option: No video cable adapter included with card. After market option Kit: No video cable adaptor included with card. DVI to VGA, DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories.
	Maximum Resolution	7680x4320 @ 60Hz
	Image Quality Features	Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component. HDCP 2.2 support over DisplayPort™, DVI, and HDMI connectors NVIDIA® 3D Vision™ and other 3D stereo technologies NVIDIA® Mosaic and nView
	Display Outputs[1]	3x DP 1.4a and VirtualLink[2] (7680x4320 @ 60Hz)
	Supported Graphics APIs	DirectX®12, OpenGL® 4.5, OpenCL™ 1.0, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran
	Available Graphics Drivers	Windows® 10 64-bit Linux® 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	1- Supports up to a total of 4 displays 2- VirtualLink's USB-C™ (data) cannot be disabled at a hardware level

Technical Specifications - Graphics

NVIDIA® Quadro® RTX 5000 16GB Graphics	**Form Factor**	Full-Height Dual Slot (4.4” Height x 10.5” Length) Weight: 975 grams + 75 grams extender
	Graphics Controller	NVIDIA® QUADRO® RTX 5000 GPU: 3072 CUDA cores Power: 265 Watts Cooling: Active
	Memory	16GB HBM2 memory Memory Bandwidth: Up to 448 GB/s ECC Memory (disabled by default)
	Connectors	DP (x4) with HDR support 3-pin mini-DIN connector via optional bracket 4-pin header for stereo signal Quadro Sync connector (compatible with Quadro II Sync) One 8-pin auxiliary power connector (2x) NVLink for RTX 5000 connectors (via optional kit) After market option Kit: no power adapter included with card. DisplayPort™ to VGA, DisplayPort™ to DVI (single-link and dual-link), and DisplayPort™ to HDMI adapters available as accessories.
	Maximum Resolution	DisplayPort™ 1.4: 7680x4320 @ 60Hz
	Image Quality Features	HDR support over DisplayPort™ 1.4 (SMPTE 2084/2086, BT. 2020) (4K @ 60 Hz 10b/12b HEVC Decode, 4K @ 60 Hz 10b HEVC Encode) HDCP 2.2 support over DisplayPort™ and HDMI connectors NVIDIA 3D Vision™ technology NVIDIA Mosaic and nView Desktop Management
	Display Outputs	4x DP1.4 HDR2 outputs (up to 7680x4320 @ 60Hz)
	GPU Architecture	NVIDIA® Volta™
	Supported Graphics APIs	DirectX®12, OpenGL® 4.5 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran
	Available Graphics Drivers	Windows® 10 64-bit Windows® 8 & 8.1 64-bit Windows® 7 64-bit Linux® 64-bit

		HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html Factory Configured: No adapters included After market option kit: No adapters included *VirtualLink's USB-C™ (data) cannot be disabled at a hardware level
NVIDIA® Quadro® RTX 6000 24GB Graphics	**Form Factor**	Full-Height Dual Slot (4.4" Height x 10.5" Length) Weight: 995 grams + 75 grams extender
	Graphics Controller	NVIDIA® QUADRO® RTX 6000 GPU: 4608 CUDA cores Power: 295 Watts Cooling: Active
	Memory	24GB HBM2 memory Memory Bandwidth: Up to 672 GB/s ECC Memory (disabled by default)
	Connectors	DP (x4) with HDR support 3-pin mini-DIN connector via optional bracket 4-pin header for stereo signal Quadro Sync connector (compatible with Quadro II Sync) One 8-pin auxiliary power connector (2x) NVLink for RTX 5000 connectors (via optional kit) After market option Kit: no power adapter included with card. DisplayPort™ to VGA, DisplayPort™ to DVI (single-link and dual-link), and DisplayPort™ to HDMI adapters available as accessories.
	Maximum Resolution	DisplayPort™ 1.4: 7680x4320 @ 60Hz
	Image Quality Features	HDR support over DisplayPort™ 1.4 (SMPTE 2084/2086, BT. 2020) (4K @ 60 Hz 10b/12b HEVC Decode, 4K @ 60 Hz 10b HEVC Encode) HDCP 2.2 support over DisplayPort™ and HDMI connectors NVIDIA 3D Vision™ technology NVIDIA Mosaic and nView Desktop Management
	Display Outputs	4x DP1.4 HDR2 outputs (up to 7680x4320 @ 60Hz)

Technical Specifications - Graphics

GPU Architecture	NVIDIA® Volta™
Supported Graphics APIs	DirectX®12, OpenGL® 4.5 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran
Available Graphics Drivers	Windows® 10 64-bit Windows® 8 & 8.1 64-bit Windows® 7 64-bit Linux® 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html Factory Configured: No adapters included After market option kit: No adapters included *VirtualLink's USB-C™ (data) cannot be disabled at a hardware level

Technical Specifications - Optical and Removable Storage

HP 9.5mm Slim DVD Writer	**Description**	9.5mm height, tray-load	
	Mounting Orientation	Either horizontal or vertical	
	Interface Type	SATA/ATAPI	
	Dimensions (WxHxD)	128 x 9.5 x 127mm	
	Supported Media Types	DVD+R DVD+RW DVD+R DL DVD-R DL DVD-R DVD-RW CD-R CD-RW	
	Disc Capacity	**DVD-ROM**	8.5 GB DL or 4.7 GB standard
	Access Times	**Full Stroke DVD**	< 200 ms (seek)
		Full Stroke CD	< 200 ms (seek)
	Maximum Data Transfer Rates	**CD ROM Read**	CD-ROM, CD-R Up to 24X CD-RW Up to 24X
		DVD ROM Read	DVD+RW Up to 8X DVD-RW Up to 8X DVD+R DL Up to 8X DVD-R DL Up to 8X DVD-ROM Up to 8X DVD-ROM DL Up to 8X DVD+R Up to 8X DVD-R Up to 8X
	Power	**Source**	SATA DC power receptacle
		DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p
		DC Current	5 VDC -< 800 mA typical, <1600 mA maximum
	Operating Environmental (all conditions non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)
		Relative Humidity	10% to 80%
		Maximum Wet Bulb Temperature	84° F (29° C)
	Operating Systems Supported	Windows 10, Windows 7 Professional 32-bit and 64-bit, Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*. Linux® No driver is required for this device. Native support is provided by the operating system.	
	Kit Contents	HP SATA DVD Writer drive, installation guide.	
HP 9.5mm Slim DVD-ROM Drive	**Description**	9.5mm height, tray-load	
	Mounting Orientation	Either horizontal or vertical	
	Interface Type	SATA / ATAPI	

Technical Specifications - Optical and Removable Storage

	Dimensions (WxHxD)	128 x 9.5 x 127mm	
	Disc Capacity	**DVD-ROM**	Single layer: Up to 4.7 GB Double layer: Up to 8.5 GB
	Access Times	**DVD-ROM Single Layer**	< 110 ms (typical)
		CD-ROM Mode 1	< 110 ms (typical)
		Full Stroke DVD	< 230 ms (typical)
		Full Stroke CD	< 220 ms (typical)
	Power	**Source**	SATA DC power receptacle
		DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p
		DC Current	5 VDC – <800mA typical, < 1600 mA maximum
	Operating Environmental (all conditions non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)
		Relative Humidity	10% to 80%
		Maximum Wet Bulb Temperature	84° F (29° C)
	Operating Systems Supported	Windows 10, Windows 7 Professional 32-bit and 64-bit, Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*. Linux® No driver is required for this device. Native support is provided by the operating system.	
	Kit Contents	9.5mm Slim DVD-ROM Drive, slim SATA data/power cable, installation guide	
HP 9.5mm Slim BDXL Blu-Ray Writer	**Description**	9.5mm height, tray-load	
	Mounting Orientation	Either horizontal or vertical	
	Interface Type	SATA/ATAPI	
	Dimensions (WxHxD)	128 x 9.5 x 127mm	
	Supported Media Types	BD-ROM BD-R BD-RE DVD-RAM DVD+R DVD+RW DVD+R DL DVD-R DL DVD-R DVD-RW CD-R CD-RW	
	Disc Capacity	**DVD-ROM**	8.5 GB DL or 4.7 GB standard
		Blu-ray	25 GB (single-layer) 50 GB (dual-layer) 100/128 GB (BDXL)
	Access Times	**Full Stroke DVD**	< 230 ms (seek)
		Full Stroke CD	< 220 ms (seek)

Technical Specifications - Optical and Removable Storage

	Blu-ray	< 230 ms (seek) (Full Stroke Blu-ray)
	Startup Time	(Time to drive ready from tray loading) BD-ROM (SL/DL) 25S / 28S BD-R (SL/DL) 25S / 28S BD-RE (SL/DL) 25S / 28S DVD-ROM (SL/DL) 18S / 18S DVD-R (SL/DL) 25S / 25S DVD-RW 25S DVD+R (SL/DL) 25S / 25S DVD+RW 25S DVD-RAM 45S CD-ROM 15S
Maximum Data Transfer Rates	**CD ROM Read**	CD-ROM, CD-R Up to 24X CD-RW Up to 24X
	DVD ROM Read	DVD-RAM Up to 8X DVD+RW Up to 8X DVD-RW Up to 8X DVD+R DL Up to 8X DVD-R DL Up to 8X DVD-ROM Up to 8X DVD-ROM DL Up to 8X DVD+R Up to 8X DVD-R Up to 8X
	Blu-ray	BD-ROM Up to 6X BD-ROM DL Up to 6X BD-R Up to 6X BD-R DL Up to 6X BD-R Up to 6X BD-RE SL/DL Up to 6X
Power	**Source**	SATA DC power receptacle
	DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p
	DC Current	5 VDC -900 mA typical, 2000mA maximum
Operating Environmental (all conditions non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)
	Relative Humidity	10% to 80%
	Maximum Wet Bulb Temperature	84° F (29° C)
Operating Systems Supported	Windows 8.1, Windows 8 32-bit and 64-bit, Windows 7 Professional 32-bit and 64-bit, Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*. Linux® No driver is required for this device. Native support is provided by the operating system.	
Kit Contents	9.5mm Slim BDXL Blu-Ray Writer, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide	
NOTES	As Blu-ray is a new format containing new technologies, certain disc, digital connection, compatibility and/or performance issues may arise, and do not	

		constitute defects in the product. Flawless playback on all systems is not guaranteed. In order for some Blu-ray titles to play, they may require a DVI or HDMI digital connection and your display may require HDCP support. HD-DVD movies cannot be played on this workstation.
HP SD Media Card Reader	**Description**	e USB3.0-SD4.0
	Interface Type	• Support USB 2.0 LPM function • Support USB 3.0 U1/U2/U3 Power saving mode • Support USB 3.0 LTM function.
	Dimensions (WxHxD)	Dedicated slot in front bezel (orderable option)
	Supported Media Types	i. Secure Digital Card (SD) ii. Secure Digital Support up to 2TB iii. Secure Digital HC (SDHC) iv. Secure Digital XC (SDXC) v. Support SD USH50 mode vi. miniSD *1 vii. miniSDHC*1 viii. MicroSD*1 ix. MicroSDHC*1 x. MicroSDXC*1 Note: "*1" means Adapter Needed
	Operating Systems Supported	No driver is required for this device. Native support is provided by the operating system. Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. Windows 10 is automatically updated, which is always enabled. ISP fees may apply and additional requirements may apply over time for updates. See http://www.microsoft.com. See http://www.microsoft.com/windows/windows-7/ for details.

Technical Specifications - Controller Cards

HP Thunderbolt™ 3 PCIe 3-port I/O Card	**Data Transfer Rate**	Supports up to 40 Gb/s 40,000 Mb/s)
	Devices Supported	Thunderbolt™ certified devices
	Bus Type	PCIe card, full or half height PCIe slots
	Ports	One USB 3.1 Type-C connector (Rear)
	Internal Connectors	One 60-pin board-to-board (FlexIO) connector
	System Requirements	Windows 10 RS3 64-bit, Intel® i5 series or higher processor, 4-GB RAM, 20-GB Hard Drive, available PCIe slot.
	Temperature - Operating	50° to 131° F (10° to 55° C)
	Temperature - Storage	-22° to 140° F (-30° to 60° C)
	Relative Humidity - Operating	20% to 80%
	Compliances	FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC
	Operating Systems Supported	-Windows 10 RS3 64-bit.
	Kit Contents	HP Thunderbolt™ 3 PCIe 3-port I/O Card, full height and half height bulkhead bracket, DisplayPort™ and GPIO (General-Purpose Input/Output) cable, FlexIO adapter board, Installation documentation and warranty card.

Technical Specifications - Networking and Communications

Integrated Intel® I219LM PCIe GbE Controller (Intel® vPro™ with Intel® AMT 12.0)	**Connector**	RJ-45
	Controller	Intel® I217LM GbE platform LAN connect networking controller
	Memory	3 KB Tx and 3KB Rx FIFO packet buffer memory
	Data Rates Supported	10/100/1000 Mbps
	Compliance	802.1as/1588, 802.1p, 802.1Q, 802.3, 802.3ab, 802.3az, 802.3i, 802.3u, 802.3z
	Bus Architecture	PCI Express and SMBus
	Data Transfer Mode	PCIe-based interface for active state operation (S0 state) and SMBus for host and management traffic (Sx low power state)
	Power Requirement	Requires 3.3V (integrated regulators for core Vdc)
	Boot ROM Support	Yes
	Network Transfer Mode	Full-duplex; Half-duplex (not supported for the 1000BASE-T transceiver)
	Network Transfer Rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps
	Management Capabilities	vPro, WOL, auto MDI crossover, PXE, Muti-port teaming, RSS, ACPI, Advanced cable diagnostic, loopback modes, AMT 12.0 support, Circuit Breaker, VLAN, Multicast Listener Discovery (MLD)

Intel® X710-DA2 2-Port SFP+ 10GbE NIC	**Connector**	2 SFP+ Ports
	Cabling	Twin Axial Cabling up to 10m
	Controller	Intel® Ethernet Controller X710-AM2
	Network Transfer Rates Supported	10GbE (with supported 10GBASE-SR transceivers)
	Data Path Width	PCIe Gen3x8 (compatible with x4)
	Power Requirement	4.3W (typical) (with supported 10GBASE-SR transceivers)
	Operating Temperature	32° to 131° F (0° to 55° C)
	Dimensions (HxW)	2.703 x 6.578 inches
	Operating System Driver Support	Windows 10 64-bit Linux®
	Kit Contents	• Intel® X710-DA2 2-Port SFP+ 10GbE NIC with standard height bracket attached • Low-profile bracket • Product Literature

HP 10GbE SFP+ SR Transceiver	**Operating Temperature**	32°F to 113°F (0°C to 45°C)
	Operating Humidity	0% to 85%, noncondensing
	Dimensions (HxWxD)	0.47 x 0.54 x 2.19 inches

Technical Specifications - Networking and Communications

	Kit Contents	HP 10GbE SFP+ SR Transceiver
Intel® X550-T2 2-Port 10GbE NIC	**Connector**	2 RJ-45
	Cabling	10GbE: Cat6a (or better) up to 100m 5GbE and below: Cat5e (or better) up to 100m
	Controller	Intel® Ethernet Controller X550
	Network Transfer Rates Supported	10GbE, 5GbE, 2.5GbE, 1GbE, 100MbE
	Data Path Width	PCIe Gen3x4
	Power Requirement	11.2W (typical)
	Operating Temperature	32° to 131° F (0° to 55° C)
	Dimensions (HxW)	5.1 x 2.7 in (without brackets)
	Operating System Driver Support	Windows 10 64-bit Linux®
	Kit Contents	• Intel® X550-T2 2-Port 10GbE NIC with standard height bracket attached • Low-profile bracket • Product Literature
Aquantia® AQN-108 1-Port 5GbE NIC	**Connector**	1 RJ-45
	Cabling	Cat5e (or better) up to 100m
	Controller	Aquantia® AQC108
	Network Transfer Rates Supported	5Gbe, 2.5GbE, 1GbE, 100MbE
	Data Path Width	PCIe Gen3x1
	Power Requirement	3.5W (typical)
	Operating Temperature	32° to 131° F (0° to 55° C)
	Dimensions (HxW)	3.72 x 3.18 inches (without brackets)
	Operating System Driver Support	Windows 7 64-bit; Windows 10 64-bit; Linux®
	Kit Contents	• Aquantia AQN-108 1-Port 5GbE NIC with standard height bracket attached • Low-profile bracket • Product Literature
Intel® I350-T2 2-Port 1GbE NIC	**Connector**	2 RJ-45
	Cabling	Cat5e (or better) up to 100m
	Controller	Intel® Ethernet I350 Controller
	Network Transfer Rates Supported	1GbE, 100MbE, 10MbE
	Data Path Width	PCIe Gen2.1x4
	Power Requirement	4.4W (typical)
	Operating Temperature	32° to 131° F (0° to 55° C)
	Dimensions (HxW)	2.75 x 5.5 inches (without brackets)

Technical Specifications - Networking and Communications

	Operating System Driver Support	Windows 7 64-bit; Windows 10 64-bit; Linux®
	Kit Contents	• Intel® I350-T2 2-Port 1GbE NIC with standard height bracket attached • Low-profile bracket • Product Literature
Intel® I350-T4 4-Port 1GbE NIC	**Connector**	4 RJ-45
	Cabling	Cat5e (or better) up to 100m
	Controller	Intel® Ethernet I350 Controller
	Network Transfer Rates Supported	1GbE, 100MbE, 10MbE
	Data Path Width	PCIe Gen2.1x4
	Power Requirement	5W (typical)
	Operating Temperature	32° to 131° F (0° to 55° C)
	Dimensions (HxW)	2.75 x 5.5 inches (without brackets)
	Operating System Driver Support	Windows 7 64-bit; Windows 10 64-bit; Linux®
	Kit Contents	• Intel® I350-T4 4-Port 1GbE NIC with standard height bracket attached • Low-profile bracket • Product Literature
Intel® 9560 802.11ac, BT 5, M.2	**WLAN Standards**	802.11a/b/g/n/ac, 802.11d, 802.11e, 802.11h, 802.11i, 802.11w, 802.11r, 802.11k, 802.11v 802.11ac Wave 2 (up to 1.73Mbps, 160MHz Channels, MU-MIMO)
	Antenna	2x2 Dual-Band
	Bluetooth Standards	5
	Operating Temperature	32° to 131° F (0° to 55° C)
	Interface	M.2 CNVio
	Dimensions	M.2 2230
	Kit Contents	Not Available
HP Power Cord Kit		DM293A
HP Serial Port Adapter		3TK82AA
HP eSATA PCI Cable Kit	**Part Number**	FH966AA
	Features	• 1x eSATA ports • Bring the same ultra-fast SATA performance that you demand from your internal SATA hard drives to an external eSATA hard drive. • Faster transfer rates than existing external storage solutions: USB 2.0 & 1394. • Complete motherboard to eSATA PCI bracket solution. • Robust and user friendly external eSATA connector.
	Part Number	4KY89AA

Technical Specifications - Networking and Communications

Z2 G4 TWR Bezel w/ Dust Filter option	**Overview**	Workstations are deployed in a variety of different ways and in different environments, from under a desk to manufacturing floors. HP Workstations designed a dust filter option to further protect the system against the ingress of dust and other particles over the life of the system. Test have shown a reduction of dust ingress of up to 32% for the HP Z2 Tower G4 Workstation platform and is cleanable and serviceable by customers. There is also a BIOS setting that will warn customer when it is time to check and clean their filters.
	Cleaning and servicing the dust filter	1. After removing the filter from the system bezel (dust filter can be removed without the use of tools from the front bezel), either blow it with and wash with water or use a delicate duster (feather duster)to brush off the filter then rinse it with water. 2. Allow the filter half a day to dry at room temperature (25C at 30%-50% humidity) 3. Temperature of water can be 0-70C, due to the dust filter meeting the SQTM 70C humidity test. Suggested water temperature for best user experience is 0-50C. 4. Normal tap water (and most other types of water) can be used to rinse the filter. Any type of corrosive liquid is restricted.
	Enabling the Check Filter warning in the BIOS:	1. Customers must enable the BIOS setting once they receive their filter. 2. To enable, do the following once you see the boot screen for your system: F10 > Advanced > Built-In Device Options > Dust Filter 3. Select to enable the Dust Filter replacement reminder, which can be set for 15, 30, 60, 90, 120, or 180 days. The Reminder will show during POST after the reminder timer has expired. 4. **NOTE:** customers who anticipate more dust ingress in their environments should set the reminder for a shorter window. Customers anticipating longer ingress can set the reminder for a longer window.
	BIOS Warnings	Large enterprise customers deploying multiple systems can centrally enable/control the BIOS warning using the WMI/BCU tool remotely to set the options below: **Dust Filter** • Disable* • Enable **Dust Filter Reminder (Days)** 15, 30, 60*, 90, 120, and 180
Z2 G4 Dust Filter (Filter Only)	**Part Number**	3TQ24AA This is intended to be a replacement filter for the HP Z2 Tower G4 Workstation in the event that the original filter would need to be replaced.
HP Z2 Tower G4 Workstation Front Card Guide Kit	**Part Number**	4KY82AA
	Features	This front card guide kit is required to enable added mechanical stability when configuring select graphics cards on the HP Z2 Tower G4 Workstation. The kit enables added mechanical stability when configuring: • 3x NVIDIA® NVS NVS 310 or NVS 315 graphics cards

- 2x NVIDIA® NVS 510 graphics cards
- 1x NVS 310 plus 1x NVS 510 graphics cards
- 2x AMD W2100 graphics cards
- 1x NVIDIA® Quadro® M4000, M5000 graphics cards
- 1x AMD FirePro W7000 graphics card

MISCELLANEOUS FEATURES

Management Features

- Advanced Configuration and Power Management Interface (ACPI). Allows the system to wake from a low power mode. Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system.
- Intel® Wired for Management support; industry wide initiative to make Intel® architecture based PCs, servers and mobile computers more inherently manageable out-of-the-box and over the network
- Dual State Power Button; acts as both an on/off button and a suspend-to-sleep button

Serviceability Features

- Dual colored power LED on front of computer to indicate either normal or fault condition
- Diagnostic LED Explanation Table:
  - Power LED will blink red 2 to 5 times, then blink white 2 or more times, then repeat (with beep tones for each blink initially):
    - 2 red + 2 white User must provide file for BIOS recovery (USB storage typically)
    - 2 red + 3 white User must enter a key sequence to proceed with recovery by policy
    - 2 red + 4 white BIOS recovery is in progress
    - 3 red + 2 white Memory could not be initialized
    - 3 red + 3 white Graphics adaptor could not be found
    - 3 red + 4 white Power supply failure / not connected
    - 3 red + 5 white Processor not installed
    - 3 red + 6 white Current processor does not support an enabled feature
    - 4 red + 2 white Processor has exceeded its temperature threshold / system thermal shutdown
    - 4 red + 3 white System internal temperature has exceeded its threshold
    - 5 red + 2 white System controller firmware is not valid
    - 5 red + 3 white System controller detected BIOS is not executing
    - 5 red + 4 white BIOS could not complete initialization / PCA failure
    - 5 red + 5 white System controller rebooted the system after a health or recovery timer triggered
- HP PC Hardware Diagnostics UEFI:
  - This utility enables hardware level testing outside the operating system on many components. The diagnostics can be invoked by pressing F2 at POST, and is available as a download from HP Support
- System/Emergency ROM
- Flash ROM
- CMOS Battery Holder for easy replacement
- Flash Recovery with Video Configuration Record Software5 Aux Power LED on System PCA
- Processor ZIF Socket for easy Upgrade
- Over-Temp Warning on Screen (Requires IM Agents)
- Clear Password Jumper
- DIMM Connectors for easy Upgrade
- Clear CMOS Button
- NIC LEDs (integrated) (Green & Amber)
- Color coordinated cables and connectors
- Tool-less Hood Removal
- Front power switch
- System memory can be upgraded without removing the system board or any internal components
- Tool-less Hard Drive, CD & Diskette Removal
- Blue Pull Tabs, and Quick Release Latches for easy Identification

Summary of Changes

Date of change:	Version History:		Description of change:
July 23, 2018	From v1 to v2	Added	AMD FirePro™ WX3100 2GB Graphics specs
July 30, 2018	From v2 to v3	Changed	Number of supported cards for Nvidia P620 changed to 1
September 13, 2018	From v3 to v4	Changed	Supported components, System Configurations and Technical Specifications – Graphics sections, format changes
January 17, 2019	From v4 to v5	Added	Compliance with FIPS 140-2 TPM 2.0
		Removed	HP DX115 Removable Drive Enclosure
March 11, 2019	From v5 to v6	Update	Internal I/O
April 3, 2019	From v6 to v7	Update	Rear image corrected
May 28, 2019	From v7 to v8	Added	Processors Refresh and added new NVIDIA Quadro RTX Graphics
June 12, 2019	From v8 to v9	Changed	Storage section
July 5, 2019	From v9 to v10	Changed	Power Supply section
August 19, 2019	From v10 to v11	Changed	Format page 12
August 27, 2019	From v11 to v12	Changed	Supported Drive Interfaces
September 1, 2019	From v12 to v13	Added	HP Z Turbo Drive G2 256 and 512GB SED TLC to Storage section