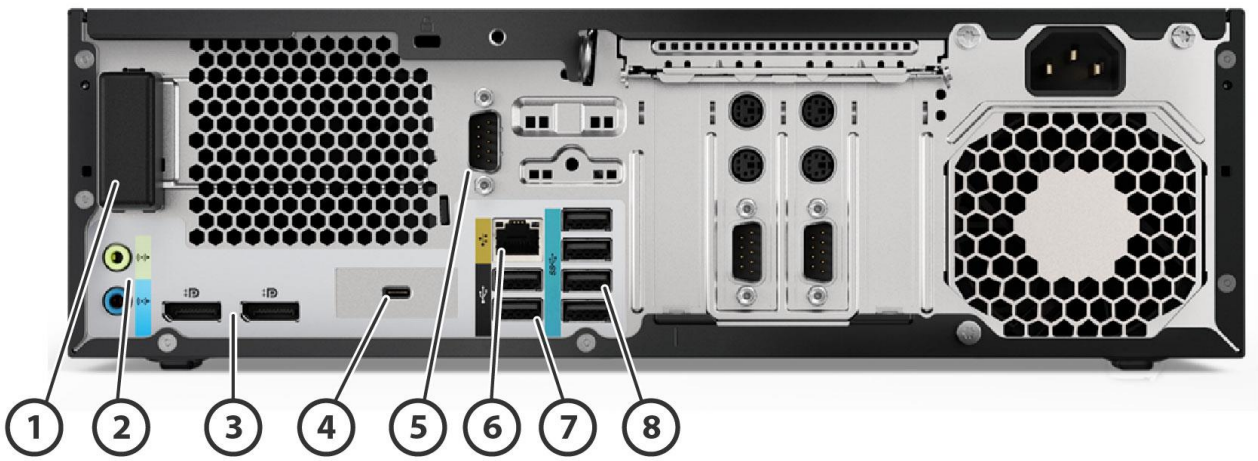
Overview

HP Z2 Small Form Factor G4 Workstation

Front View

1. Power button
2. Combo Microphone/Headphone
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/internal shared 3.5" bay
8. Slim ODD bay

Overview



Rear view

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

Supported Components

Form Factor Small Form Factor

Operating Systems Preinstalled:

- Windows 10 Home*
- Windows 10 Pro*
- 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	95W
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	3.5	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

Supported Components

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	65W
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	65W
Intel® Core™ i5-9600 processor[1,2]	6	3.1	4.6	9	2666	Y	Intel® UHD Graphics 630	Y	Y	65W
Intel® Core™ i5-9500 processor[1,2]	6	3.0	4.4	9	2666	Y	Intel® UHD Graphics 630	Y	Y	65W
Intel® Core™ i3-9100 processor[1]	4	3.6	4.2	8	2666	Y	Intel® UHD Graphics 630	Y	N	65W
Intel® Core™ i7-8700 processor[1]	6	3.2	4.6	12	2666	Y	Intel® UHD Graphics 630	Y	Y	65W
Intel® Core™ i5-8500 processor[1]	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.

NOTES: Integrated Intel® UHD graphics P630 is supported on 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.

Supported Components

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
Convertibility	The Z2G4 SFF can either be placed flat on the desktop or made to stand on the desk with the optional tower stand.
Expansion Slots (see system board section for more details)	1 PCIe Gen3 x16 slot 1 PCIe Gen3 x1 slot /x4 connector 1 PCIe Gen3 x1 slot /x4 connector 1 PCIe Gen3 x4 slot /x16 connector 2 M.2 storage (PCIe Gen3 x4)* 1 M.2 Wlan (PCIe Gen3 x1+ intel CNVI)* (all slots are Low Profile) **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 at 80mm
Expansion Bays	1 shared internal/external 3.5" bay. 1 internal 3.5" bay 1 internal 2.5" bay (for SSD only)
Front I/O	1 USB-A 3.0, 1 USB-A 3.0 Charging Data Port, 1 Combo Microphone/Headphone, and 1 USB-C 3.1 Gen2 Charging Data Port (Optional). 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 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-A 3.0 ports, 2 USB-A 2.0 ports, 1 serial port (Optional), RJ-45 (LOM), 1 Audio Line-in, and 1 Audio Line-out, Optional PS/2 ports, Flex IO port (3rd DisplayPort™/HDMI/VGA/2nd 1GbE LAN/ USB-C 3.1 Gen2 Charging Port with Alt mode/Thunderbolt™ 3.0 (Thunderbolt™ uses Flex IO connection but will be a PCIe Gen 3 Add-in card)
Interfaces Supported	SD Media Card Reader (optional), USB-C 3.1 Gen2 Charging Port (optional)
Chassis Dimensions (H x W x D)	Standard desktop orientation: 100 x 338 x 381 mm (3.95 x 13.3 x 15.0 in); Optional SFF Tower orientation (excluding stand dimension): 338 x 100 x 381 mm (13.3 x 3.95 x 15.0 in)
Weight	Exact weights depend upon configuration Minimum Weight: 5.5 kg (12.12 lb) Typical Weight*: 6.3 kg (13.82 lb) Maximum Weight: 7.8 kg (17.17 lb) Max Supported Weight (desktop orientation): 35 kg (77 lb) Packaging (H x W x D): 499 x229 x 518 mm(19.65 x 9.02 x 20.39 in) Shipping Weight: 9.35 kg(20.6 lb) * Configured with 1 3.5" hard drives, 1 optical drive, 2 DIMMs and 1 NVIDIA Quadro P620 graphics card
Power Supply	400W internal power adapter, up to 92% efficiency, active PFC 310W 90% Efficiency wide-ranging, active Power Factor Correction (PFC)

Supported Components

	250W 92% Efficiency wide-ranging, active PFC Power Supply option available in some countries. **NOTE:** The Power Supply Efficiency Report may be found at this link: https://www.plugloadsolutions.com/80PlusPowerSupplies.aspx
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.
Workstation ISV Certifications	See the latest list of certifications at http://www.hp.com/united-states/campaigns/workstations/partnerships.html

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™ i7-8700 3.2 26666 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

Supported Components

NOTE 1: Intel® Integrated Graphics P630 for Xeon processors support 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
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 CMR	Y	Y	QB576AA
2TB SATA 7200 rpm 6Gb/s 3.5" HDD SMR	Y	Y	8VE04AA/AT
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	
1TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	Y	Y	W0R10AA
2TB 7200RPM SATA 3.5in Enterprise	Y	Y	2Z274AA
8TB 7200RPM SATA 3.5in Enterprise	Y	Y	2Z273AA

SATA Solid State Drives	Factory Configured	Option Kit	Option Kit Part Number
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 512 GB SATA 6 Gb/s SED Opal 2 SSD	Y	Y	
Storage Acceleration			
16GB Intel® Optane™ memory*	Y	Y	2EB68AA

Supported Components

*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/AT
	HP Z Turbo Drv G2 256GB SED TLC PCIe SSD **	Y	Y	5RR61AA
	HP Z Turbo Drv G2 512GB SED TLC PCIe SSD **	Y	Y	5RR62AA
	HP Z Turbo Drive 1TB SED Z2 G4 TLC SSD Kit	Y	Y	6YT77AA
	HP 256GB M.2 2280 PCIe NVMe TLC SSD Z2/Z4/Z6 Kit	Y	Y	8PE68AA
	HP 512GB M.2 2280 PCIe NVMe TLC SSD Z2/Z4/Z6 Kit	Y	Y	8PE69AA
	HP 1TB M.2 2280 PCIe NVMe TLC SSD Z2/Z4/Z6 Kit	Y	Y	8PE70AA
	Intel® 905p Series SSD (Optane SSD)			
	Intel® Optane SSD 905p 280GB AiC	Y	Y	2SC47AA
	Intel® Optane SSD 905p 480GB AiC	Y	Y	2SC48AA

* PCIe card installed in standard PCIe x4 slot
** Installed in native M.2 storage slot Z2G4

NOTE 1: 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 2: The HP Z2G4 TWR 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 slots on the system's motherboard.

Hard Drive Controllers		**Factory Configured**	**Option Kit**
	Integrated SATA Controller (Z2G4)		
	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

Supported Components

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 Graphics	**Integrated Intel® HD Graphics (Z2G4)**				
	Intel® UHD Graphics P630	Y	N		1
	Intel® UHD Graphics 630	Y	N		1
	Intel® UHD Graphics 610	Y	N		1
Graphics DisplayPort™ Cable Adapters	HP DisplayPort™ To DVI-D Adapter	Y	Y	FH973AA	1
	HP DisplayPort™ To DVI-D Adapter (2-Pack)	Y	N		1
	HP DisplayPort™ To DVI-D Adapter (4-Pack)	Y	N		1
	HP DisplayPort™ To VGA Adapter	N	Y	AS615AA	1
	HP DisplayPort™ to Dual Link DVI Adapter	Y	Y	NR078AA	1
	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	NVIDIA® Quadro® P400 2GB Graphics	Y	Y	1ME43AA	2
	NVIDIA® Quadro® P620 2GB Graphics	Y	Y	3ME25AA	1
Mid-range 3D	NVIDIA® Quadro® P1000 4GB Graphics	Y	Y	1ME01AA	1
	AMD Radeon™ Pro WX3100 4GB Graphics	Y	Y	2TF08AA	1
	AMD Radeon™ Pro WX 3200 4GB Graphics	Y	Y	6YT68AA	1
	AMD Radeon™ Pro WX4100 4GB Graphics	N	Y	Z0B15AA	1

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. Utility.

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
	32GB DDR4-2666 ECC (2x16GB) RAM

Supported Components

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

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
HP 16GB (1x16GB) DDR4-2666 nECC Unbuffered RAM	3PL82AA
HP 32GB (1x32GB) DDR4-2666 nECC Unbuffered RAM	6FR91AA

NOTES: Only unbuffered DDR4 DIMMs are supported.

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.

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.

Factory-configured CTO (xxxxxAV) and aftermarket AMO (xxxxxAA, xxxxxAT) HP memory part numbers designated as “2666” will be transitioned to use "3200" speed memory components. This does not affect HP part number availability, nor does it affect system performance or operation. All hardware configurations currently supporting HP memory part numbers designated as “2666” have been tested to work with “3200" memory and are fully supported by HP under standard support terms.

Multimedia and Audio Devices	Factory Configured	Option Kit	Option Kit Part Number

Supported Components

	Integrated Conexant CX20632 5.1 HDA codec	Y	N

Optical and Removable Storage		Factory Configured	Option Kit	Option Kit Part Number
	HP SlimTray Optical Drives			
	HP 9.5mm Slim DVD Writer	Y	N	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			
	HP SD Media Card Reader	Y	N	N/A
	HDD Frame/Carriers			
	HP DP25 Removable 2.5" HDD Frame/Carrier	N	Y	W3J84AA
	HP DP25 Removable 2.5" HDD Spare Carrier	N	Y	W3J85AA

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.

Controller Cards		Factory Configured	Option Kit	Option Kit Part Number
	HP Thunderbolt™ 3 PCIe I/O Card	Y	Y	4CX35AA

Note 1: Utilizes Flex IO port internal connection for video output

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
	Intel® AX200 802.11 a/b/g/n/ac/ax(WiFi 6) WLAN + Bluetooth 5 PCIe	N	Y	7CE01AA

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

Supported Components

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 Solenoid Lock and Hood (SFF) Sensor	Y	Y	J6L43AA
	HP Business PC Security Lock Kit*	N	Y	PV606AA
	HP UltraSlim Cable Lock Kit	N	Y	T1A62AA

* The HP Business PC Security Lock Kit does not work with the Integrated Work Center stand.

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 Business Slim CCID SmartCard Keyboard	Y	Y	
	HP USB Business Slim Keyboard	Y	Y	N3R87AA
	HP PS/2 Business Slim Keyboard	N	Y	
	HP Wireless Business Slim Keyboard & Mouse	Y	Y	N3R88AA

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® Qualified Configuration	Y	N	
	HP PCIe x1 Parallel Port Card	N	Y	N1M40AA
	HP (SFF) Tower Stand	Y	Y	VN569AA
	HP Z2 SFF G4 Bezel w/ Dust Filter option	N	Y	4KY90AA
	HP Z2 SFF G4 Dust filter only	N	Y	3TQ23AA

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

Software		Factory Configured	Option Kit	Support Notes

Supported Components

HP Performance Advisor	Y	N	See Note 1
HP Velocity	Y	N	
HP Remote Graphics Software (RGS) 7.x	Y	N	
HP PC Hardware Diagnostics UEFI (Windows OS only)	Y	N	See Note 2

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
Windows 10 Pro
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

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.

Supported Components

- 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.
- 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.

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
Secure Erase [18]
Absolute Persistence Module[19]
Pre-boot Authentication
HP Wireless Wakeup

Software
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
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]
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

Supported Components

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.
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 7.63. 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 24.38 x 24.38 mm (9.6 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 Windows® 7 Professional 64-Bit or 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 (LP, half length) • 1 PCI Express Gen3 slot x4 mechanical/ x1 electrical (LP, half length) • 1 PCI Express Gen3 slot x4 mechanical/ x1 electrical (LP, half length) • 1 PCI Express Gen3 slot x16 mechanical/ x4 electrical (LP, half length) • 2 M.2 storage (PCIe Gen3 x4)[1] • 1 M.2 WLAN (PCIe Gen3 x1+ Intel CNVi) **NOTE:** LP = Low Profile **NOTE:** In the PCIe Gen3 slot (x16 electrical/x16 mechanical) slot, if it is not being used for a graphics card, only cards certified as After Market Options for this platform are supported. **NOTE 1:** M.2 storage slot supports compatible devices up to 80mm
Supported Drive Interfaces	**SATA**: Integrated (4) Serial ATA interfaces (6Gb/s SATA). RAID 0 and 1 supported. Factory integrated RAID for Microsoft Windows only. **Serial Attached SCSI**: None **Integrated RAID**: **NOTE:** Requires identical hard drives (speeds, capacity, interface)
	Integrated Graphics Intel® UHD Graphics 610 (on Pentium Gold-5xxx processors); Intel® UHD Graphics 630 (on Core i3/i5/i7-8xxxx processors); Intel® Integrated Graphics for Xeon E 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; 2 DP 1.2 graphics ports integrated on motherboard; Supports up to three simultaneous displays across DP outputs. 2 DP are native on the system, 3rd DP is optional via Flex IO port Max. resolution supported: 4096x2160 @60Hz

System Technical Specifications

	Network Controller	Integrated Ethernet PHY Connection I219LM. Management capabilities: WOL, PXE 2.1 and AMT 12.0
	IDE connector	No
	Floppy connector	No
	Serial	Yes- requires optional Serial Port Adapter Kit
	2nd Serial	Yes- requires optional Serial Port Adapter Kit
IEEE 1394 Connector(s)		
USB Connector(s)	**Front**	2 USB-A 3.0, 1 USB-C 3.1 Gen2 (optional)
	Rear	4 USB-A 3.0, 2 USB-A 2.0
	Internal	1 USB 3.0, 2 USB 2.0
HD Integrated Audio	Yes	
Flash ROM	Yes	
Chassis Fan Header	Yes	
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	
Power Supply Headers	Yes	
Power Switch, Power LED & Hard Drive LED Header	Yes	
Clear Password Jumper	Yes	
Keyboard/Mouse	USB or PS/2 (Option)	

System Configurations							
Z2G4 SFF 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 500 GB 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)	10.923		10.726		10.907	
	Windows short Idle (S0)	13.260		11.751		12.327	
	Windows Busy Typ (S0)	69.719		67.981		69.363	
	Windows Busy Max (S0)	92.524		91.362		92.438	
	Sleep (S3)	1.029	0.919	1.012	0.917	1.025	0.928
	Off (S5)	0.691	0.526	0.678	0.531	0.679	0.526
	Zero Power Mode (EuP)	0.229		0.237		0.228	
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)	37.269		36.597		37.215	

System Technical Specifications

	Windows short Idle (S0)	45.243		40.094		42.060	
	Windows Busy Typ (S0)	237.881		231.951		236.667	
	Windows Busy Max (S0)	315.692		311.727		315.398	
	Sleep (S3)	3.511	3.136	3.453	3.129	3.450	3.166
	Off (S5)	2.358	1.795	2.313	1.812	2.317	1.795
	Zero Power Mode (EuP)	0.781		0.809		0.778	
Z2G4 SFF Configuration #2 (TBD) ENERGY STAR® CERTIFIED	**Processor Info**	1x Intel® Core™ i7-8700 3.2 12MB 65W CPU					
	Memory Info	16GB (2x 8GB) 2666 MHz DDR4 ECC					
	Graphics Info	1x NVIDIA® Quadro® P620 2GB Graphics					
	Disks/Optical/Floppy	1x SATA 1 TB 7.2k rpm/ 1x9.5mm Slim ODD					
	PSU	310W 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)	19.648		18.526		18.484	
	Windows short Idle (S0)	21.091		21.388		21.103	
	Windows Busy Typ (S0)	153.53		151.26		154.897	
	Windows Busy Max (S0)	179.01		178.05		181.1	
	Sleep (S3)	1.380	1.273	1.384	1.239	1.372	1.271
	Off (S5)	0.714	0.554	0.705	0.547	0.712	0.553
	Zero Power Mode (EuP)	0.236		0.233		0.235	
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)	67.039		63.211		63.067	
	Windows short Idle (S0)	71.962		72.805		72.003	
	Windows Busy Typ (S0)	523.844		516.100		528.509	
	Windows Busy Max (S0)	610.782		607.507		617.913	
	Sleep (S3)	4.709	4.343	4.722	4.227	4.681	4.337
	Off (S5)	2.436	1.890	2.405	1.866	2.429	1.887
	Zero Power Mode (EuP)	0.805		0.795		0.802	
Z2G4 SFF Configuration #3 (TBD)	**Processor Info**	1x Intel® Xeon® E-2176 3.7 8MB 80W CPU					
	Memory Info	64GB (4x16GB) 2666 MHz DDR4 ECC					
	Graphics Info	1x AMD®Radeon Pro® WX 3100 4GB Graphics					
	Disks/Optical/Floppy	1x 4TB 7.2k rpm Enterprise SATA					
	PSU	310W 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)	26.453		26.666		25.821	
	Windows short Idle (S0)	27.842		27.759		26.823	

System Technical Specifications

	Windows Busy Typ (S0)	181.72		179.41		189.543	
	Windows Busy Max (S0)	211.71		214.01		212.21	
	Sleep (S3)	1.901	1.734	1.897	1.782	1.718	1.606
	Off (S5)	0.705	0.549	0.715	0.543	0.709	0.546
	Zero Power Mode (EuP)	0.235		0.237		0.231	
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)	90.258		90.984		88.101	
	Windows short Idle (S0)	94.997		94.714		91.520	
	Windows Busy Typ (S0)	620.029		612.147		646.721	
	Windows Busy Max (S0)	722.355		730.202		724.061	
	Sleep (S3)	6.486	5.916	6.473	6.080	5.862	5.450
	Off (S5)	2.405	1.873	2.440	1.853	2.419	1.863
	Zero Power Mode (EuP)	0.802		0.931		0.788	

Power Supply	400W internal power adapter, up to 92% efficiency, active PFC 310W, 90% efficiency, wide-ranging, active PFC Power Supply; 250W, 92% efficiency, wide-ranging, active PFC Power Supply; The Z2G4 SFF 92% PSU Efficiency Report can be found at this link: https://www.plugloadsolutions.com/80PlusPowerSupplies.aspx
Operating Voltage Range	90-264 VAC
Rated Voltage Range	100-240 VAC
Rated Line Frequency	50-60 Hz
Operating Line Frequency Range	47-63 Hz
Rated Input Current	4A @ 100-240V
Heat Dissipation	Typical: TBD btu/hr (TBD kcal/hr) Maximum: TBD btu/hr (TBD kcal/hr)
Power Supply Fan	70mm x 70mm x 25 mm 4-wire PWM
ENERGY STAR® certified (Config Dependent)	Yes
FEMP Standby Power Compliant	Yes, with Wake-on-LAN disabled: <1W in S4/S5- Power Off
Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)	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

System Technical Specifications

Declared Noise Emissions (Entry-level, Mid-level, and High-end configurations)

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 Graphics
	Disks/Optical	1 TB SATA 6Gb/s SSD No Optical

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296) Test Unit on ISO Table	**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
Idle	3.2	18
Hard drive Operating (random reads)	3.2	18

System Configuration (Mid-level)	**Processor Info**	Intel® Xeon® processor E-2136
	Memory Info	64GB DDR4-2666 nECC (4x16GB) RAM
	Graphics Info	NVIDIA® Quadro® P1000 4GB
	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) Test Unit on ISO Table	**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
Idle	3.5	25
Hard drive Operating (random reads)	3.4	24

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® P1000 4GB
	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) Test Unit on ISO Table	**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
Idle	3.5	25
Hard drive Operating (random reads)	3.4	24

System Technical Specifications

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
Hard Drives	Tool-less (Internal bay with installed carrier)
Expansion Cards	Tool-less
Processor Socket	Tool-less, except for the processor heatsink.
Blue User Touch Points	Yes, on tool-free 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 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

System Technical Specifications

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
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	No
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): 93mm x 86mm 75.8mm Performance (<=95W): 93mm x 102.7mm x 75.8mm
Chassis Fan	65W CPU: CPU heatsink fan also operates as the chassis fan. 80W CPU: Requires chassis fan (810283-002) along with fan holder (L28631-002) 95W CPU: Requires chassis fan (L13267-001) along with fan holder(L28630-001)
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
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
Trusted Platform Module Chip	Yes
Integrated Chassis Handles	No
Power Supply	Requires T15 Torx or flat blade screwdriver
PCI Card Retention	Yes, rear (all), middle (none), front (none)
Flash ROM	Yes

System Technical Specifications

Diagnostic Power Switch LED on board	Yes
Clear Password Jumper	Yes
Clear CMOS Button	Yes
CMOS Battery Holder	Yes
DIMM Connectors	Yes

Environmental Data

Eco-Label Certifications & declarations

This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:

- IT ECO declaration
- US ENERGY STAR®
- 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.

System Configuration

The configuration used for the Energy Consumption and Declared Noise Emissions data for the Notebook model is based on a "Typically Configured Notebook".

Energy Consumption (in accordance with US ENERGY STAR® test method)	**115VAC, 60Hz**	**230VAC, 50Hz**	**100VAC, 50Hz**
Normal Operation (Short idle)	12.20 W	21.94 W	22.11 W
Normal Operation (Long idle)	18.65 W	18.56 W	18.60 W
Sleep	1.40 W	0.62 W	01.41 W
Off	0.62 W	0.24 W	0.23 W

NOTE:
Energy efficiency data listed is for an ENERGY STAR® compliant product if offered within the model family. HP computers marked with the ENERGY STAR® Logo are compliant with the applicable U.S. Environmental Protection Agency (EPA) ENERGY STAR® specifications for computers. If a model family does not offer ENERGY STAR® compliant configurations, then energy efficiency data listed is for a typically configured PC featuring a hard disk drive, a high efficiency power supply, and a Microsoft Windows® operating system.

Heat Dissipation*	**115VAC, 60Hz**	**230VAC, 50Hz**	**100VAC, 50Hz**
Normal Operation (Short idle)	42 BTU/hr	75 BTU/hr	76 BTU/hr
Normal Operation (Long idle)	64 BTU/hr	63 BTU/hr	64 BTU/hr
Sleep	5 BTU/hr	2 BTU/hr	5 BTU/hr
Off	2 BTU/hr	1 BTU/hr	1 BTU/hr

***NOTE:** Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)	Sound Power (L_{WAd}, bels)	Sound Pressure (L_{pAm}, decibels)
Typically Configured – Idle	3.50	25.2
Fixed Disk – Random writes	3.41	24.3

System Technical Specifications

Longevity and Upgrading

This product can be upgraded, possibly extending its useful life by several years. Upgradeable features and/or components contained in the product may include:

- 3 USB ports
- 1 PC card slot (type I/II)
- 1 ExpressCard/54 slot
- 1 IEEE 1394 Port
- 2 SODIMM memory slots
- Optional expansion base docking station
- 1 multi-bay II storage port
- Interchangeable HDD??

Spare parts are available throughout the warranty period and or for up to "5" years after the end of production.

Batteries

This battery(s) in this product comply with EU Directive 2006/66/EC

Batteries used in the product do not contain:
Mercury greater the1ppm by weight
Cadmium greater than 20ppm by weight

Battery description: CR2032 (coin cell)
Battery type: Lithium

Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC.
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This product is in compliance with the IEEE 1680 (EPEAT) standard at the gold level, see www.epeat.net
- Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.
- This product contains 13.2% post-consumer recycled plastic (by wt.)
- This product is 94.3% recycle-able when properly disposed of at end of life.

Packaging Materials

External:	PAPER/Corrugated	1210 g
Internal:	PLASTIC/Polyethylene Expanded - EPE	207 g
	PLASTIC/Polyethylene low density - LDPE	43 g

The plastic packaging material contains at least 0% recycled content.
The corrugated paper packaging materials contains at least 35% recycled content.

Material Usage

This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/gse.pdf):

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants – may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons

- Chlorinated Paraffins
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- Nickel – finishes must not be used on the external surface designed to be frequently handled or carried by the user.
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Biphenyl Ethers (PBBEs)
- Polybrominated Biphenyl Oxides (PBBOs)
- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) – except for wires and cables, has been voluntarily removed from most applications.
- Radioactive Substances
- Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

Packaging Usage

HP follows these guidelines to decrease the environmental impact of product packaging:

- Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.
- Eliminate the use of ozone-depleting substances (ODS) in packaging materials.
- Design packaging materials for ease of disassembly.
- Maximize the use of post-consumer recycled content materials in packaging materials.
- Use readily recyclable packaging materials such as paper and corrugated materials.
- Reduce size and weight of packages to improve transportation fuel efficiency.
- Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.

End-of-life Management and Recycling

Hewlett-Packard 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/go/reuse-recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

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

System Technical Specifications

HP, Inc. Corporate Environmental Information	For more information about HP's commitment to the environment: Global Citizenship Report http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html Eco-label certifications http://www8.hp.com/us/en/hp-information/environment/ecolabels.html ISO 14001 certificates: http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842 and http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf

System Technical Specifications

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 Z2G4 workstations support Intel® vPro™ technology when purchased with a vPro™ technology capable CPU: Intel® Xeon® processor E-2100 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 Customer Advisories 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.
Certification and Compliance	Environmental Sustainability questions concerning: • Ecolabels (EPEAT, TCO, etc.) • ENERGY STAR, California Energy Commission (CEC) • Compliance with Environmental legislation (EU ErP, China CECP, EU RoHS and other countries) • Supply Chain Social Environmental Responsibility (SER) (conflict minerals; human rights, etc.) • Product specific environmental features (material content, packaging content, recycled content, etc.) • China Energy Label (CEL) • Please contact sustainability@hp.com For country specific Regulatory Compliance approval documents or Regulatory and Safety questions concerning: • Declarations of Conformity (for self-service, go to https://www.hp.com/uk-en/certifications/technical/regulations-certificates.html?jumpid=ex_r135_uk/en/any/corp/hpuk-mu_chev/certificates)

System Technical Specifications

- GS Certificates
- Product Safety Certificates (UL, CB, BIS, etc.)
- EMC Certificates, Declarations of Conformity, or Certificates of Conformity (CE, FCC, ICES, etc.)
- CCC Certificates
- Ergonomics
-

Please contact techregshelp@hp.com

Stable & Consistent Offerings

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

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

Intel® Core™ i3-8100 4C 3.6/3.6 nHT 65W CPU
Intel® Pentium™ Gold 5400 2C 3.7/3.7 HT 54W 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)	
		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 CMR	**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	**Single Track**	1.0 ms *
			Average	11 ms *

	overhead, including settling)	**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)	
	*Actual performance may vary.		
2.0TB SATA 7200 rpm 6Gb/s 3.5" HDD SMR	**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	256MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	1.2 ms *
		Average	12 ms *
		Full Stroke	21 ms *
	Rotational Speed	7,200 rpm	
	Logical Blocks	3,907,029,168	
	Operating Temperature	41° to 140° F (5° to 60° C)	
	*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	Serial ATA (6Gb/s)	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s*	
	Buffer	32MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.6 ms *
		Average	4.2 ms *
		Full Stroke	25ms (typical)*
	Rotational Speed	7200 rpm	
	Operating Temperature	32° to 140° F (0° to 60° C)	
	*Actual performance may vary.		
1TB SATA 7200 rpm 6GB/s 3.5" HDD (Enterprise Class)	**Capacity**	1TB	
	Protocol	SATA	
	Form Factor	3.5"	
		AHCI	

Technical Specifications - Hard Drives

	Controller		
	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	
	Capacity	1TB	
	Protocol	SATA	

*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.		
HP SATA 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.		

Technical Specifications - Hard Drives

HP 256GB SATA 6Gb/s SED Opal 2 SSD	**Capacity**	256GB
	Height	0.28 in; 0.7 cm
	Width	2.5 in; 6.36 cm
	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 512GB SATA 6Gb/s SSD	**Capacity**	512GB
	Height	0.28 in; 0.7 cm
	Width	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 1TB SATA 6Gb/s SSD	**Capacity**	1TB
	Height	0.28 in; 0.7 cm
	Width	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	
	Height:	0.28 in; 0.7 cm	
	Width	2.5 in; 6.36 cm	
	NAND Type	3D TLC	
	Endurance	400TBW (TB Written)	
	Reliability (MTTF)	1.5M hours	
	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*

Technical Specifications - Hard Drives

*Actual performance may vary.

Performance PCIe SSDs for HP Workstations	**HP Z Turbo Drive 256GB M.2 2280 TLC SSD**	**Capacity**	256GB	
		Protocol	PCIe	
		Form Factor	M.2	
		Controller	NVMe	
		NAND Type	3D TLC	
		SED Support	Opal 2	
		Endurance	200TB	
		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**	3500 MB/s *
			Sequential Write	2200 MB/s *
			Random Read	240K IOPS *
			Random Write	480K IOPS *
		*Actual performance may vary.		
	HP ZTurbo Drive 512GB M.2 2280 TLC SSD	**Capacity**	512GB	
		Protocol	PCIe	
		Form Factor	M.2	
		Controller	NVMe	
		NAND Type	3D TLC	
		SED Support	Opal 2	
		Endurance	300TB	
		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**	3500 MB/s*
			Sequential Write	2900 MB/s*
			Random Read	460 K IOPS*
			Random Write	500K IOPS*
		*Actual performance may vary.		
	HP ZTurbo Drive 1TB M.2 2280 TLC SSD	**Capacity**	1TB	
		Protocol	PCIe	
		Form Factor	M.2	
		Controller	NVMe	
		NAND Type	3D TLC	
		SED Support	Opal 2	
		Endurance	400TB	
		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**	3500 MB/s*
		Sequential Write	3000 MB/s*
		Random Read	580K IOPS*
		Random Write	500K IOPS*

*Actual performance may vary.

HP ZTurbo Drive 2TB M.2 2280 TLC SSD	**Capacity**	2TB	
	Protocol	PCIe	
	Form Factor	M.2	
	Controller	NVMe	
	NAND Type	3D TLC	
	SED Support	Opal 2	
	Endurance	500TB	
	Reliability (MTTF)	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**	3300 MB/s*
		Sequential Write	2400 MB/s*
		Random Read	500K IOPS*
		Random Write	440K 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.

Intel® 905p Series AIC 480GB PCIe SSD	**Capacity**	480GB	
	Protocol	PCIe	
	Form Factor	PCIe Card, Half Height	
	Controller	NVMe	
	NVM Type	3DXPoint	

Technical Specifications - Hard Drives

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® HD* Graphics (Z2G4)	**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
	Supported Graphics APIs	OpenGL 4.4 DirectX 12
	Available Graphics Drivers	Windows 10 Linux®

*Integrated graphics will depend on processor. HD content required to view HD images

Technical Specifications - Graphics

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 2:** AMO kits for P400, P620, P1000 and Adapters will ship in July 2017. • 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: - 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables

AMD Radeon™ Pro WX3100 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(TM) 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(TM) 1.4 1x DisplayPort(TM) 1.4
	Shading Architecture	Shader Model 6.0
	Supported Graphics APIs	OpenCL(TM) 2.0, DirectX(R) 12.0, OpenGL 4.5
	Available Graphics Drivers	Windows 10 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 3200 4GB Graphics	**Form Factor**	Low-Profile Single Slot (2.75 "H x 6.6" L)
	Graphics Controller	Radeon™ Pro WX 3100 Graphics Card GPU: 640 Stream Processors organized into 8 Compute Units

Technical Specifications - Graphics

	Power: 56 Watts Cooling: Active
Memory	4GB GDDR5 memory Memory Bandwidth: 6 Gbps / 96 GB/s Memory Width: 128 bit
Connectors	2x Mini DisplayPort™ 1.4 plus 1x DisplayPort™ 1.4 – HDR ready connectors with HBR3 and MST support. Factory Configured: No adapters included After market option kit: One mDP-to-DP cable adapters included Additional Mini DisplayPort™-to-DisplayPort™, DisplayPort™-to-VGA or DisplayPort™-to-DVI adapters are available as Factory Configuration or Option Kit accessories.
Maximum Resolution	5K support @ 60Hz • 1x single-cable 5K monitor, or 2x dual-cable 5K monitors 3x 4K support @ 60Hz
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	3 full physical DP1.3 HBR3 / DP1.4 HDR outputs FreeSync support
GPU Architecture	Polaris
Supported Graphics APIs	DirectX®12 OpenGL® 4.5 OpenCL™ 2.0 Vulkan™ 1.0
Available Graphics Drivers	Windows 10 (Windows® 7 64-bit available from AMD) Linux® 64-bit (selected Enterprise distributions) 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® 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 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 2:** 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: - 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables

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

Technical Specifications - Graphics

	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 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. 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. 6. 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.

Technical Specifications - Graphics

AMD FirePro WX 3100 4GB Graphics	**Form Factor**	Low Profile, single slot (6.6” x 3.118”) Full Height, single slot (6.6" x 4.725")
	Graphics Controller	AMD FirePro W4300 graphics GPU Frequency: 930Mhz Memory Clock Speed: 1500Mhz GPU: 768 Stream Processors organized into 12 Compute Units Power: <50 Watts Cooling: Active
	Bus Type	PCI Express® x16, Generation 3.0
	Memory	4GB GDDR5 memory Memory Bandwidth: up to 96 GB/s Memory Width: 128 bit
	Connectors	4x Mini Display Port 1.2 connectors with HBR2 and MST support. Factory Configured: No video cable adapter included After market option kit: No video cable adapter included Additional DisplayPort™-to-VGA, DisplayPort™-to-HDMI, or DisplayPort™-to-DVI adapters are available as Factory Configuration or Option Kit accessories.
	Maximum Resolution	DisplayPort™: - 4096x2160 @24bpp (3 x 4K @ 60Hz, 4 x 4K @ 30Hz)
	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 Incorporated Adaptive-Sync enables FreeSync™ technology from AMD that allows GPU control of display refresh rates for tear-free and jitter-free image quality when rotating models or viewing video content.(Requires FreeSync compliant displays)
	Display Output	Max number of monitors supported using DisplayPort™ 1.2a: - 4 direct attached monitors - 6 using DP 1.2a with MST and HBR2 enabled monitors Monitor chaining from a single DisplayPort™ (subject to a max of 6 total monitors across all outputs, requires use of DisplayPort™ enabled monitors supporting MST and HBR2): - one 4096x2160 display - two 2560x1600 displays - four 1920x1200 displays
	Shading Architecture	Shader Model 5.0
	Supported Graphics APIs	OpenGL 4.4 OpenCL 2.0

		DirectX 12.0
	Available Graphics Drivers	Windows 10 (64-bit and 32-bit) Windows® 7 (64-bit and 32-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. AMD Eyefinity technology supports up to six DisplayPort™ monitors on an enabled graphics card. Supported display quantity, type and resolution vary by model and board design; confirm specifications with manufacturer before purchase. To enable more than two displays, or multiple displays from a single output, additional hardware such as DisplayPort™-ready monitors or DisplayPort™ 1.2 MST-enabled hubs may be required. A maximum of two active adapters is recommended for consumer systems. See www.amd.com/eyefinityfaq for full details. 2. Configurations of two FirePro W4300 graphics cards in HP Z440 Workstation require the HP Z440 Fan and Front Card Guide Kit, configurable from the factory (CTO PN: G8T99AV) or as an Aftermarket Option (AMO PN: J9P80AA).
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

Technical Specifications - Graphics

	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 2:** AMO kits for P400, P620, P1000 and Adapters • Two mDP-to-DP Adapters are included in the P400, P600 and P1000 AMO kits. • If mDP-to-DP Adapters are needed, Adapters can be ordered separately: - 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables

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**	< 200ms (seek)
		Full Stroke CD	< 200ms (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	
	Dimensions (WxHxD)	128 x 9.5 x 127mm	
	Disc Capacity	**DVD-ROM**	Single layer: Up to 4.7 GB

Technical Specifications - Optical and Removable Storage

			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 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 DVD-ROM Drive, 5.25" ODD Bay adapter/carrier, 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)
		Blu-ray	< 230 ms (seek) (Full Stroke Blu-ray)

Technical Specifications - Optical and Removable Storage

	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**	i. ii. 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	• Secure Digital Card (SD) • Secure Digital Support up to 2TB • Secure Digital HC (SDHC) • Secure Digital XC (SDXC) • Support SD USH50 mode • miniSD *1 • miniSDHC*1 • MicroSD*1 • MicroSDHC*1 • 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

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 Gen 3x4, 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, 128-MB RAM, 1-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.
	Warranty	The HP Thunderbolt™ 3 PCIe 3-port I/O Card has a one-year Limited Warranty or the remainder of the warranty of the HP supported product in which it is installed. Technical support is available seven days a week, 24 hours a day, by phone, as well as online support forums. Certain restrictions and exclusions apply.

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 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
	Kit Contents	HP 10GbE SFP+ SR Transceiver

Technical Specifications - Networking and Communications

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 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; 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)
	Operating System Driver Support	Windows 7 64-bit; Windows 10; 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; 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

Technical Specifications – Miscellaneous Features

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 30, 2018	From v1 to v2	Changed	Number of supported cards for Nvidia P620 changed to 1
August 16, 2018	From v2 to v3	Changed	Supported components, System Configurations and Technical Specifications – Graphics sections, format changes
December 10, 2018	From v3 to v4	Changed	Environmental date table
January 17, 2019	From v4 to v5	Added	Compliance with FIPS 140-2 TPM 2.0
May 28, 2019	From v5 to v6	Added	Processors Refresh
June 12, 2019	From v6 to v7	Changed	Storage section
September 1, 2019	From v7 to v8	Added	HP Z Turbo Drive G2 256 and 512GB SED TLC to Storage section
October 26, 2019	From v8 to v9	Changed	Graphics section
November 2, 2019	From v9 to v10	Changed	Networking and Communications section
December 5, 2019	From v10 to v11	Changed	Power Supply section
January 15, 2020	From v11 to v12	Changed	Storage section
February 20, 2020	From v12 to v13	Changed	Processors Matrix and PCIe SSDs section
January 5, 2021	From v13 to v14	Changed	Processors, Memory, Graphics, Operating Systems and Hard Drives sections
October 1, 2021	From v14 to v15	Changed	Input Devices section
December 1, 2021	From v15 to v16	Changed	Graphics section
March 1, 2023	From v16 to v17	Changed	Manageability section