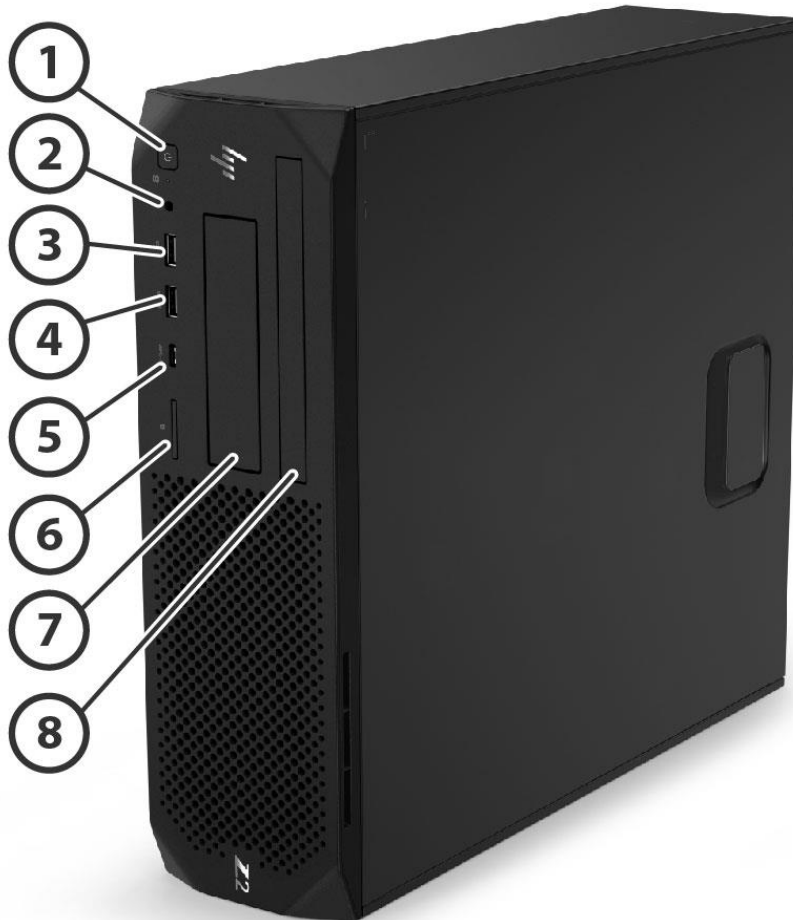


### Overview

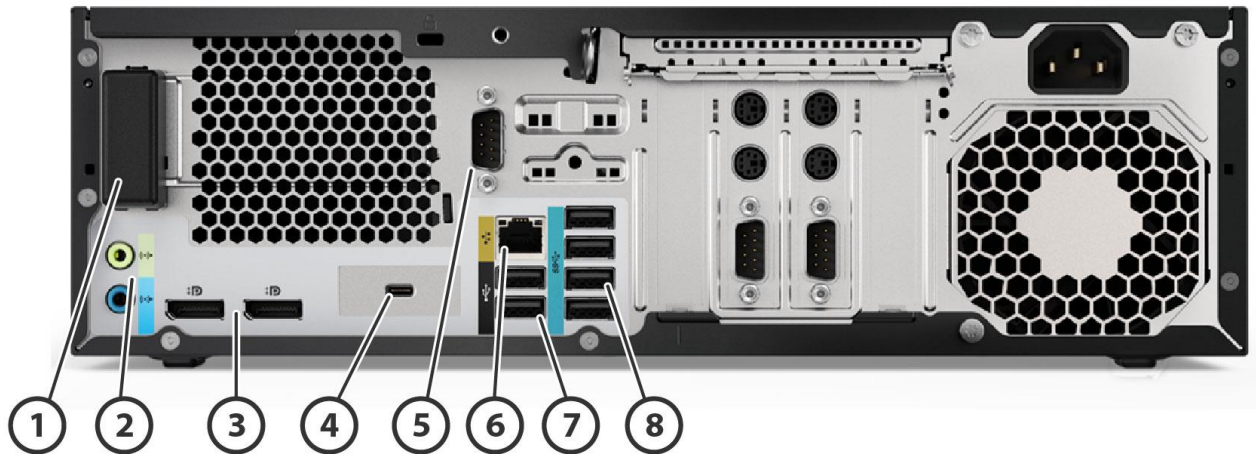
### HP Z2 Small Form Factor G4 Workstation



#### 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™/2<sup>nd</sup> 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 64\*
- Windows 10 Pro 64\*
- Windows 10 Pro (National Academic License)\*
- Windows 10 Pro for Workstations – HP recommends Windows 10 Pro\*
- HP Linux®-ready

Supported:

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

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

**NOTE:** For detailed OS/hardware support information for Linux®, see: [http://www.hp.com/support/linux\\_hardware\\_matrix](http://www.hp.com/support/linux_hardware_matrix)

### Processors

Name	Cores	Clock Speed (GHz)	Intel® Turbo Boost Technology <sup>3</sup>	Cache (MB)	Memory Speed (MT/s)	Hyper-Threading	Integrated Graphics	Featuring Intel® vPro™ Technology <sup>4</sup>	16GB Intel® Optane™ memory <sup>2,*</sup>	TDP (W)
Intel® Xeon® processor E-2176G <sup>1</sup>	6	3.7	4.7	12	2666	Y	Intel® UHD Graphics	Y	N	80W
Intel® Xeon® processor E-2174G <sup>1</sup>	4	3.8	4.7	8	2666	Y	Intel® UHD Graphics	Y	N	71W
Intel® Xeon® processor E-2144G <sup>1</sup>	4	3.6	4.5	8	2666	Y	Intel® UHD Graphics	Y	N	71W
Intel® Xeon® processor E-2136 <sup>1</sup>	6	3.3	4.5	12	2666	Y	N/A	Y	N	80W
Intel® Xeon® processor E-2126G <sup>1</sup>	6	3.3	4.5	12	2666	N	Intel® UHD Graphics	Y	N	80W
Intel® Xeon® processor E-2124G <sup>1</sup>	4	3.4	4.3	8	2666	N	Intel® UHD Graphics	Y	N	71W
Intel® Xeon® processor E-2104G <sup>1</sup>	4	3.2	N/A	8	2666	N	Intel® UHD Graphics	Y	N	65W
Intel® Core™ i7-8700K processor <sup>1</sup>	6	3.7	4.7	12	2666	Y	Intel® UHD Graphics	Y	N	95W
Intel® Core™ i7+8700K processor (Core i7 and 16GB Intel® Optane™ memory) <sup>1,2,*</sup>	6	3.7	4.7	12	2666	Y	Intel® UHD Graphics 630	Y	Y	95W
Intel® Core™ i7-8700 processor <sup>1</sup>	6	3.2	4.6	12	2666	Y	Intel® UHD Graphics	Y	N	65W

### Supported Components

Intel® Core™ i7+8700 processor (Core i7 and 16GB Intel® Optane™ memory) <sup>1,2,*</sup>	6	3.2	4.6	12	2666	Y	Intel® UHD Graphics 630	Y	Y	65W
Intel® Core™ i5-8600 processor <sup>1</sup>	6	3.1	4.2	9	2666	N	Intel® UHD Graphics	Y	N	65W
Intel® Core™ i5+8600 processor (Core i7 and 16GB Intel® Optane™ memory) <sup>1,2,*</sup>	6	3.1	4.2	9	2666	N	Intel® UHD Graphics 630	Y	Y	65W
Intel® Core™ i5-8500 processor <sup>1</sup>	6	3.0	4.0	9	2666	N	Intel® UHD Graphics	Y	N	65W
Intel® Core™ i5+8500 processor (Core i7 and 16GB Intel® Optane™ memory) <sup>1,2,*</sup>	6	3.0	4.0	9	2666	N	Intel® UHD Graphics 630	Y	Y	65W
Intel® Core™ i3-8100 processor <sup>1</sup>	4	3.6	N/A	6	2400	N	Intel® UHD Graphics	N	N	65W
Intel® Pentium™ G5400 processor <sup>1</sup>	2	3.7	N/A	4	2400	Y	Intel® UHD Graphics	N	N	54W

<sup>1</sup>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.

<sup>2</sup>Intel® Optane™ memory system acceleration does not replace or increase the DRAM in your system.

\*16GB Intel® Optane™ memory Available Fall 2018

<sup>3</sup>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.

<sup>4</sup>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.

Processor numbers differentiate features within each processor family, not across different processor families. See: [http://www.intel.com/products/processor\\_number/](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>.

### Supported Components

<b>Color</b>	Black
<b>Convertibility</b>	The Z2G4 SFF can either be placed flat on the desktop or made to stand on the desk with the optional tower stand.
<b>Expansion Slots</b> (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)  <b>NOTE:</b> 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
<b>Expansion Bays</b>	1 shared internal/external 3.5" bay. 1 internal 3.5" bay 1 internal 2.5" bay (for SSD only)
<b>Front I/O</b>	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).
<b>Internal I/O</b>	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.
<b>Rear I/O</b>	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 (standard), RJ-45 (LOM), 1 Audio Line-in, and 1 Audio Line-out, Optional PS/2 ports, Flex IO port (3 <sup>rd</sup> DisplayPort™/HDMI/VGA/2 <sup>nd</sup> 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)
<b>Interfaces Supported</b>	SD Media Card Reader (optional), USB-C 3.1 Gen2 Charging Port (optional)
<b>Chassis Dimensions (H x W x D)</b>	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)
<b>Weight</b>	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 x 229 x 518 mm (19.65 x 9.02 x 20.39 in) Shipping Weight: 9.35 kg (20.6 lb)

### Supported Components

\* Configured with 1 3.5" hard drives, 1 optical drive, 2 DIMMs and 1 NVIDIA Quadro P620 graphics card

#### Power Supply

310W 90% Efficiency wide-ranging, active Power Factor Correction (PFC)

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 64GB 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
<b>Intel® Xeon® processor E-2100 family<sup>2</sup></b>		
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
<b>8th generation Intel® Core™ processor family<sup>3</sup></b>		
Intel® Core™ i7-8700K 3.7 2666 6C CPU	Y	N
Intel® Core™ i7+8700K (Core i7 and 16GB Intel® Optane™ memory*) 3.7 2666 6C CPU	Y	N
Intel® Core™ i7-8700 3.2 2666 6C CPU	Y	N
Intel® Core™ i7+8700 (Core i7 and 16GB Intel® Optane™ memory*) 3.2 2666 6C CPU	Y	N
Intel® Core™ i5-8600 3.1 2666 6C CPU	Y	N
Intel® Core™ i5+8600 (Core i7 and 16GB Intel® Optane™ memory*) 3.1 2666 6C CPU	Y	N
Intel® Core™ i5-8500 3.0 2666 6C CPU	Y	N
Intel® Core™ i5+8500 (Core i7 and 16GB Intel® Optane™ memory*) 3.0 2666 6C CPU	Y	N
<b>8th generation Intel® Core™ i3/Pentium processor family<sup>2</sup></b>		
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.

\*16GB Intel® Optane™ memory Available Fall 2018

#### 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	Y	Y	QB576AA
4TB SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	K4T76AA
6TB SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	3DH90AA
500GB SATA 7.2K SED SFF HDD	Y	N	
1TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	Y	Y	WOR10AA

#### 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	
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 (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.

\*\*16GB Intel® Optane™ memory Available Fall 2018

#### PCIe SSDs

##### PCIe SSDs for HP Workstations

HP Z Turbo Drv G2 1TB TLC PCIe SSD **	Y	Y	TBD
HP Z Turbo Drv G2 256GB TLC PCIe SSD **	Y	Y	Note 2
HP Z Turbo Drv G2 512GB TLC PCIe SSD **	Y	Y	Note 2
<b>Intel® 905p Series SSD (Optane SSD)</b>			
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

\*\*\* Intel® Optane SSD Available Fall 2018

**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
<b>Integrated SATA Controller (Z2G4)</b>		
Integrated SATA Controller, RAID 0,1 supported: 4x 6 Gb/s ports	Y	N
<b>Factory integrated RAID on motherboard for SATA drives</b>		
RAID 0 Data Configuration	Y	N
RAID 1 Data Configuration	Y	N
<b>Factory integrated RAID on motherboard for Z Turbo Drive</b>		
RAID 0 Boot or Data Configuration	Y	N
RAID 1 Boot or Data Configuration	Y	N

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

**NOTE 1:** Requires identical drives (speeds, capacity, and interface).



### Supported Components

Graphics		Factory Configured	Option Kit	Option Kit Part Number	Supported # of cards
<b>Integrated Graphics</b>	<b>Integrated Intel® HD Graphics (Z2G4)</b>				
	Intel® UHD Graphics P630	Y	N		1
	Intel® UHD Graphics 630	Y	N		1
	Intel® UHD Graphics 610	Y	N		1
<b>Graphics DisplayPort™ Cable Adapters</b>	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			
<b>Entry 3D</b>	NVIDIA® Quadro® P400 2GB Graphics	Y	Y	1ME43AA	2
	NVIDIA® Quadro® P620 2GB Graphics	Y	Y	3ME25AA	1
	AMD Radeon™ Pro WX3100 4GB Graphics	Y	Y	2TF08AA	1
<b>Mid-range 3D</b>	AMD Radeon™ Pro WX4100 4GB Graphics	N	Y	Z0B15AA	1
	NVIDIA® Quadro® P1000 4GB Graphics	Y	Y	1ME01AA	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.

### Supported Components

#### 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  
 64GB DDR4-2666 ECC (4x16GB) 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

#### NOTES

Intel® Xeon® E, Intel® Core i3 and Intel® Pentium 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 2666 MT/s capable CPU is used in the system, the maximum speed the memory will run at is 2666 MT/s regardless of the specified speed of the memory.

Transfer rates up to 2666 MT/s

#### AMO

#### Option Kit Part Number

##### DDR4-2666 ECC Unbuffered DIMMs - AMO

HP 8GB (1x8GB) DDR4-2666 ECC Unbuffered RAM	3TQ39AA
HP 16GB (1x16GB) DDR4-2666 ECC Unbuffered RAM	3TQ40AA

##### DDR4-2666 non-ECC Unbuffered DIMMs - AMO

HP 4GB (1x4GB) DDR4-2666 nECC Unbuffered RAM	3TQ31AA
HP 8GB (1x8GB) DDR4-2666 nECC Unbuffered RAM	3PL81AA
16GB (1x16GB) DDR4-2666 nECC Unbuffered RAM	3PL82AA

**NOTE:** Only unbuffered DDR4 DIMMs are supported.

The CPUs determine the speed at which the memory is clocked. If a 2666 MHz capable CPU is used in the system, the maximum speed the memory will run at is 2666 MHz regardless of the specified speed of the memory.

### Supported Components

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

Optical and Removable Storage	Factory Configured	Option Kit	Option Kit Part Number
<b>HP SlimTray Optical Drives</b>			
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
<b>HP SD Media Card Reader</b>			
HP SD Media Card Reader	Y	Y	
<b>HDD Frame/Carriers</b>			
HP DP25 Removable 2.5" HDD Frame/Carrier	N	Y	W3J84AA
HP DP25 Removable 2.5" HDD Spare Carrier	N	Y	W3J85AA
<p>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.</p>			

Controller Cards	Factory Configured	Option Kit	Option Kit Part Number
HP Thunderbolt™ 3 PCIe I/O Card	Y	Y	4CX35AA
<b>Note 1:</b> Utilizes Flex IO port internal connection for video output			
<b>Note:</b> HP Thunderbolt™ 3 PCIe I/O Card is not available until September 2018			

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 <sup>(3)</sup> NIC	Y	Y	V4A91AA
Intel® I350-T4 4-Port 1GbE <sup>(3)</sup> NIC	N	Y	W8X25AA
Aquantia AQN-108 1-Port 5GbE NIC	Y	Y	1PM63AA

### Supported Components

**NOTE 1:** The integrated network connection is required to support Intel® vPro™ Technology.

**NOTE 2:** If AMT is provisioned, then network teaming with the integrated LAN port is not possible.

**NOTE 3:** "Gigabit" Ethernet indicates compliance with IEEE standard 802.3ab for Gigabit Ethernet, and does not connote actual operating speed of 1 Gb/sec. For high speed transmission, connection to a Gigabit Ethernet server and network infrastructure is required.

#### Racking and Physical Security

	Factory Configured	Option Kit	Option Kit Part Number
Kensington Lock	N	Y	
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
SpaceMouse Pro USB 3D Input Device	N	Y	B4A20AA
3Dconnexion CADMouse	N	Y	M5C35AA
HP USB Business Slim CCID SmartCard Keyboard	Y	Y	
HP USB Business Slim Keyboard	Y	Y	N3R87AA
HP PS/2 Business Slim Keyboard	N	Y	
HP 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

### Supported Components

HP Flex IO module (1 Gbe LAN)	Y	Y	3TQ26AA
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### Software

	Factory Configured	Option Kit	Support Notes
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 64  
 Windows 10 Pro 64  
 Windows 10 Pro (National Academic License)  
 Windows 10 Pro for Workstations – HP recommends Windows 10 Pro  
 Red Hat® Enterprise Linux® (RHEL) Workstation – Paper License (1yr)

**NOTE:** For detailed OS/hardware support information for Linux, see: [http://www.hp.com/support/linux\\_hardware\\_matrix](http://www.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),

### Supported Components

HP Client Manager, and fail-safe recovery. In addition, the HP BIOS Configuration Utility enables replication of BIOS settings within Windows while the Replicated Setup feature provides the same capability within BIOS (F10) Setup. The BIOS Configuration Utility is available from the HP support website.

- HP BIOS uses PKI signing of the BIOS for trusted BIOS upgrades and recovery.

Additional HP BIOS Features:

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

#### HP Sure Start Gen4 Start

- BIOS Integrity checking – Sure Start protection ensures that only trusted BIOS code is executed and not rootkits, viruses and malware. Verification is done upon boot up, shutdown and while the system is on.
- Sure Start is set by default to automatically repair the BIOS if corrupted or compromised but is policy driven for better manageability.
- 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.

### Supported Components

#### SOFTWARE COMPONENTS AND APPLICATIONS WITH WINDOWS

##### BIOS

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

##### Software

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

##### Manageability Features

- HP Driver Packs<sup>22</sup>
- HP System Software Manager (SSM)
- HP BIOS Config Utility (BCU)
- HP Client Catalog
- HP Manageability Integration Kit Gen2<sup>23</sup>

##### Client Security Software

- HP Client Security Suite Gen4<sup>25</sup> including:
  - HP Security Manager<sup>26</sup> (including Credential Manager, HP Password Manager, HP Spare Key)
  - HP Device Access Manager
  - HP Power On Authentication
  - Microsoft Defender<sup>27</sup>

##### Security Management

- Secure Erase<sup>18</sup>
- TPM 2.0 Embedded Security Chip shipped with Windows 10 (Common Criteria EAL4+ Certified)<sup>32</sup>
- SATA port disablement (viaBIOS)
- RAID configurations<sup>33</sup>
- 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<sup>37</sup>
- HP Sure Start Gen4<sup>30</sup>
- HP Sure Run<sup>35</sup>
- HP Sure Recover<sup>36</sup>

17. HP BIOSphere Gen4 features may vary depending on the Workstation platform and configurations requires 8th Gen Intel® processors.

18. Secure Erase for the methods outlined in the National Institute of Standards and Technology Special Publication 800-88. Supported on Workstation platforms with BIOS version F.03 or higher.

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 Workstations with 8th generation Intel® or AMD processors and requires an open, wired network connection. You must back up important files, data, photos, videos, etc. before using HP Sure Recover to avoid loss of data.

38. HP Sure Click is available on select HP platforms and supports Microsoft® Internet Explorer and Chromium™. Check <http://h20195.www2.hp.com/v2/GetDocument.aspx?docname=4AA7-0922ENW> for all compatible platforms as they become available



### System Technical Specifications

#### System Board

<b>System Board Form Factor</b>	ATX 24.38 x 24.38 mm (9.6 x 9.6 inches)
<b>Processor Socket</b>	Single LGA 1151
<b>CPU Bus Speed</b>	DMI
<b>Chipset</b>	Intel® PCH C246
<b>Memory Expansion Slots</b>	4 DDR4 memory slots
<b>Memory Type Supported</b>	DDR4, UDIMM (Unbuffered), ECC& non-ECC
<b>Memory Modes</b>	Non-Interleaved for single channel. Interleaved when both channels are populated.
<b>Memory Speed Supported</b>	2666MT/s DDR4
<b>Memory Protection</b>	ECC available on data
<b>Maximum Memory</b>	64GB
<b>Memory Configuration (Supported)</b>	4GB, 8GB and 16GB non-ECC/ 8GB and 16GB ECC unbuffered DIMMs are supported. ECC and non-ECC memory DIMMs cannot be mixed on the same system. <b>NOTE:</b> * 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.
<b>PCI Express Connectors</b>	<ul style="list-style-type: none"> <li>• 1 PCI Express Gen3 slot x16 mechanical/ x16 electrical (LP, half length)</li> <li>• 1 PCI Express Gen3 slot x4 mechanical/ x1 electrical (LP, half length)</li> <li>• 1 PCI Express Gen3 slot x4 mechanical/ x1 electrical (LP, half length)</li> <li>• 1 PCI Express Gen3 slot x16 mechanical/ x4 electrical (LP, half length)</li> <li>• 2 M.2 storage (PCIe Gen3 x4)<sup>1</sup></li> <li>• 1 M.2 WLAN (PCIe Gen3 x1+ Intel CNVi)</li> </ul>

**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

<b>Supported Drive Interfaces</b>	<p><b>SATA</b> Integrated (4) Serial ATA interfaces (6Gb/s SATA). RAID 0 and 1 supported. Factory integrated RAID for Microsoft Windows only.</p> <p><b>Serial Attached SCSI</b> None</p> <p><b>Integrated RAID</b> <b>NOTE:</b> Requires identical hard drives (speeds, capacity, interface)</p> <p><b>Integrated Graphics</b> 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</p> <p>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;</p> <p>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, 3<sup>rd</sup> DP is optional via Flex IO port Max. resolution supported: 4096x2160 @60Hz</p>
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### System Technical Specifications

<b>Network Controller</b>	Integrated Ethernet PHY Connection I219LM. Management capabilities: WOL, PXE 2.1 and AMT 12.0
<b>IDE connector</b>	No
<b>Floppy connector</b>	No
<b>Serial</b>	Yes- requires optional Serial Port Adapter Kit
<b>2nd Serial</b>	Yes- requires optional Serial Port Adapter Kit

#### IEEE 1394 Connector(s)

<b>USB Connector(s)</b>	<b>Front</b>	2 USB-A 3.0, 1 USB-C 3.1 Gen2 (optional)
	<b>Rear</b>	4 USB-A 3.0, 2 USB-A 2.0
	<b>Internal</b>	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

**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

<b>Z2G4 SFF Configuration #1 (TBD)</b>	<b>Processor Info</b>	1x Intel® Core™ i3-8100 3.6 6MB 65W CPU	
	<b>Memory Info</b>	8GB (1x 8GB) 2666 MHz DDR4 non-ECC	
	<b>Graphics Info</b>	Intel® UHD Integrated Graphics 630	
	<b>Disks/Optical/Floppy</b>	1x SATA 500 GB 7.2k rpm/ 1x 9.5mm Slim ODD	
	<b>PSU</b>	250W 92%	
	<b>Other</b>		

<b>Energy Consumption (Watts)</b>		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	
<b>Heat Dissipation (Btu/hr)</b>		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled

### System Technical Specifications

	Windows Idle (S0)	37.269		36.597		37.215	
	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	

<b>Z2G4 SFF Configuration #2 (TBD)</b> ENERGY STAR® CERTIFIED	<b>Processor Info</b>	1x Intel® Core™ i7-8700 3.2 12MB 65W CPU					
	<b>Memory Info</b>	16GB (2x 8GB) 2666 MHz DDR4 ECC					
	<b>Graphics Info</b>	1x NVIDIA® Quadro® P620 2GB Graphics					
	<b>Disks/Optical/Floppy</b>	1x SATA 1 TB 7.2k rpm/ 1x9.5mm Slim ODD					
	<b>PSU</b>	310W 90%					
	<b>Other</b>						

<b>Energy Consumption (Watts)</b>		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	

<b>Heat Dissipation (Btu/hr)</b>		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	

<b>Z2G4 SFF Configuration #3 (TBD)</b>	<b>Processor Info</b>	1x Intel® Xeon® E-2176 3.7 8MB 80W CPU					
	<b>Memory Info</b>	64GB (4x16GB) 2666 MHz DDR4 ECC					
	<b>Graphics Info</b>	1x AMD®Radeon Pro® WX 3100 4GB Graphics					
	<b>Disks/Optical/Floppy</b>	1x 4TB 7.2k rpm Enterprise SATA					
	<b>PSU</b>	310W 90%					
	<b>Other</b>						

<b>Energy Consumption (Watts)</b>		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	

### System Technical Specifications

	Windows short Idle (S0)	27.842		27.759		26.823		
	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		
<b>Heat Dissipation (Btu/hr)</b>		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	
<b>Power Supply</b>	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: <a href="https://www.plugloadsolutions.com/80PlusPowerSupplies.aspx">https://www.plugloadsolutions.com/80PlusPowerSupplies.aspx</a>							

<b>Operating Voltage Range</b>	90-264 VAC
<b>Rated Voltage Range</b>	100-240 VAC
<b>Rated Line Frequency</b>	50-60 Hz
<b>Operating Line Frequency Range</b>	47-63 Hz
<b>Rated Input Current</b>	4A @ 100-240V
<b>Heat Dissipation</b>	Typical: TBD btu/hr (TBD kcal/hr) Maximum: TBD btu/hr (TBD kcal/hr)
<b>Power Supply Fan</b>	70mm x 70mm x 25 mm 4-wire PWM
<b>ENERGY STAR® certified (Config Dependent)</b>	Yes
<b>FEMP Standby Power Compliant</b>	Yes, with Wake-on-LAN disabled: <1W in S4/S5- Power Off
<b>Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)</b>	Yes
<b>ErP Lot 6- Tier 1 Compliance @ 230V (&lt;1W in S4/S5- Power Off)</b>	Yes
<b>ErP Lot 6- Tier 2 Compliance @ 230V (&lt;0.5W in S4/S5- Power Off)</b>	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

#### Idle

#### Sound Power (LWAd, bels)

3.2

#### Deskside Sound Pressure

(LpAm, decibels)

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

#### Idle

#### Sound Power (LWAd, bels)

3.5

#### Deskside Sound Pressure

(LpAm, decibels)

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

#### Idle

#### Sound Power (LWAd, bels)

3.5

#### Deskside Sound Pressure

(LpAm, decibels)

25

#### Hard drive Operating

(random reads)

3.4

24

### System Technical Specifications

<b>Environmental Requirements</b>	<b>Temperature</b>	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
	<b>Humidity</b>	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
	<b>Maximum Altitude</b>	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 <b>Temperature</b> for details.
	<b>Shock (non-repetitive)</b>	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
	<b>Vibration</b>	Operating random: 0.5 g (rms), 5-300 Hz, up to 0.0025 g <sup>2</sup> /Hz Non-operating random: 2.0 g (rms), 5-500 Hz, up to 0.0150 g <sup>2</sup> /Hz

### Physical Security and Serviceability

<b>Access Panel</b>	Tool-less Includes system board and memory information
<b>Hard Drives</b>	Tool-less (Internal bay with installed carrier )
<b>Expansion Cards</b>	Tool-less
<b>Processor Socket</b>	Tool-less, except for the processor heatsink.
<b>Blue User Touch Points</b>	Yes, on tool-free internal chassis mechanisms
<b>Color-coordinated Cables and Connectors</b>	Yes
<b>Memory</b>	Tool-less
<b>System Board</b>	Screw-In
<b>Dual Color Power and HD LED on Front of Computer</b>	Yes
<b>Configuration Record SW</b>	Yes
<b>Over-Temp Warning on Screen</b>	Yes
<b>Restore CD/DVD Set</b>	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.
<b>Dual Function Front Power Switch</b>	Yes, causes a fail-safe power off when held for 4 seconds
<b>Padlock Support</b>	Yes (optional): Locks side cover and secures chassis from theft

### System Technical Specifications

	0.22-in diameter padlock loop at rear of system
<b>Cable Lock Support</b>	Yes, Kensington Cable Lock (optional): Locks side cover and secures chassis from theft 3 mm x 7 mm slot at rear of system
<b>Universal Chassis Clamp Lock Support</b>	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
<b>Solenoid Lock and Hood Sensor</b>	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.
<b>Rear Port Control Cover</b>	Yes, locks rear IO cables to prevent cable theft
<b>Serial, USB, Audio, Network, Enable/Disable Port Control</b>	Yes, enables or disables serial, USB, audio, and network ports
<b>Removable Media Write/Boot Control</b>	Yes, prevents ability to boot from removable media on supported devices (and can disable writes to media)
<b>Power-On Password Setup Password</b>	Yes, prevents an unauthorized person from booting up the workstation Yes, prevents an unauthorized person from changing the workstation configuration
<b>NIC LEDs (integrated) (Green &amp; Amber)</b>	Yes
<b>CPUs and Heatsinks</b>	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
<b>Power Supply Diagnostic LED</b>	No
<b>Front Power Button</b>	Yes, ACPI multi-function
<b>Front Power LED</b>	Yes, white (normal), red (fault)
<b>Front Hard Drive Activity LED</b>	Yes, white
<b>Front ODD Activity LED</b>	Yes
<b>Internal Speaker</b>	Yes
<b>System/Emergency ROM Flash Recovery</b>	Recovers corrupted system BIOS.
<b>Cooling Solutions</b>	Air cooled forced convection
<b>Power Supply Fans</b>	70mm x 70mm x 25mm 4-wire PWM (non-serviceable)
<b>CPU Heatsink Fan</b>	Mainstream (<=65W): 93mm x 86mm 75.8mm Performance (<=95W): 93mm x 102.7mm x 75.8mm
<b>Chassis Fan</b>	Not applicable. CPU heatsink fan also operates as the chassis fan.
<b>Memory Heatsink Fan</b>	No
<b>HP PC Hardware Diagnostics UEFI</b>	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.
<b>Access Panel Key Lock</b>	No
<b>ACPI-Ready Hardware</b>	Advanced Configuration and Power Management Interface (ACPI). <ul style="list-style-type: none"> <li>Allows the system to wake from a low power mode.</li> <li>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</li> </ul>
<b>Trusted Platform Module Chip</b>	Yes

### System Technical Specifications

<b>Integrated Chassis Handles</b>	No
<b>Power Supply</b>	Requires T15 Torx or flat blade screwdriver
<b>PCI Card Retention</b>	Yes, rear (all), middle (none), front (none)
<b>Flash ROM</b>	Yes
<b>Diagnostic Power Switch LED on board</b>	Yes
<b>Clear Password Jumper</b>	Yes
<b>Clear CMOS Button</b>	Yes
<b>CMOS Battery Holder</b>	Yes
<b>DIMM Connectors</b>	Yes



### System Technical Specifications

#### Social and Environmental Responsibility

- Eco-Label Certifications & Declarations** This product is low halogen except for power cords, cables and peripherals. Service parts obtained after purchase may not be Low Halogen.
- ENERGY STAR® (energy-saving features available on selected configurations -Windows only)
  - US Federal Energy Management Program (FEMP)
  - China Energy Conservation Program (CECP)
  - IT ECO declaration

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

The battery in this product does not contain:

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

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

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

**HP Inc. Corporate Environmental Information** For more information about HP's commitment to the environment:  
Living Progress Report <http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html>

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

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

- Additional Information**
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive - 2002/96/EC.
  - Plastic parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.
  - This product is >90% recycle-able when properly disposed of at end of life
  - EPEAT Gold registered in the United States. See <http://www.epeat.net> for registration status in your country. EPEAT® registered where applicable. EPEAT registration varies by country. See <http://www.epeat.net> for registration status by country. Search keyword *generator* on HP's 3<sup>rd</sup> party option store for solar energy accessory at <http://www.hp.com/go/options>

**Packaging** HP Workstation product packaging meets the HP General Specification for the Environment at [http://www.hp.com/hpinfo/globalcitizenship/society/gen\\_specifications.html](http://www.hp.com/hpinfo/globalcitizenship/society/gen_specifications.html)

### System Technical Specifications

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

### Packaging Materials

#### Internal

Cushions made from fabricated recycled expanded-polyethylene (EPE) or recycled expanded-polypropylene (EPP). May also be made from recycled molded paper-pulp (MPP).

#### External

Carton made from corrugated fiberboard with at least 25% recycled content.

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### 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 System Software Manager**

Visit: <http://ftp.hp.com/pub/caps-softpaq/cmit/HPIA.html>

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.

### 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.

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

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

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

### Technical Specifications - Processors

#### Intel® Xeon® processor E-2100 family

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

#### 8th generation Intel® Core™ processor family

Intel® Core™ i7-8700K 6C 3.7/4.7 HT 95W CPU  
Intel® Core™ i7+8700K (Core i7 and 16GB Intel® Optane™ memory\*,\*\*) 6C 3.7/4.7 HT 95W CPU  
Intel® Core™ i7-8700 6C 3.2/4.6 HT 65W CPU  
Intel® Core™ i7+8700 (Core i7 and 16GB Intel® Optane™ memory\*,\*\*) 6C 3.2/4.6 HT 65W CPU  
Intel® Core™ i5-8600 6C 3.1/4.2 nHT 65W CPU  
Intel® Core™ i5+8600 (Core i7 and 16GB Intel® Optane™ memory\*,\*\*) 6C 3.1/4.2 nHT 65W CPU  
Intel® Core™ i5-8500 6C 3.0/4.0 nHT 65W CPU  
Intel® Core™ i5+8500 (Core i7 and 16GB Intel® Optane™ memory\*,\*\*) 6C 3.0/4.0 nHT 65W 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

\*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.

\*\*16GB Intel® Optane™ memory Available Fall 2018

### Technical Specifications - Hard Drives

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

### Technical Specifications - Hard Drives

<b>Logical Blocks</b>	3,907,029,168
<b>Operating Temperature</b>	41° to 131° F (5° to 55° C)

<b>500GB SATA 7.2K SED SFF HDD</b>	<b>Capacity</b>	500GB	
	<b>Height</b>	0.275 in; 0.7 cm	
	<b>Width</b>	<b>Media Diameter</b>	2.5 in; 6.36 cm
		<b>Physical Size</b>	2.75 in; 6.99 cm
	<b>Interface</b>	Serial ATA (6Gb/s)	
	<b>Synchronous Transfer Rate (Maximum)</b>	Up to 600MB/s	
	<b>Buffer</b>	32MB	
	<b>Seek Time (typical reads, includes controller overhead, including settling)</b>	<b>Single Track</b>	0.6 ms
		<b>Average</b>	4.2 ms
		<b>Full Stroke</b>	25ms (typical)
	<b>Rotational Speed</b>	7200 rpm	
	<b>Operating Temperature</b>	32° to 140° F (0° to 60° C)	

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

### Technical Specifications - Hard Drives

		<b>Sequential Write</b>	up to 226MB/s
	<b>Enterprise Class Features</b>	High Reliability	
	<b>Capacity</b>	1TB	
	<b>Protocol</b>	SATA	
<b>4TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)</b>	<b>Capacity</b>	4TB	
	<b>Protocol</b>	SATA	
	<b>Form Factor</b>	3.5"	
	<b>Controller</b>	AHCI	
	<b>Reliability (MTBF)</b>	2.0M hours	
	<b>Rated Power On Hours</b>	8760/yr	
	<b>Annualized Failure Rate</b> (based on Rated POH)	<0.62%	
	<b>Rated for 24/7/365 Operation</b>	YES	
	<b>Physical Size (Height)</b>	1 in; 2.54 cm	
	<b>Physical Size (Width)</b>	4 in; 10.17 cm	
	<b>Media Diameter</b>	3.5 in; 8.9 cm	
	<b>Interface</b>	Serial ATA (6Gb/s), NCQ enabled	
	<b>Synchronous Transfer Rate (Maximum)</b>	Up to 600MB/s	
	<b>Buffer</b>	128MB	
	<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b>	0.7ms
		<b>Average</b>	8.5ms
		<b>Full Stroke</b>	15.7ms
	<b>Operating Temperature</b>	41° to 131° F (5° to 55° C)	
	<b>Performance</b>	<b>Sequential Read</b>	up to 226MB/s
		<b>Sequential Write</b>	up to 226MB/s
	<b>Enterprise Class Features</b>	High Reliability	
<b>6TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)</b>	<b>Capacity</b>	6TB	
	<b>Protocol</b>	SATA	
	<b>Form Factor</b>	3.5"	
	<b>Controller</b>	AHCI	
	<b>Reliability (MTBF)</b>	2.0M hours	
	<b>Rated Power On Hours</b>	8760/yr	
	<b>Annualized Failure Rate</b> (based on Rated POH)	<0.44%	
	<b>Rated for 24/7/365 Operation</b>	YES	
	<b>Physical Size (Height)</b>	1 in; 2.54 cm	
	<b>Physical Size (Width)</b>	4 in; 10.17 cm	
	<b>Media Diameter</b>	3.5 in; 8.9 cm	
	<b>Interface</b>	Serial ATA (6Gb/s), NCQ enabled	



### Technical Specifications - Hard Drives

<b>Synchronous Transfer Rate (Maximum)</b>	Up to 600MB/s	
<b>Buffer</b>	128MB	
<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b>	0.7ms
	<b>Average</b>	8.5ms
	<b>Full Stroke</b>	15.7ms
<b>Operating Temperature</b>	41° to 140° F (5° to 60°C)	
<b>Performance</b>	<b>Sequential Read</b>	up to 226MB/s
	<b>Sequential Write</b>	up to 226MB/s
<b>Enterprise Class Features</b>	High Reliability	

#### HP SATA Solid State Drives (SSDs) for Workstations

##### HP 256GB SATA 6Gb/s SSD

<b>Capacity</b>	256GB
<b>Height</b>	0.28 in; 0.7 cm
<b>Interface</b>	SATA 6Gb/s
<b>Synchronous Transfer Rate (Maximum)</b>	Up to 500MB/s (Sequential Read)
<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)

##### HP 256GB SATA 6Gb/s SED Opal 2 SSD

<b>Capacity</b>	256GB
<b>Height</b>	0.28 in; 0.7 cm
<b>Width</b>	2.5 in; 6.36 cm
<b>Interface</b>	6Gb/s SATA
<b>Synchronous Transfer Rate (Maximum)</b>	Up to 550MB/s (Sequential Read)
<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)

##### HP 512GB SATA 6Gb/s SSD

<b>Capacity</b>	512GB
<b>Height</b>	0.28 in; 0.7 cm
<b>Width</b>	2.5 in; 6.36 cm
<b>Interface</b>	6Gb/s SATA
<b>Synchronous Transfer Rate (Maximum)</b>	Up to 500MB/s (Sequential Read)
<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)

##### HP 1TB SATA 6Gb/s SSD

<b>Capacity</b>	1TB
<b>Height</b>	0.28 in; 0.7 cm
<b>Width</b>	2.5 in; 6.36 cm
<b>Interface</b>	6Gb/s SATA
<b>Synchronous Transfer Rate (Maximum)</b>	Up to 500MB/s (Sequential Read)
<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)

### Technical Specifications - Hard Drives

<b>HP 2TB SATA 6Gb/s SSD</b>	<b>Capacity</b>	2TB	
	<b>Protocol</b>	SATA	
	<b>Height:</b>	0.28 in; 0.7 cm	
	<b>Width</b>	2.5 in; 6.36 cm	
	<b>NAND Type</b>	3D TLC	
	<b>Endurance</b>	400TBW (TB Written)	
	<b>Reliability (MTTF)</b>	1.5M hours	
	<b>Interface</b>	SATA 6Gb/s	
	<b>Synchronous Transfer Rate (Maximum)</b>	Up to 550MB/s (Sequential Read)	
	<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)	
	<b>Performance</b>	<b>Sequential Read</b>	530 MB/s
		<b>Sequential Write</b>	500 MB/s
		<b>Random Read</b>	92K IOPS
<b>Random Write</b>		83K IOPS	

### PCIe SSDs for HP Workstations

<b>HP Z Turbo Drv G2 256GB TLC PCIe SSD (Z2 MB)</b>	<b>Capacity</b>	256GB	
	<b>Protocol</b>	PCIe	
	<b>Form Factor</b>	M.2 in native slot on motherboard	
	<b>Controller</b>	NVMe	
	<b>NAND Type</b>	3D TLC	
	<b>Endurance</b>	75TBW (TB Written)	
	<b>Reliability (MTBF)</b>	1.5M hours	
	<b>Interface</b>	PCI Express 3.0 x4	
	<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)	
	<b>Performance</b>	<b>Sequential Read</b>	2800 MB/s
		<b>Sequential Write</b>	320 MB/s (1100 MB/s max/Turbo)
		<b>Random Read</b>	250K IOPS
		<b>Random Write</b>	180K IOPS

<b>HP Z Turbo Drv G2 512GB TLC PCIe SSD (Z2 MB)</b>	<b>Capacity</b>	512GB	
	<b>Protocol</b>	PCIe	
	<b>Form Factor</b>	M.2 in native slot on motherboard	
	<b>Controller</b>	NVMe	
	<b>NAND Type</b>	3D TLC	
	<b>Endurance</b>	150TBW (TB Written)	
	<b>Reliability (MTBF)</b>	1.5M hours	
	<b>Interface</b>	PCI Express 3.0 x4 electrical x4 physical	
	<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)	
	<b>Performance</b>	<b>Sequential Read</b>	2800 MB/s

### Technical Specifications - Hard Drives

<b>HP Z Turbo Drv G2 1TB TLC PCIe SSD (Z2 MB)</b>	<b>Capacity</b>	1TB	<b>Sequential Write</b>	660 MB/s (1600 MB/s max/Turbo)
	<b>Protocol</b>	PCIe	<b>Random Read</b>	260K IOPS
	<b>Form Factor</b>	M.2 in native slot on motherboard	<b>Random Write</b>	260K IOPS
	<b>Controller</b>	NVMe		
	<b>NAND Type</b>	3D TLC		
	<b>Endurance</b>	300TBW (TB Written)		
	<b>Reliability (MTBF)</b>	1.5M hours		
	<b>Interface</b>	PCI Express 3.0 x4		
	<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)		
	<b>Performance</b>		<b>Sequential Read</b>	3000 MB/s
		<b>Sequential Write</b>	1150 MB/s (1700 MB/s max/Turbo)	
		<b>Random Read</b>	360K IOPS	
		<b>Random Write</b>	330K IOPS	

### Intel® 905p Series AIC PCIe SSD

<b>Intel® 905p Series AIC 280GB PCIe SSD</b>	<b>Capacity</b>	280GB		
	<b>Protocol</b>	PCIe		
	<b>Form Factor</b>	PCIe Card, Half Height		
	<b>Controller</b>	NVMe		
	<b>NVM Type</b>	3DXPoint		
	<b>Endurance</b>	5.11 PBW (PB Written)		
	<b>Reliability (MTBF)</b>	1.6M hours		
	<b>Operating Temperature</b>	32° to 185° F (0° to 85° C)		
	<b>Performance</b>		<b>Sequential Read</b>	2730 MB/s
			<b>Sequential Write</b>	2280 MB/s
		<b>Random Read</b>	587K IOPS	
		<b>Random Write</b>	559K IOPS	

<b>Intel® 905p Series AIC 480GB PCIe SSD</b>	<b>Capacity</b>	480TB		
	<b>Protocol</b>	PCIe		
	<b>Form Factor</b>	PCIe Card, Half Height		
	<b>Controller</b>	NVMe		
	<b>NVM Type</b>	3DXPoint		
	<b>Endurance</b>	8.76 PBW (PB Written)		
	<b>Reliability (MTBF)</b>	1.6M hours		
	<b>Operating Temperature</b>	32° to 185° F (0° to 85° C)		

### Technical Specifications - Hard Drives

<b>Performance</b>	<b>Sequential Read</b>	27100 MB/s
	<b>Sequential Write</b>	2280 MB/s
	<b>Random Read</b>	582K IOPS
	<b>Random Write</b>	561K IOPS

### Technical Specifications - Graphics

<b>Integrated Intel® HD* Graphics (Z2G4)</b>	<b>Form Factor</b>	Integrated in select Intel® Xeon® E, Intel® Core™ i7, and Intel® Core™ i5 processors.
		Check specific platform specifications for selections.
	<b>Graphics Controller</b>	Intel® UHD Graphics
	<b>Memory</b>	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® DVM 5.0), to provide an optimal balance between graphics and system memory use.
	<b>Connectors</b>	Check system platform specifications where Intel® UHD Graphics are available.
	<b>Maximum Resolution</b>	Display Port: 4096 x 2160 HDMI: 4096 x 2160 DVI: 1920x1200 VGA: 2048x1536
		<b>NOTE:</b> For HDMI, DVI and VGA outputs, separate adapters may be required.
	<b>Shading Architecture</b>	Shader Model 5.0
	<b>Supported Graphics APIs</b>	OpenGL 4.4 DirectX 12
	<b>Available Graphics Drivers</b>	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:
  - 2KW86A6 - HP (Bulk 4) miniDP-to-DP Adapter Cables
  - 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables

### Technical Specifications - Graphics

<b>AMD Radeon™ Pro WX3100 4GB Graphics</b>	<b>Form Factor</b>	Low Profile, half length (full-height bracket included)
	<b>Graphics Controller</b>	Architecture: Polaris 12 Lexa GL Number of Cores: 512 Stream Processors organized into 8 compute units Power: 50W Cooling Solution: Active Fan Heatsink
	<b>Bus Type</b>	PCI Express® x8, Generation 3.0
	<b>Memory</b>	Size: 4GB GDDR5 Bandwidth: 96 GB/s Interface: 128-bit
	<b>Connectors</b>	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.
	<b>Maximum Resolution</b>	DisplayPort(TM) 1.4: - up to 3x 5120 x 2880 x 24 bpp @ 60Hz - supports Multi-Stream Transport (MST)
	<b>Image Quality Features</b>	Advanced support for 8-bit, 10-bit, and 16-bit per RGB color component. High bandwidth scaler for high quality up and downscaling.
	<b>Display Output</b>	2x Mini-DisplayPort(TM) 1.4 1x DisplayPort(TM) 1.4
	<b>Shading Architecture</b>	Shader Model 6.0
	<b>Supported Graphics APIs</b>	OpenCL(TM) 2.0, DirectX(R) 12.0, OpenGL 4.5
	<b>Available Graphics Drivers</b>	Windows 10 64-bit Linux®  HP qualified drivers may be preloaded or available from the HP support Web site: <a href="http://welcome.hp.com/country/us/en/support.html">http://welcome.hp.com/country/us/en/support.html</a>
	<b>Notes</b>	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 <a href="http://www.amd.com/firepro">www.amd.com/firepro</a> for details.

<b>NVIDIA® Quadro® P400 2GB Graphics</b>	<b>Form Factor</b>	Dimensions: 2.713" H x 5.7" L Single Slot, Low Profile Cooling: Active
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### Technical Specifications - Graphics

Weight: 129 grams

<b>Graphics Controller</b>	NVIDIA® Quadro® P400 Graphics Card GP107 GPU 256 CUDA cores Max Power: 30 Watts
<b>Bus Type</b>	PCI Express 3.0 x16
<b>Memory</b>	Size: 2 GB GDDR5, 2000 MHz Memory Interface: 64-bit Memory Bandwidth: 32 GB/s
<b>Connectors</b>	3mDP Outputs*
<b>Maximum Resolution</b>	DisplayPort™ 1.4: - up to 3x 5120 x 2880 x 24 bpp @ 60Hz - supports Multi-Stream Transport (MST)
<b>Image Quality Features</b>	10-bit internal display processing pipeline 10-bit scan-out support
<b>Display Output</b>	3 mDP Connectors
<b>Shading Architecture</b>	Full Microsoft DirectX 12 Shader Model 5.1
<b>Supported Graphics APIs</b>	OpenGL 4.5 DirectX 12 Vulkan 1.0 API support includes: CUDA C, CUDA C++, DirectCompute , OpenCL
<b>Available Graphics Drivers</b>	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>

<b>Notes</b>	<p>*P400, P620 and P1000 only have mini-DisplayPort™ (mDP) video ports.</p> <p><b>Note 2:</b> AMO kits for P400, P1000 and Adapters.</p> <ul style="list-style-type: none"> <li>• Two mDP-to-DP Adapters are included in the P400 and P1000 AMO kits.</li> <li>• If mDP-to-DP Adapters are needed, Adapters can be ordered separately: <ul style="list-style-type: none"> <li>- 2KW86A6 - HP (Bulk 4) miniDP-to-DP Adapter Cables</li> <li>- 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables</li> </ul> </li> </ul>
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### AMD Radeon™ Pro WX 4100 4GB Graphics

<b>Form Factor</b>	Low Profile (full-height bracket included)
<b>Graphics Controller</b>	Polaris 11 Baffin GL XT GPU: 1024 Stream Processors organized into 16 Compute Units Power: 50 Watts Cooling Solution: Active Fan Heatsink
<b>Memory</b>	Size: 4GB GDDR5 Bandwidth: 96 GB/s Interface: 128-bit



### Technical Specifications - Graphics

<b>Connectors</b>	<p>4x Mini DisplayPort™ 1.4 – HDR ready connectors with HBR3 and MST support.</p> <p>Factory Configured: Four mDP-to-DP cable adapters included After market option kit: Four mDP-to-DP cable adapters included</p> <p>Additional DisplayPort™-to-VGA or DisplayPort™-to-DVI adapters are available as Factory Configuration or Option Kit accessories.</p>
<b>Maximum Resolution</b>	<p>DisplayPort™ 1.4:</p> <ul style="list-style-type: none"> <li>- up to 4x 5120 x 2880 x 24 bpp @ 60Hz</li> <li>- supports Multi-Stream Transport (MST)</li> </ul>
<b>Image Quality Features</b>	Advanced support for 8-bit and 10-bit per RGB color component. High bandwidth scaler for high quality up and downscaling
<b>Display Output</b>	<p>4 Mini-DisplayPort™ 1.4 Outputs</p> <p>FreeSync support</p>
<b>GPU Architecture</b>	GCN 4th Generation
<b>Supported Graphics APIs</b>	<p>DirectX®12</p> <p>OpenGL® 4.5</p> <p>OpenCL™ 2.0</p> <p>Vulkan™ 1.0</p>
<b>Available Graphics Drivers</b>	<p>Windows 10 64-bit</p> <p>Linux®</p> <p>HP qualified drivers may be preloaded or available from the HP support Web site: <a href="http://welcome.hp.com/country/us/en/support.html">http://welcome.hp.com/country/us/en/support.html</a></p>
<b>Notes</b>	<ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>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.</li> </ol>

**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

### Technical Specifications - Graphics

Memory Clock Speed: 1500Mhz  
GPU: 768 Stream Processors organized into 12 Compute Units  
Power: <50 Watts  
Cooling: Active

<b>Bus Type</b>	PCI Express® x16, Generation 3.0
<b>Memory</b>	4GB GDDR5 memory Memory Bandwidth: up to 96 GB/s Memory Width: 128 bit
<b>Connectors</b>	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.
<b>Maximum Resolution</b>	DisplayPort™: - 4096x2160 @24bpp (3 x 4K @ 60Hz, 4 x 4K @ 30Hz)
<b>Image Quality Features</b>	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)
<b>Display Output</b>	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
<b>Shading Architecture</b>	Shader Model 5.0
<b>Supported Graphics APIs</b>	OpenGL 4.4 OpenCL 2.0 DirectX 12.0
<b>Available Graphics Drivers</b>	Windows 10 (64-bit and 32-bit) Windows® 7 (64-bit and 32-bit)

### Technical Specifications - Graphics

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](http://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  
Microsoft Windows 7  
Linux®

HP qualified drivers may be preloaded or available from the HP support

### Technical Specifications - Graphics

#### Notes

Web site:

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

\*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:
    - 2KW86A6 - HP (Bulk 4) miniDP-to-DP Adapter Cables
    - 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables
-

### Technical Specifications - Optical and Removable Storage

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

<b>HP 9.5mm Slim DVD-ROM Drive</b>	<b>Description</b>	9.5mm height, tray-load
	<b>Mounting Orientation</b>	Either horizontal or vertical
	<b>Interface Type</b>	SATA / ATAPI
	<b>Dimensions (WxHxD)</b>	128 x 9.5 x 127mm
	<b>Disc Capacity</b>	<b>DVD-ROM</b> Single layer: Up to 4.7 GB

### Technical Specifications - Optical and Removable Storage

		Double layer: Up to 8.5 GB
<b>Access Times</b>	<b>DVD-ROM Single Layer</b>	< 110 ms (typical)
	<b>CD-ROM Mode 1</b>	< 110 ms (typical)
	<b>Full Stroke DVD</b>	< 230 ms (typical)
	<b>Full Stroke CD</b>	< 220 ms (typical)
<b>Power</b>	<b>Source</b>	SATA DC power receptacle
	<b>DC Power Requirements</b>	5 VDC ± 5%-100 mV ripple p-p
	<b>DC Current</b>	5 VDC – <800mA typical, < 1600 mA maximum
<b>Operating Environmental</b> (all conditions non-condensing)	<b>Temperature</b>	41° to 122° F (5° to 50° C)
	<b>Relative Humidity</b>	10% to 80%
	<b>Maximum Wet Bulb Temperature</b>	84° F (29° C)
<b>Operating Systems Supported</b>	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.	
<b>Kit Contents</b>	9.5mm Slim DVD-ROM Drive, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide	

<b>HP 9.5mm Slim BDXL Blu-Ray Writer</b>	<b>Description</b>	9.5mm height, tray-load	
	<b>Mounting Orientation</b>	Either horizontal or vertical	
	<b>Interface Type</b>	SATA/ATAPI	
	<b>Dimensions (WxHxD)</b>	128 x 9.5 x 127mm	
	<b>Supported Media Types</b>	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	
<b>Disc Capacity</b>	<b>DVD-ROM</b>	8.5 GB DL or 4.7 GB standard	
	<b>Blu-ray</b>	25 GB (single-layer) 50 GB (dual-layer) 100/128 GB (BDXL)	
<b>Access Times</b>	<b>Full Stroke DVD</b>	< 230 ms (seek)	
	<b>Full Stroke CD</b>	< 220 ms (seek)	
	<b>Blu-ray</b>	< 230 ms (seek) (Full Stroke Blu-ray)	

### Technical Specifications - Optical and Removable Storage

	<b>Startup Time</b>	(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
<b>Maximum Data Transfer Rates</b>	<b>CD ROM Read</b>	CD-ROM, CD-R Up to 24X CD-RW Up to 24X
	<b>DVD ROM Read</b>	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
	<b>Blu-ray</b>	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
<b>Power</b>	<b>Source</b>	SATA DC power receptacle
	<b>DC Power Requirements</b>	5 VDC ± 5%-100 mV ripple p-p
	<b>DC Current</b>	5 VDC -900 mA typical, 2000mA maximum
<b>Operating Environmental</b> (all conditions non-condensing)	<b>Temperature</b>	41° to 122° F (5° to 50° C)
	<b>Relative Humidity</b>	10% to 80%
	<b>Maximum Wet Bulb Temperature</b>	84° F (29° C)
<b>Operating Systems Supported</b>	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.	
<b>Kit Contents</b>	9.5mm Slim BDXL Blu-Ray Writer, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide	
<b>NOTES</b>	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	

### Technical Specifications - Optical and Removable Storage

or HDMI digital connection and your display may require HDCP support. HD-DVD movies cannot be played on this workstation.

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**HP SD Media Card Reader Description****Interface Type**

- i.
- ii. USB3.0-SD4.0
  - Support USB 2.0 LPM function
  - Support USB 3.0 U1/U2/U3 Power saving mode
  - Support USB 3.0 LTM function.

**Dimensions (WxHxD)****Supported Media Types**

Dedicated slot in front bezel (orderable option)

- Secure Digital Card (SD)
- Secure Digital Support up to 2TB
- Secure Digital HC (SDHC)
- Secure Digital XC (SDXC)
- Support SD UHS50 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

<b>HP Thunderbolt™ 3 PCIe 3-port I/O Card</b>	<b>Data Transfer Rate</b>	Supports up to 40 Gb/s (40,000 Mb/s)
	<b>Devices Supported</b>	Thunderbolt™ certified devices
	<b>Bus Type</b>	PCIe card Gen 3x4, full or half height PCIe slots
	<b>Ports</b>	One USB 3.1 Type-C connector (Rear)
	<b>Internal Connectors</b>	One 60-pin board-to-board (FlexIO) connector
	<b>System Requirements</b>	Windows 10 RS3 64-bit, Intel® i5 series or higher processor, 128-MB RAM, 1-GB Hard Drive, available PCIe slot.
	<b>Temperature - Operating</b>	50° to 131° F (10° to 55° C)
	<b>Temperature - Storage</b>	-22° to 140° F (-30° to 60° C)
	<b>Relative Humidity - Operating</b>	20% to 80%
	<b>Compliances</b>	FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC
	<b>Operating Systems Supported</b>	Windows 10 RS3 64-bit.
	<b>Kit Contents</b>	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.
	<b>Warranty</b>	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

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

<b>Intel® X710-DA2 2-Port SFP+ 10GbE NIC</b>	<b>Connector</b>	2 SFP+ Ports
	<b>Cabling</b>	Twin Axial Cabling up to 10m
	<b>Controller</b>	Intel® Ethernet Controller X710-AM2
	<b>Network Transfer Rates Supported</b>	10GbE (with supported 10GBASE-SR transceivers)
	<b>Data Path Width</b>	PCIe Gen3x8 (compatible with x4)
	<b>Power Requirement</b>	4.3W (typical) (with supported 10GBASE-SR transceivers)
	<b>Operating Temperature</b>	32° to 131° F (0° to 55° C)
	<b>Dimensions (HxW)</b>	2.703 x 6.578 inches
	<b>Operating System Driver Support</b>	Windows 10 64-bit Linux®
	<b>Kit Contents</b>	<ul style="list-style-type: none"> <li>• Intel® X710-DA2 2-Port SFP+ 10GbE NIC with standard height bracket attached</li> <li>• Low-profile bracket</li> <li>• Product Literature</li> </ul>

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

### Technical Specifications - Networking and Communications

<b>Intel® X550-T2 2-Port 10GbE NIC</b>	<b>Connector</b>	2 RJ-45
	<b>Cabling</b>	10GbE: Cat6a (or better) up to 100m 5GbE and below: Cat5e (or better) up to 100m
	<b>Controller</b>	Intel® Ethernet Controller X550
	<b>Network Transfer Rates Supported</b>	10GbE, 5GbE, 2.5GbE, 1GbE, 100MbE
	<b>Data Path Width</b>	PCIe Gen3x4
	<b>Power Requirement</b>	11.2W (typical)
	<b>Operating Temperature</b>	32° to 131° F (0° to 55° C)
	<b>Dimensions (HxW)</b>	5.1 x 2.7 in (without brackets)
	<b>Operating System Driver Support</b>	Windows 10 64-bit Linux®
	<b>Kit Contents</b>	<ul style="list-style-type: none"> <li>• Intel® X550-T2 2-Port 10GbE NIC with standard height bracket attached</li> <li>• Low-profile bracket</li> <li>• Product Literature</li> </ul>
	<hr/>	
<b>Aquantia® AQN-108 1-Port 5GbE NIC</b>	<b>Connector</b>	1 RJ-45
	<b>Cabling</b>	Cat5e (or better) up to 100m
	<b>Controller</b>	Aquantia® AQC108
	<b>Network Transfer Rates Supported</b>	5GbE, 2.5GbE, 1GbE, 100MbE
	<b>Data Path Width</b>	PCIe Gen3x1
	<b>Power Requirement</b>	3.5W (typical)
	<b>Operating Temperature</b>	32° to 131° F (0° to 55° C)
	<b>Dimensions (HxW)</b>	3.72 x 3.18 inches (without brackets)
	<b>Operating System Driver Support</b>	Windows 7 64-bit; Windows 10 64-bit; Linux®
	<b>Kit Contents</b>	<ul style="list-style-type: none"> <li>• Aquantia AQN-108 1-Port 5GbE NIC with standard height bracket attached</li> <li>• Low-profile bracket</li> <li>• Product Literature</li> </ul>
	<hr/>	
<b>Intel® I350-T2 2-Port 1GbE NIC</b>	<b>Connector</b>	2 RJ-45
	<b>Cabling</b>	Cat5e (or better) up to 100m
	<b>Controller</b>	Intel® Ethernet I350 Controller
	<b>Network Transfer Rates Supported</b>	1GbE, 100MbE, 10MbE
	<b>Data Path Width</b>	PCIe Gen2.1x4
	<b>Power Requirement</b>	4.4W (typical)
	<b>Operating Temperature</b>	32° to 131° F (0° to 55° C)
	<b>Dimensions (HxW)</b>	2.75 x 5.5 inches (without brackets)
	<b>Operating System Driver Support</b>	Windows 7 64-bit; Windows 10 64-bit; Linux®
	<b>Kit Contents</b>	<ul style="list-style-type: none"> <li>• Intel® I350-T2 2-Port 1GbE NIC with standard height bracket attached</li> </ul>

### Technical Specifications - Networking and Communications

- Low-profile bracket
- Product Literature

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<b>Intel® I350-T4 4-Port 1GbE NIC</b>	<b>Connector</b>	4 RJ-45
	<b>Cabling</b>	Cat5e (or better) up to 100m
	<b>Controller</b>	Intel® Ethernet I350 Controller
	<b>Network Transfer Rates Supported</b>	1GbE, 100MbE, 10MbE
	<b>Data Path Width</b>	PCIe Gen2.1x4
	<b>Power Requirement</b>	5W (typical)
	<b>Operating Temperature</b>	32° to 131° F (0° to 55° C)
	<b>Dimensions (HxW)</b>	2.75 x 5.5 inches (without brackets)
	<b>Operating System Driver Support</b>	Windows 7 64-bit; Windows 10 64-bit; Linux®
	<b>Kit Contents</b>	<ul style="list-style-type: none"><li>• Intel® I350-T4 4-Port 1GbE NIC with standard height bracket attached</li><li>• Low-profile bracket</li><li>• Product Literature</li></ul>

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<b>Intel® 9560 802.11ac, BT 5, M.2</b>	<b>WLAN Standards</b>	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)
	<b>Antenna</b>	2x2 Dual-Band
	<b>Bluetooth Standards</b>	5
	<b>Operating Temperature</b>	32° to 131° F (0° to 55° C)
	<b>Interface</b>	M.2 CNVio
	<b>Dimensions</b>	M.2 2230
	<b>Kit Contents</b>	Not Available

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### 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 Software
- 5 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

<b>Date of change:</b>	<b>Version History:</b>		<b>Description of change:</b>
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

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