

### Overview

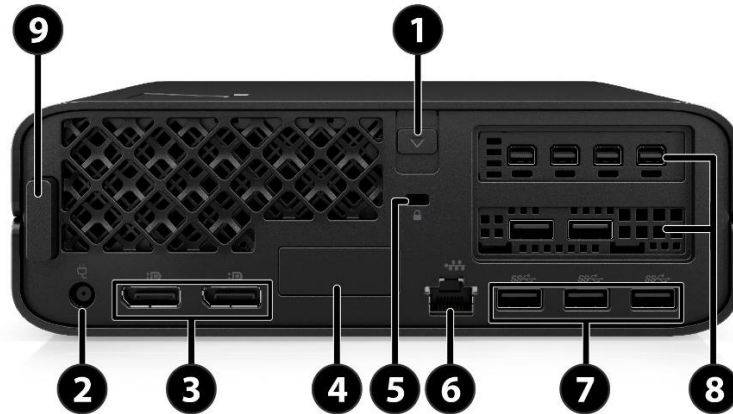
### HP Z2 G9 Mini Workstation Desktop PC



#### Front-Side View

1. Power button
2. Universal audio jack (with CTIA & OMTP headset support)
3. Antenna
4. 1 USB-A 10Gbps port (charge port supports up to 5V/2.1A)
5. 2 USB-C® 20Gbps port (charging supported up to 5V/3A)

### Overview



#### Rear View

1. Cover release latch
2. Power connector
3. (2) DisplayPort 1.4
4. Flex IO left side, choice of:  
(1) VGA, (1) HDMI 2.0b, (1) DisplayPort™ 1.4, (1) Dual USB-A 5Gbps port, (1) 1GbE LAN, (1) USB-C® 10Gbps port (Alt Mode), (1) Thunderbolt™ 3 with USB4 40Gbps, (1) 1Gbps Fiber LC NIC, (1) 2.5GbE LAN, (1) USB-based Serial port, (1) 10GbE LAN
5. Security cable slot
6. (1) 1GbE LAN
7. (3) USB-A 10Gbps port
8. PCIe, choice of:  
Graphic Cards<sup>3</sup>, (1) Dual USB-A 10Gbps port, (1) Serial port
9. Antenna

<sup>1</sup> Onboard Display support DP1.4/HBR2. Flex I/O module Display support DP1.4/HBR3 (Resolution support up to 5120x3200 24bpp @60Hz).

<sup>2</sup> Available on selected configurations only.

<sup>3</sup> Discrete graphics cards require purchase of the Performance Base Unit, which includes a PCIe backplane riser and 280W power supply

### Overview



**HP Z2 G9 Mini Workstation Desktop PC, bottom view**

Removable VESA cap for access to integrated VESA mounting holes

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### Overview

#### Form Factor

Mini

#### Operating Systems

Preinstalled:

- Windows 11 Pro - HP recommends Windows 11 Pro<sup>2</sup>
- Windows 11 Home - HP recommends Windows 11 Pro<sup>2</sup>
- Windows 11 Pro (preinstalled with Windows 10 Pro Downgrade)<sup>1,2,3</sup>
- Linux<sup>®</sup>-ready<sup>5</sup>
- Ubuntu<sup>®4,5</sup>
  - Intel 12<sup>th</sup> generation processors will support and preinstall Ubuntu 20.04 and 22.04 LTS
  - Intel 13<sup>th</sup> generation processors support and preinstall Ubuntu 22.04 LTS

Web-Supported only:

- Windows<sup>®</sup> 10 Enterprise<sup>2</sup>

Supported Version:

- HP tested Windows 10, versions 20H2, 21H1, 21H2 and 22H2 on this platform. For testing information on newer versions of Windows 10, please see: <https://support.hp.com/document/c05195282>.
- Red Hat<sup>®</sup> Enterprise Linux<sup>®</sup> Workstation 8 and 9<sup>5</sup>
- SUSE Linux<sup>®</sup> Enterprise Desktop 15<sup>5</sup>
- Ubuntu<sup>®4,5</sup>
  - Intel 12<sup>th</sup> generation processors support Ubuntu 20.04 and 22.04 LTS
  - Intel 13<sup>th</sup> generation processors support Ubuntu 22.04 LTS

<sup>1</sup> Device comes with Windows 10 and a free Windows 11 upgrade or may be preloaded with Windows 11. Upgrade timing may vary by device. Features and app availability may vary by region. Certain features require specific hardware (see Windows 11 Specifications).

<sup>2</sup> 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 is automatically updated and enabled. High speed internet and Microsoft account required. ISP fees may apply and additional requirements may apply over time for updates. See <http://www.windows.com>.

<sup>3</sup>This system is preinstalled with Windows 10 Pro software and also comes with a license for Windows 11 Pro software and provision for recovery software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.

<sup>4</sup>Specific versions of certified Ubuntu<sup>®</sup> will vary based upon the generation of Intel processors for this platform. Not all features are available in all editions or versions of Ubuntu. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS to take full advantage of Ubuntu functionality. Ubuntu may be automatically updated. ISP fees may apply and additional requirements may apply over time for updates.

<sup>5</sup>For detailed Linux<sup>®</sup> OS/hardware support information, see:

[http://www.hp.com/support/linux\\_hardware\\_matrix](http://www.hp.com/support/linux_hardware_matrix)

**NOTE:** Your product does not support Windows 8 or Windows 7. In accordance with Microsoft's support policy, HP does not support the Windows<sup>®</sup> 8 or Windows 7 operating system on products configured with Intel<sup>®</sup> and AMD<sup>®</sup> 7th generation and forward processors or provide any Windows<sup>®</sup> 8 or Windows 7 drivers on <http://www.support.hp.com>. A full list of HP products and the Windows 10 versions tested is available on the HP support website. <https://support.hp.com/us-en/document/c05195282>

### Overview

#### Processors Overview<sup>1,2,3,4,5</sup>

##### Intel 13<sup>th</sup> Generation Processors:

Intel® Core™ i5-13400 (2.5GHz P-Core base frequency, 1.8GHz E-Core base frequency, up to 3.3GHz E-Core Max Turbo frequency, up to 4.6 GHz P-core Max Turbo frequency, 20MB L3 cache, 6 P-cores and 4 E-cores, 16 threads)

Intel® Core™ i5-13500 (2.5GHz P-Core base frequency, 1.8GHz E-Core base frequency, up to 3.5GHz E-Core Max Turbo frequency, up to 4.8 GHz P-core Max Turbo frequency, 24MB L3 cache, 6 P-cores and 8 E-cores, 20 threads)

Intel® Core™ i5-13600 (2.7GHz P-Core base frequency, 2GHz E-Core base frequency, up to 3.7GHz E-Core Max Turbo frequency, up to 5 GHz P-core Max Turbo frequency, 24MB L3 cache, 6 P-cores and 8 E-cores, 20 threads)

Intel® Core™ i5-13600K (3.5GHz P-Core base frequency, 2.6GHz E-Core base frequency, up to 3.9GHz E-Core Max Turbo frequency, up to 5.1 GHz P-core Max Turbo frequency, 24MB L3 cache, 6 P-cores and 8 E-cores, 20 threads)

Intel® Core™ i7-13700 (2.1GHz P-Core base frequency, 1.5GHz E-Core base frequency, up to 4.1GHz E-Core base frequency, up to 5.1GHz E-Core base frequency, 30MB L3 cache, 8 P-cores and 8 E-cores, 24 threads)

Intel® Core™ i7-13700K (3.4GHz P-Core base frequency, 2.5GHz E-Core base frequency, up to 4.2GHz E-Core Max Turbo frequency, up to 5.3 GHz P-core Max Turbo frequency, 30MB L3 cache, 8 P-cores and 8 E-cores, 24 threads)

Intel® Core™ i9-13900 (2GHz P-Core base frequency, 1.5GHz E-Core base frequency, up to 4.2GHz E-Core Max Turbo frequency, up to 5.2 GHz P-core Max Turbo frequency, 36MB L3 cache, 8 P-cores and 16 E-cores, 32 threads)

Intel® Core™ i9-13900K (3GHz P-Core base frequency, 2.2GHz E-Core base frequency, up to 4.3GHz E-Core Max Turbo frequency, up to 5.4 GHz P-core Max Turbo frequency, 36MB L3 cache, 8 P-cores and 16 E-cores, 32 threads)

##### Intel 12<sup>th</sup> Generation Processors:

Intel® Core™ i9-12900K (2.4GHz E-core base frequency, 3.2GHz P-core base frequency, up to 3.9 GHz E-core Max Turbo frequency, up to 5.1 GHz P-core Max Turbo frequency, 30MB L3 cache, 8 P-cores and 8 E-cores, 24 threads)

Intel® Core™ i9-12900 (1.8GHz E-core base frequency, 5.0 GHz P-core base frequency, up to 3.8 GHz E-core Max Turbo frequency, up to 5.0 GHz P-core Max Turbo frequency, 30MB L3 cache, 8 P-cores and 8 E-cores, 24 threads)

Intel® Core™ i7-12700K (2.7 GHz E-core base frequency, 3.6 GHz P-core base frequency, up to 3.8 GHz E-core Max Turbo frequency, up to 4.9 GHz P-core Max Turbo frequency, 25MB L3 cache, 8 P-cores and 4 E-cores, 20 threads)

Intel® Core™ i7-12700 (1.6 GHz E-core base frequency, 2.1 GHz P-core base frequency, up to 3.6 GHz E-core Max Turbo frequency, up to 4.8 GHz P-core Max Turbo frequency, 25MB L3 cache, 8 P-cores and 4 E-cores, 20 threads)

Intel® Core™ i5-12600K (2.8 GHz E-core base frequency, 3.7 GHz P-core base frequency, up to 3.6 GHz E-core Max Turbo frequency, up to 4.9 GHz P-core Max Turbo frequency, 20MB L3 cache, 6 P-cores and 4 E-cores, 16 threads)

Intel® Core™ i5-12600 (3.3 GHz P-core base frequency, up to 4.8 GHz P-core Max Turbo frequency, 18MB L3 cache, 6 P-cores and 0 E-cores, 12 threads)

Intel® Core™ i5-12500 (3.0 GHz P-core base frequency, up to 4.6 GHz P-core Max Turbo frequency, 18MB L3 cache, 6 P-cores and 0 E-cores, 12 threads)

Intel® Core™ i5-12400 (2.5 GHz P-core base frequency, up to 4.4 GHz P-core Max Turbo frequency, 18MB L3 cache, 6 P-cores and 0 E-cores, 12 threads)

Intel® Core™ i3-12300 (3.5 GHz P-core base frequency, up to 4.4 GHz P-core Max Turbo frequency, 12MB, 4 P-cores. 8 threads)

Intel® Core™ i3-12100 (3.3 GHz P-core base frequency, up to 4.3 GHz P-core Max Turbo frequency, 12MB, 4 P-cores. 8 threads)

<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 Turbo Boost performance varies depending on hardware, software and overall system configuration. See <http://www.intel.com/technology/turboboost> for more information.

### Overview

<sup>3</sup> Intel vPro® requires Windows 10 Pro 64 bit or higher, a vPro supported processor, vPro enabled chipset, vPro enabled wired LAN and/or Wi-Fi 6E WLAN and TPM 2.0. Some functionality requires additional 3rd party software in order to run. Features of vPro® Essentials and Enterprise vary. See <http://intel.com/vpro>

<sup>4</sup> Error Correction Memory

<sup>5</sup>TDP configured down to 90W.

#### Base Units

Standard Base Unit supports only Intel integrated graphics.  
Performance Base Unit includes a PCIe Backplane Riser for discrete graphics cards.

*(Power Adapters ordered separately. See Details in the Power Adapter Section)*

#### Convertibility

Z2 Mini G9 can either be placed on a flat surface or mounted behind a display or under a desk. (Mounting sold separately)

#### Expansion Slots

- 1 PCI Express Gen4 slot x16 mechanical/ x8 electrical (Low-profile HP graphics cards only\*)

This is only available in the performance base unit.  
\* *The HP Mini discrete graphics cards come with custom rear connector bulkhead. (see system board section for more details)*

#### Side I/O

1 USB-A 10Gbps port (charge port supports up to 5V/2.1A)  
2 USB-C® 20Gbps port (charging supported up to 5V/3A),  
1 Universal audio jack

#### Internal I/O

(1) serial port available with header

#### Rear I/O

(2) DisplayPort 1.4, (1) 1GbE LAN, (3) USB-A 10Gbps port, (1)

#### Optional I/O

Flex IO\* – choose one of the following options: (1) DisplayPort™ 1.4 HBR3<sup>1</sup>, (1) HDMI 2.0b, (1) VGA, (1) Dual USB-A 5Gbps port, (1) USB-C® 10Gbps port (USB Power Delivery, Alt Mode DisplayPort™), (1) 1 GbE LAN, (1) Thunderbolt™ 3 with USB4™ 40Gbps, (1) 2.5 GbE LAN, (1) USB-based Serial port option, (1) 1GbE Fiber LC NIC, (1) 10GbE LAN

PCIe – choose one of the following options: (1) Dual USB-A 10Gbps, (1) Serial. These options consume 1 rear bulkhead space each. They do not require a Performance Base Unit with PCIe Backplane Riser.

\*Actual flex I/O choice depends on configuration selected.

1GbE Fiber LC NIC and 2.5GbE LAN will be available in Q3, 2022

<sup>1</sup>Onboard Display support DP1.4/HBR2. Flex I/O module Display support DP1.4/HBR3 (Resolution support up to 5120x3200 24bpp @60Hz). Discrete graphics support DP1.4 / HBR3.

#### On-board RAID Support

NVMe RAID 0 Striped Array  
NVMe RAID 1 Mirrored Array

#### Chassis Dimensions (H x W x D)

H: 2.7" [69mm] (Standard desktop orientation)  
W: 8.3" [211mm]  
D: 8.6" [218mm]

#### Packaged Dimensions

H: 11.73" (298mm)  
W: 6.69" (170mm)  
D: 19.65" (499mm)

#### Rack Dimensions

5U

#### Weight

Exact weights depend upon configuration  
Minimum: 2.4kg (5.29lbs.)  
Maximum: 3.1kg (6.83lbs.)

### Overview

<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 (non-pressurized)</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 Temperature for details.
<b>Power Adapters</b>	Choice of: 180W 89% Average Efficiency 280W 89% Average Efficiency.  <i>All power Adapters are external to the product.</i> <ul style="list-style-type: none"><li>• <i>Standard Base Unit System defaults to 180W Power Adapters. When configured with a 125W K SKU Processor, the 280W Power Adapter is required.</i></li><li>• <i>Performance Base Units require 280W Power Adapters supporting Discrete Graphics and 125W K SKU configurations.</i></li></ul>
<b>Workstation ISV Certifications</b>	See the latest list of certifications at <a href="http://www.hp.com/united-states/campaigns/workstations/partnerships.html">http://www.hp.com/united-states/campaigns/workstations/partnerships.html</a>
<b>Chipset</b>	Intel® W680 chipset
<b>Memory</b>	2 SODIMM slots, supporting up to 64GB ECC/non-ECC, DDR5 5600 MT/s

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### Supported Components

#### Storage \*

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
<b>PCIe Solid State Drives</b>				
Z Turbo 512GB 2280 PCIe-4x4 TLC M.2 Z2 G9 Mini Kit SSD	Y	Y	4M9Z5AA	
Z Turbo 1TB 2280 PCIe-4x4 TLC M.2 Z2 G9 Mini Kit SSD	Y	Y	4M9Z6AA	
Z Turbo 2TB 2280 PCIe-4x4 TLC M.2 Z2 G9 Mini Kit SSD	Y	Y	4M9Z7AA	
Z Turbo 512GB 2280 PCIe-4x4 SED OPAL2 TLC M.2 Z2 G9 Mini Kit SSD	Y	Y	4M9Z9AA	
Z Turbo 1TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 Z2 G9 Mini Kit SSD	Y	Y	4N000AA	
Z Turbo 2TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 Z2 G9 Mini Kit SSD	Y	Y	4N001AA	
512 GB HP Z Turbo Drive PCIe® NVMe™ M.2 SSD	Y	Y		
1 TB HP Z Turbo Drive PCIe® NVMe™ M.2 SSD	Y	Y		
2 TB HP Z Turbo Drive PCIe® NVMe™ M.2 SSD	Y	Y		
Z Turbo 4TB 2280 PCIe-4x4 TLC M.2 Z2 G9 MINI Kit SSD	Y	Y	5S493AA	
512 GB HP Z Turbo Drive PCIe® NVMe™ Opal 2 M.2 SSD	Y	Y		
1 TB HP Z Turbo Drive PCIe® NVMe™ Opal 2 M.2 SSD	Y	Y		
2 TB HP Z Turbo Drive PCIe® NVMe™ Opal 2 M.2 SSD	Y	Y		
Z Turbo 4TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 Z2 G9 MINI Kit SSD	Y	Y	5S499AA	
256 GB PCIe® NVMe™ Value M.2 SSD	Y	Y	4N009AA	
512 GB PCIe® NVMe™ Value M.2 SSD	Y	Y	4N008AA	
1 TB PCIe® NVMe™ Value M.2 SSD	Y	Y	4N010AA	

**NOTE1:** SATA hardware-assisted 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-assisted RAID. All drives must be identical in type and capacity. Boot volume/RAID array must be less than 2 TB

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

#### Graphics Adapters

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
<b>Graphics Cable Adapters</b>				
HP USB-C to DP Adapter	Y	Y	4SH08AA	
HP DisplayPort to DVI-D Adapter	Y	Y	FH973AA	
HP DisplayPort To DVI Adapter (Bulk 90)	Y	Y	FH973A6	
HP DisplayPort to HDMI Adapter	Y	Y	2JA63AA	
HP DisplayPort To VGA Adapter	Y	Y	AS615AA	
HP DisplayPort to VGA Adapter Bulk Qty.90)	Y	Y	AS615A6	
HP DisplayPort To VGA Adapter	Y	Y	F7W97AA	
USB-C to VGA Adapter	Y	Y	4SH06AA	



### Supported Components

USB-C to HDMI Adapter	Y	Y	4SH07AA	
HP Single miniDP-to-DP Adapter Cable	Y	Y	2MY05AA	
<b>Discrete Graphics</b>				
<b>Entry 3D Graphics</b>				
NVIDIA® T400 2GB	Y	N		1
NVIDIA® T400 4GB	Y	Y	5Z7E0AA	1
NVIDIA® T600 4GB	Y	N		1
<b>High End 3D Graphics</b>				
NVIDIA® T1000 4GB	Y	N		1
NVIDIA® T1000 8GB	Y	Y	5Z7D8AA	1
NVIDIA RTX™ A2000 6GB	Y	Y	340L0AA	1
NVIDIA RTX™ A2000 12GB	Y	Y	5Z7D9AA	1
NVIDIA RTX 4000 SFF Ada 20 GB 4mDP Graphics	Y	Y	8C1W1AA	1

- Discrete graphics cards require a Performance Base Unit chosen at time of order. Performance Base Units include a PCIe backplane riser and requires aa 280W power adapter. Standard Base Units are not capable of supporting discrete graphics.

### Supported Components

#### Memory

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP 8GB (1x8GB) DDR5-4800 nECC SODIMM	Y	Y	4M9Y4AA/AT	1
HP 16GB (1x16GB) DDR5-4800 nECC SODIMM	Y	Y	4M9Y5AA/AT	1
HP 16GB (1x16GB) DDR5-4800 ECC SODIMM	Y	Y	4M9Y6AA/AT	1
HP 32GB (1x32GB) DDR5-4800 nECC SODIMM	Y	Y	4M9Y7AA/AT	1,2
HP 32GB (1x32GB) DDR5-4800 ECC SODIMM	Y	Y	4M9Y8AA/AT	1,2
8GB DDR5 (1x8GB) 5600 SODIMM NECC Memory	Y	Y	79U70AA	1
16GB DDR5 (1x16GB) 5600 SODIMM NECC Memory	Y	Y	79U71AA	1
16GB DDR5 (1x16GB) 5600 SODIMM ECC Memory	Y	Y	79U74AA	1
32GB DDR5 (1x32GB) 5600 SODIMM NECC Memory	Y	Y	79U72AA	1
32GB DDR5 (1x32GB) 5600 SODIMM ECC Memory	Y	Y	79U73AA	1

**NOTE 1:** Two channels of DDR5 memory are supported. To realize full performance at least one DIMM must be inserted into each channel.

**NOTE 2:** Max memory speed with these modules are 5200MHz

See Processor Overview for ECC memory supported processors

#### Optical and Removable Storage

	Factory Configured	Option Kit	Option Kit Part Number
<b>HP Slim Tray Optical Drives</b>			
HP External Ultra-Slim DVD-RW Drive	N	Y	Y3T76AA
HP USB External DVDRW Drive	N	Y	F2B56AA

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.

#### Networking and Communications

	Factory Configured	Option Kit	Option Kit Part Number
Integrated Intel® I219LM PCIe GbE Controller (Intel® vPro® with Intel AMT 16.0)	Y	N	
HP 1GbE LAN Flex Port 2020	Y	Y	141J6AA/AT
HP Flex 1GbE Fiber LC Single Port	Y	Y	20J15AA
HP 2.5GbE LAN Flex Port	Y	Y	169K0AA
Intel® Wi-Fi 6E AX211 (2x2) and Bluetooth® 5.3 wireless card **	Y	N	
HP 10GBase-T Flex IO	Y	Y	56Q71AA

\*Wi-Fi 6E requires a Wi-Fi 6E router, sold separately, to function in the 6GHz band. Availability of public wireless access points limited. Wi-Fi 6E is backwards compatible with prior 802.11 specs. And available in countries where Wi-Fi 6E is supported.

\*\*Intel AX211 must be configured at time of purchase. Not available as an After Market Option

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

### Supported Components

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

#### Racking and Physical Security

	Factory Configured	Option Kit	Option Kit Part Number
HP B500 PC Mounting Bracket	N	Y	2DW52AA/AT
HP B550 Z Display PC Mounting Bracket*	N	Y	16U00AA/AT
HP Z Display B600 PC Mounting Bracket	N	Y	529H3AA/AT
HP Keyed Cable Lock 10mm	N	Y	T1A62AA
HP Master Keyed Cable Lock 10mm	N	Y	T1A63AA
HP Rack Cable Management Arm	N	Y	35Z34AA
HP Z2 Mini ePSU Sleeve	Y	Y	3RW68AA
HP Z2 Mini Arm/Wall VESA Mount Solution	N	Y	4N004AA/AT
HP Z2 Mini Vertical Stand	N	Y	4N006AA
HP Z2 Mini G9 Rail Rack Kit	N	Y	6C1U0AA/AT

\*If physical security is required for IO ports, recommended configuration is B600 PC Mounting Bracket and Z2 Mini VESA Mount Solution.

#### Input Devices

	Factory Configured	Option Kit	Option Kit Part Number
HP USB 320K Keyboard	Y	Y	9SR37AA
HP Wireless Business Slim Keyboard and Mouse	Y	Y	
HP 320M Wired Mouse	Y	Y	9VA80AA
HP Wired Desktop 320MK Mouse and Keyboard	N	Y	
HP 125 Wired Keyboard	Y	Y	266C9AA
HP 975 USB+BT Dual Mode Wireless	N	Y	3Z726AA
HP 655 Wireless USB BLK KBD/MSE Kit	N	Y	4R009AA
HP 655 Wireless Keyboard and Mouse Combo (Blk Qty.10)	N	Y	4R009A6
HP 125 Wired Mouse	Y	Y	265A9AA
HP 128 Laser Wired Mouse	Y	Y	265D9AA
HP 935 Creator Wireless Mouse	N	Y	1D0K8AA
HP 455 Programmable Wireless Keyboard	Y	Y	4R177AA
HP 455 Programmable Wireless Keyboard (Bulk Qty.12)	Y	Y	4R177A6
HP Wired Desktop 320MK Mouse and Keyboard	Y	Y	9SR36AA

**NOTE:** Keyboard and Mouse are optional or add on features.

#### Other Hardware

	Factory Configured	Option Kit	Option Kit Part Number
HP Z2 Mini G9 Serial Port Adapter	Y	Y	4M9Y9AA
HP Z2 Mini G9 Dual Type-A SuperSpeed USB 10Gbps Port	Y	Y	4M9Z0AA/AT

### Supported Components

HP Serial Port v3 Flex IO	Y	N	
HP USB-C 3.2 Gen2 Alt Flex Port 2020	Y	Y	141K6AA/AT
HP Dual USB-A 3.2 Gen1 Flex 2020	Y	Y	141J8AA/AT
HP HDMI Flex Port	Y	Y	69D47AA/AT
HP DP Flex Port 2020	Y	Y	141J7AA/AT
HP VGA Flex Port 2020	Y	Y	141K7AA/AT
HP TBT3 v3 Flex IO	Y	Y	440A5AA
HP Z2 Power Cord Kit	Y	Y	1N1D5AA
C13-C14 2.0m 15A 100-127V Countries Straight Desktop Power Cord	Y	Y	8R881AA
C13-C14 2.0m 10A 200-240V Countries Straight Desktop Power Cord	Y	Y	8R882AA
HP 280W Slim Smart 7.4mm AC Adapter	Y	Y	4J0P0AA
HP 1GbE LAN Flex Port 2020	Y	Y	141J6AA/AT
HP Flex 1GbE Fiber LC Single Port	Y	Y	20J15AA
HP 2.5GbE LAN Flex Port	Y	Y	169K0AA
HP Z2 Mini Remote System Controller	Y	Y	7K6D7AA

### Software

	Factory Configured	Option Kit	Support Notes
HP Performance Advisor	Y	N	1
HP PC Hardware Diagnostics UEFI (Windows OS only)	Y	N	2
HP PC Hardware Diagnostics Windows		N	3
HP Wolf Security	Y	N	
HP Notifications	Y	N	
HP Desktop Support Utility	Y	N	
HP Documentation	Y	N	
HP Image Assistant	N	N	
HP Support Assistant	N	N	
myHP	Y	N	
HP Easy Clean	Y	N	
Kingsoft WPS Office	Y	N	4
Adobe Substance 3D Collection Plan	N	Y	6
WSL2/Ubuntu Data Science Stack	Y	N	7

**NOTE 1:** Supports and is preinstalled with Windows 10 only. Also available as a free download from <http://www.hp.com/go/performanceadvisor>

**NOTE 2:** Windows OS only

**NOTE 3:** Not available in Russia

**NOTE 4:** Only available in China

**NOTE 6:** Not available in China

**NOTE 7:** Optional Software

### Supported Components

#### Operating Systems

- Windows 11 Pro – HP recommends Windows 11 Pro<sup>2</sup>
- Windows 11 Home – HP recommends Windows 11 Pro<sup>2</sup>
- Windows 11 Pro (preinstalled with Windows 10 Pro Downgrade) <sup>1,2,3</sup>
- Linux<sup>®</sup>-ready<sup>5</sup>
- Red Hat<sup>®</sup> Enterprise Linux<sup>®</sup> Workstation 8 and 9<sup>5</sup>
- SUSE Linux<sup>®</sup> Enterprise Desktop 15<sup>5</sup>
- Ubuntu<sup>®</sup><sup>4,5</sup>
  - Intel 12<sup>th</sup> generation processors support Ubuntu 20.04 and 22.04 LTS
  - Intel 13<sup>th</sup> generation processors support Ubuntu 22.04 LTS

<sup>1</sup> Device comes with Windows 10 and a free Windows 11 upgrade or may be preloaded with Windows 11. Upgrade timing may vary by device. Features and app availability may vary by region. Certain features require specific hardware (see Windows 11 Specifications).

<sup>2</sup> 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 is automatically updated and enabled. High speed internet and Microsoft account required. ISP fees may apply and additional requirements may apply over time for updates. See <http://www.windows.com>.

<sup>3</sup>This system is preinstalled with Windows 10 Pro software and also comes with a license for Windows 11 Pro software and provision for recovery software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.

<sup>4</sup> Specific versions of certified Ubuntu<sup>®</sup> will vary based upon the generation of Intel processors for this platform. Not all features are available in all editions or versions of Ubuntu. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS to take full advantage of Ubuntu functionality. Ubuntu may be automatically updated. ISP fees may apply, and additional requirements may apply over time for updates.

<sup>5</sup>For detailed Linux<sup>®</sup> OS/hardware support information, see: [http://www.hp.com/support/linux\\_hardware\\_matrix](http://www.hp.com/support/linux_hardware_matrix)

**NOTE:** Your product does not support Windows 8 or Windows 7. In accordance with Microsoft's support policy, HP does not support the Windows<sup>®</sup> 8 or Windows 7 operating system on products configured with Intel<sup>®</sup> and AMD<sup>®</sup> 7<sup>th</sup> generation and forward processors or provide any Windows<sup>®</sup> 8 or Windows 7 drivers on <http://www.support.hp.com>. A full list of HP products and the Windows 10 versions tested is available on the HP support website. <https://support.hp.com/us-en/document/c05195282>

#### HP BIOS

##### 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
  - Most Wake events other than power buttons and WOL (Wake on LAN supported by embedded Lan controller under S4/S5 Maximum Power Saving Enabled)
  - USB charging ports

### Supported Components

#### HP Sure Start Gen7 Start

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

**NOTE:** HP Sure Start Gen7 is available on HP Workstation products equipped with Intel® 12<sup>th</sup> generation processors.

#### HP Performance Control Modes

HP Z Desktop Workstations offers Performance Control Modes in the F10 BIOS menu. Z2 G9 offers Quiet Mode, Performance Mode, Rack Mode and High-Performance Mode. HP recommends using High Performance Mode. Customers can get up to 34% performance improvements using High Performance Mode over Performance Mode\*. It is possible to configure High Performance Mode as default from the factory.

How to Set HP Performance Control Modes:

**In the F10 BIOS Menu**, the setting titled “Performance Control” is adjustable to High Performance Mode, Performance Mode, Rack Mode or Quiet Mode. These modes are choice points for performance and acoustic trade-offs based on user needs or recommended balanced conditions in performance and noise optimization.

At startup, push the F10 key while system is booting to get to the BIOS Menu.

Go to → Advanced → System Options → scroll down and choose “Performance Control”

Set the Performance Mode you desire and then go back to Main → Save Changes and Exit → Yes

**In HP Performance Advisor software**, select BIOS Settings → Advanced → System Options → Performance Controls

The machine will restart in the mode you’ve chosen.

You can change these modes anytime you prefer to prioritize acoustics (Quiet Mode), want a balance between performance and acoustics (Performance or Rack Mode) or prefer to prioritize performance (High Performance Mode).

For more information on performance control modes, please see the white paper called, HP Performance Control Modes for Z Desktop Workstations.

\*Compared to Performance Mode. Performance increase based on Z2 Tower G9 with 64GB of memory, 1TB NVMe, Windows 11 22H2 OS, RTX A4000, i9-13900 CPU using SPECworkstation 3.1

### Supported Components

#### SOFTWARE COMPONENTS AND APPLICATIONS WITH WINDOWS

##### Software

HP Support Assistant<sup>14</sup>  
HP Image Assistant  
HP Desktop Support Utility  
HP Documentation  
HP Notifications  
HP PC Hardware Diagnostics UEFI  
HP PC Hardware Diagnostics Windows  
HP Performance Advisor<sup>1</sup>  
myHP  
HP Easy Clean<sup>20</sup>  
WSL/Ubuntu Data Science Stack  
HP Privacy Settings  
Touchpoint Customizer for Commercial

##### Manageability Features

HP Driver Packs<sup>2</sup>  
HP UWP Pack  
HP System Software Manager (SSM)  
HP BIOS Config Utility (BCU)  
HP Manageability Integration Kit Gen4<sup>3</sup>  
HP Smart Support<sup>5</sup>  
HP Client Catalog (download)  
HP Image Assistant (download)  
HP Cloud Recovery  
HP Client Management Script Library (download)  
HP BIOSphere Gen6<sup>13</sup>

##### Client Security Software

HP Client Security Suite Gen7<sup>4</sup> including: (including Credential Manager, HP Password Manager<sup>6</sup>, HP Spare Key)  
HP Power On Authentication  
Microsoft Defender<sup>7</sup>

##### Security Management

HP Secure Erase<sup>16</sup>  
HP Wolf Pro Security Edition (optional)<sup>18</sup>  
HP Wolf Security for Business<sup>22</sup> Includes:  
HP Sure Click<sup>11</sup>  
HP Sure Sense<sup>12</sup>  
HP Sure Run Gen5<sup>9</sup>  
HP Sure Recover Gen4<sup>10</sup>  
HP Sure Start Gen7<sup>8</sup>  
HP Tamper Lock  
HP Sure Admin<sup>17</sup>  
HP Client Security Manager Gen 7<sup>4</sup>

<sup>1</sup> HP Performance Advisor Software – HP Performance Advisor is ready to help you get the most out of your HP Workstation from day one—and every day after. Learn more or download at: <http://hp.com/PerformanceAdvisor>

<sup>2</sup> HP Driver Packs not preinstalled, however available for download at <http://www.hp.com/go/clientmanagement>.

<sup>3</sup> HP Manageability Integration Kit can be downloaded from <http://www8.hp.com/us/en/ads/clientmanagement/overview.htm>

<sup>4</sup> HP Client Security Manager Gen7 requires Windows and is available on the select HP PCs.

### Supported Components

- <sup>5</sup> HP Smart Support automatically collects the telemetry necessary upon initial boot of the product to deliver device-level configuration data and health insights and is available preinstalled on select products, thru HP Factory Configuration Services; or it can be downloaded. For more information about how to enable HP Smart Support or for download, please visit <http://www.hp.com/smart-support>.
- <sup>6</sup> 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.
- <sup>7</sup> Microsoft Defender Opt in and internet connection required for updates.
- <sup>8</sup> HP Sure Start Gen 7 is available on select HP PCs and workstations. See product specifications for availability.
- <sup>9</sup> HP Sure Run Gen5 is available on select Windows 11 based HP Pro, Elite and Workstation PCs with select Intel® or AMD processors
- <sup>10</sup> HP Sure Recover Gen4 is available on select HP PCs and requires Windows 10 and an open network connection. You must back up important files, data, photos, videos, etc. before using HP Sure Recover to avoid loss of data. Network based recovery using Wi-Fi is only available on PCs with Intel Wi-Fi Module
- <sup>11</sup> HP Sure Click requires Windows 10 Pro or higher or Enterprise. See [https://bit.ly/2PrLT6A\\_SureClick](https://bit.ly/2PrLT6A_SureClick) for complete details.
- <sup>12</sup> HP Sure Sense requires Windows 11 Pro or Enterprise and supports Microsoft Internet Explorer, Google Chrome™, and Chromium™. Supported attachments include Microsoft Office (Word, Excel, PowerPoint) and PDF files in read only mode, when Microsoft Office or Adobe Acrobat are installed.
- <sup>13</sup> HP BIOSphere Gen6 features may vary depending on the platform and configurations.
- <sup>14</sup> HP Support Assistant requires Windows and Internet access.
- <sup>16</sup> Secure Erase – For the methods outlined in the National Institute of Standards and Technology Special Publication 800-88 “Clear” sanitation method. HP Secure Erase does not support platforms with Intel® Optane.
- <sup>17</sup> HP Sure Admin requires Windows 11, HP BIOS, HP Manageability Integration Kit from <http://www.hp.com/go/clientmanagement> and HP Sure Admin Local Access Authenticator smartphone app from the Android or Apple store.
- <sup>18</sup> HP Wolf Pro Security Edition is available preloaded on select SKUs and, depending on the HP product purchased, includes a paid 1-year or 3-year license. The HP Wolf Pro Security Edition software is licensed under the license terms of the HP Wolf Security Software – End-User license Agreement (EULA) that can be found at: [https://support.hp.com/us-en/document/ish\\_3875769-3873014-16](https://support.hp.com/us-en/document/ish_3875769-3873014-16) as that EULA is modified by the following: “7. Term. Unless otherwise terminated earlier pursuant to the terms contained in this EULA, the license for the HP Wolf Pro Security Edition (HP Sure Sense Pro and HP Sure Click Pro) is effective upon activation and will continue for either a twelve (12) month or thirty-six (36) month license term (“Initial Term”). At the end of the Initial Term you may either (a) purchase a renewal license for the HP Wolf Pro Security Edition from HP.com, HP Sales or an HP Channel Partner, or (b) continue using the standard versions of HP Sure Click and HP Sure Sense at no additional cost with no future software updates or HP Support.
- <sup>20</sup> HP Easy Clean requires Windows 10 RS3 and higher and will disable the keyboard, touchscreen, and clickpad only. Ports are not disabled. See user guide for cleaning instructions.
- <sup>22</sup> HP Wolf Security for Business requires Windows 10 or higher, includes various HP security features and is available on HP Pro, Elite, RPOS and Workstation products. See product details for included security features



### System Technical Specifications

#### System Board

**System Board Form Factor** 198.65 x 192.21 mm (7.82 x 7.567 inch)

**Processor Socket** Single LGA-1700

**CPU Bus Speed** DMI 4.0

**Chipset** Intel® PCH W680

**Super I/O Controller** Nuvoton SIO21

**Memory Expansion Slots** 2 DDR5 memory slots

**Memory Type Supported** DDR5, SODIMM ECC & non-ECC

**Memory Modes** Non-Interleaved for single channel. Interleaved when both channels are populated.

**Memory Speed Supported** 5600MT/s DDR5 for single ranked DIMMs (8GB and 16GB modules), 5200MT/s for dual ranked DIMMs (32GB modules)

**Memory Protection** ECC available on data

**Maximum Memory** 64GB\*

\*Maximum memory capacities assume 64-bit operating systems, such as Genuine Windows® 11 Professional 64 bit, Red Hat Linux 64-bit.

#### Memory Configuration (Supported)

8GB, 16GB and 32GB non-ECC and 16GB and 32GB ECC SO DIMMs are supported. ECC and non-ECC memory DIMMs cannot be mixed in the same system

**PCI Express Connectors**

- 1 PCI Express Gen4 slot x16 mechanical/ x8 electrical (Low-profile, full length, Riser only)
- 2 M.2 NVMe Storage (PCIe Gen4 x4)
- 1 M.2 WLAN (Intel CNVi)

In the PCIe Gen4 (x16 mechanical/x8 electrical) slot, it intent to supported HP certified dGFX card.

#### Supported Interfaces

**SATA** None

**Serial Attached SCSI** None

**Integrated RAID**  
 NVMe RAID 0 Striped Array  
 NVMe RAID 1 Mirrored Array

**Integrated Graphics**  
 Intel® UHD Graphics 730 (on Core i5-12400/i3-12300/i3-12100 processors); Intel® UHD Graphics 770 (on Core i5/i7/i9-12xxx processors);  
 Based on Unified Memory Architecture (UMA) – a region of system memory is reserved and dedicated to the graphics display. Support for Microsoft DirectX 12, OpenGL 4.6 and OpenCL 3.0 on Intel® UHD Graphics 730/770;  
 Based on Unified Memory Architecture (UMA) – a region of system memory is reserved and dedicated to the graphics display.  
 3 DP 1.4 graphics ports integrated in motherboard; Supports up to three simultaneous displays across DisplayPort\*/HDMI\*/DVI outputs. Max. resolution supported on onboard DP 1.4/HBR2 ports: 4096x2304 @

### System Technical Specifications

		60Hz, 24bpp Max. resolution supported on 18lexion DP 1.4/HBR3 ports: 5120x3200 @ 60Hz, 24bpp
	<b>Network Controller</b>	Integrated Ethernet PHY Connection I219LM. Management capabilities: WOL, PXE 2.1 and AMT 16
	<b>External SATA (eSATA)</b>	None
	<b>IDE connector</b>	None
	<b>Floppy connector</b>	None
	<b>Serial</b>	1 internal header (requires optional Serial Port Adapter Kit with PCIe Bracket)
	<b>2<sup>nd</sup> Serial</b>	None
	<b>HD Integrated Audio</b>	Yes
<b>USB Connector(s)</b>	<b>Side</b>	1 Type-A SuperSpeed USB 10Gbps port (support charging) 2 Type-C <sup>®</sup> SuperSpeed USB 20Gbps port (charging supported)
	<b>Rear</b>	3 Type-A SuperSpeed USB 10Gbps port
		Flex IO, choice of: 1 Dual Type-A SuperSpeed USB 5Gbps port, 1 Type-C <sup>®</sup> SuperSpeed USB 10Gbps port (Alt Mode)
		PCIe, choose of: Graphic Cards, 1 Dual SuperSpeed USB Type-A 10Gbps , 1 serial
<b>HD Integrated Audio</b>	Realtek ALC3205-A2-CG	
<b>Flash ROM</b>	Yes	
<b>CPU Fan Header</b>	Yes	
<b>Memory Fan Header</b>	None	
<b>Chassis Fan Header</b>	None	
<b>Front PCI Fan Header</b>	None	
<b>Front Control</b>	Yes	
<b>Panel/Speaker Header</b>	Yes	
<b>CMOS Battery Holder – Lithium</b>	Yes	
<b>Integrated Trusted Platform Module</b>	Integrated TPM 2.0 Convertible to FIPS 140-2 Certified mode through firmware v15.21.	
<b>Power Supply Headers</b>	DC Jack for adapter	
<b>Power Switch, Power LED &amp; Hard Drive LED Header</b>	Yes	
<b>Clear Password Jumper</b>	None	
<b>Keyboard/Mouse</b>	USB	
<b>Power Adapter</b>	Choice of: 180W 89% Average Efficiency. 280W 89% Average Efficiency.	

*All power Adapters are External to the product.*

- *Standard Base Unit System default to 180W Power Adapters. When configured with a 120W K SKU Processor, the 280W Power Adapter is required.*

### System Technical Specifications

- Performance Base Units require 280W Power Adapters supporting Discrete Graphics and 120W K SKU configurations.

## PROCESSORS

Name	Ghz P-Core Base Frequency	Ghz E-Core Base Frequency	Up to X P-Core Max Turbo Freq	Up to x GHz E-Core Max Turbo Frequency	L3 Cache (MB)	P-Cores	E-Cores	Total Cores	Processor Threads	Memory Speed (MT/s) (DDR5) <sup>4</sup>	ECC Memory Support <sup>5</sup>	Integrated Graphics	Featuring Intel® vPro® Technology <sup>3</sup>	TDP (W)	Max Turbo Frequency (GHz) <sup>2</sup>
<b>Intel 13<sup>th</sup> Generation Processors</b>															
Intel® Core™ i9-13900K	3	2.20	5.4	4.3	36	8	16	24	32	5600	Y	Intel® UHD Graphics 770	Y	125	5.8
Intel® Core™ i9-13900	2	1.50	5.2	4.2	36	8	16	24	32	5600	Y	Intel® UHD Graphics 770	Y	65	5.6
Intel® Core™ i7-13700K	3.4	2.50	5.3	4.2	30	8	8	16	24	5600	Y	Intel® UHD Graphics 770	Y	125	5.8
Intel® Core™ i7-13700	2.1	1.50	5.1	4.10	30	8	8	16	24	5600	Y	Intel® UHD Graphics 770	Y	65	5.2
Intel® Core™ i5-13600K	3.5	2.60	5.1	3.9	24	6	8	14	20	5600	Y	Intel® UHD Graphics 770	Y	65	5.1
Intel® Core™ i5-13600	2.7	2.00	5.0	3.7	24	6	8	14	20	4800	Y	Intel® UHD Graphics 770	Y	65	5.0
Intel® Core™ i5-13500	2.5	1.80	4.8	3.5	24	6	8	14	20	4800	Y	Intel® UHD Graphics 770	Y	65	4.8
Intel® Core™ i5-13400	2.5	1.80	4.6	3.3	20	6	4	10	16	4800	N	Intel® UHD Graphics 730	N/A	65	4.6
<b>Intel 12<sup>th</sup> Generation Processors</b>															
Intel® Core™ i9-12900K	3.2	2.4	5.1	3.9	30	8	8	16	24	4800	Y	Intel® UHD Graphics 770	Y	125	5.2
Intel® Core™ i9-12900	5	1.8	5.0	3.8	30	8	8	16	24	4800	Y	Intel® UHD Graphics 770	Y	65	5.1
Intel® Core™ i7-12700K	3.6	2.7	4.9	3.8	25	8	4	12	20	4800	Y	Intel® UHD Graphics 770	Y	125	5.0
Intel® Core™ i7-12700	2.1	1.6	4.8	3.6	25	8	4	12	20	4800	Y	Intel® UHD Graphics 770	Y	65	4.9
Intel® Core™ i5-12600K	3.7	2.8	4.9	3.6	20	6	4	10	16	4800	Y	Intel® UHD Graphics 770	Y	125	4.9
Intel® Core™ i5-12600	3.3	N/A	4.8	N/A	18	6	0	6	12	4800	Y	Intel® UHD Graphics 770	Y	65	4.8
Intel® Core™ i5-12500	3	N/A	4.6	N/A	18	6	0	6	12	4800	Y	Intel® UHD Graphics 770	Y	65	4.6
Intel® Core™ i5-12400	2.5	N/A	4.4	N/A	18	6	0	6	12	4800	N	Intel® UHD Graphics 730	N/A	65	4.4
Intel® Core™ i3-12300	3.5	N/A	4.4	N/A	12	4	0	4	8	4800	N	Intel® UHD Graphics 730	N/A	60	4.4
Intel® Core™ i3-12100	3.3	N/A	4.3	N/A	12	4	0	4	8	4800	N	Intel® UHD Graphics 730	N/A	60	4.3

### System Technical Specifications

	<p><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.</p> <p><sup>2</sup> Intel Turbo Boost performance varies depending on hardware, software and overall system configuration. See <a href="http://www.intel.com/technology/turboboost">http://www.intel.com/technology/turboboost</a> for more information.</p> <p><sup>3</sup> Intel vPro® requires Windows 10 Pro 64 bit or higher, a vPro supported processor, vPro enabled chipset, vPro enabled wired LAN and/or Wi-Fi 6E WLAN and TPM 2.0. Some functionality requires additional 3<sup>rd</sup> party software in order to run. Features of vPro® Essentials and Enterprise vary. See <a href="http://intel.com/vpro">http://intel.com/vpro</a></p> <p><sup>4</sup> Memory will run at 4400 speed (MT/s) if there is one DIMM per channel. 2 DIMMS per channel will run 4000 speed (MT/s). DIMMs must be the same, either 8GB or 16GB DIMMs. 32GB DIMMs run at 3200 MT/s.</p> <p><sup>5</sup> Error Correction Memory</p>
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### System Configurations

<b>HP Z2 G9 Mini Configuration #1</b>	Processor Info	Core i5-12500,6C 3.0G 65W
	Memory Info	2 x 8G DDR5 4800 NECC
	Graphics Info	NA
	Disks/Optical/Floppy	512GB SSD Z Turbo
	Power Supply	180W

Energy Consumption (Watts)	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows long Idle (S0)	8.18		8.23		7.92	
Windows short Idle (S0)	9.36		9.89		9.54	
Windows Busy Typ (S0)	142.5		127.09		144.96	
Windows Busy Max (S0)	125.56		125.1		124.52	
Sleep (S3)	1.2	1.13	1.25	1.2	1.13	1.25
Off (S5)	0.8	0.66	0.84	0.8	0.66	0.84
Zero Power Mode (ErP)	0.28		0.3		0.28	

Heat Dissipation (Btu/hr)	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled
Windows long Idle (S0)	27.89		28.06		27.01	
Windows short Idle (S0)	31.92		33.73		32.53	
Windows Busy Typ (S0)	485.93		433.38		494.31	
Windows Busy Max (S0)	428.16		426.59		424.61	
Sleep (S3)	4.09	3.85	4.26	4.09	3.85	4.26
Off (S5)	2.73	2.25	2.86	2.73	2.25	2.86
Zero Power Mode (ErP)	0.95		1.02		0.95	

<b>HP Z2 G9 Mini Configuration #2</b>	Processor Info	Core i7-12700,12C 2.1G 65W
	Memory Info	2 x 8G DDR5 4800 NECC
	Graphics Info	NVIDIA T400 4GB
	Disks/Optical/Floppy	512GB SSD Z Turbo
	Power Supply	280W

### System Technical Specifications

#### Energy Consumption (Watts)

	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows long Idle (S0)	14.86		14.69		15.23	
Windows short Idle (S0)	16.28		16.07		16.73	
Windows Busy Typ (S0)	194.33		216.33		206.95	
Windows Busy Max (S0)	142.56		141.32		142.82	
Sleep (S3)	1.18	1.1	1.16	1.18	1.1	1.16
Off (S5)	0.77	0.65	0.8	0.77	0.65	0.8
Zero Power Mode (ErP)	0.28		0.29		0.28	

#### Heat Dissipation (Btu/hr)

	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled
Windows long Idle (S0)	50.67		50.09		51.93	
Windows short Idle (S0)	55.51		54.8		57.05	
Windows Busy Typ (S0)	662.67		737.69		705.7	
Windows Busy Max (S0)	486.13		481.9		487.02	
Sleep (S3)	4.02	3.75	3.96	4.02	3.75	3.96
Off (S5)	2.63	2.22	2.73	2.63	2.22	2.73
Zero Power Mode (ErP)	0.95		0.99		0.95	

#### HP Z2 G9 Mini Configuration #3

Processor Info	Core i9-12900,16C 2.4G 65W
Memory Info	2 x 16G DDR5 4800 NECC
Graphics Info	NVIDIA T1000 8GB
Disks/Optical/Floppy	512GB SSD Z Turbo
Power Supply	280W

#### Energy Consumption (Watts)

	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows long Idle (S0)	18.7		18.77		18.93	
Windows short Idle (S0)	20.03		19.99		20.18	
Windows Busy Typ (S0)	250.3		252.72		241.04	
Windows Busy Max (S0)	176.71		178.28		175.62	
Sleep (S3)	1.25	1.12	1.21	1.25	1.12	1.21
Off (S5)	0.8	0.69	0.8	0.8	0.69	0.8
Zero Power Mode (ErP)	0.28		0.29		0.28	

#### Heat Dissipation (Btu/hr)

	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled
Windows long Idle (S0)	63.77		64.01		64.55	
Windows short Idle (S0)	68.3		68.17		68.81	
Windows Busy Typ (S0)	853.52		861.78		821.95	
Windows Busy Max (S0)	602.58		607.93		598.86	
Sleep (S3)	4.26	3.82	4.13	4.26	3.82	4.13
Off (S5)	2.73	2.35	2.73	2.73	2.35	2.73
Zero Power Mode (ErP)	0.95		0.99		0.95	

#### HP Z2 G9 Mini Configuration #4

Processor Info	Core i7-12700K,12C 3.6G 125W
Memory Info	2 x 16G DDR5 4800 ECC
Graphics Info	NVIDIA RTX A2000

### System Technical Specifications

	Disks/Optical/Floppy	1T SSD Z Turbo					
	Power Supply	280W					
Energy Consumption (Watts)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows long Idle (S0)	18.07		17.95		18.27	
	Windows short Idle (S0)	19.72		19.65		19.78	
	Windows Busy Typ (S0)	246.4		237.11		252.67	
	Windows Busy Max (S0)	226.48		225.61		225.86	
	Sleep (S3)	1.26	1.16	1.22	1.26	1.16	1.22
	Off (S5)	0.79	0.65	0.77	0.79	0.65	0.77
	Zero Power Mode (ErP)	0.27		0.29		0.28	

Heat Dissipation (Btu/hr)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled
	Windows long Idle (S0)	61.62		61.21		62.3	
	Windows short Idle (S0)	67.25		67.01		67.45	
	Windows Busy Typ (S0)	840.22		808.55		861.61	
	Windows Busy Max (S0)	772.3		769.33		770.18	
	Sleep (S3)	4.3	3.96	4.16	4.3	3.96	4.16
	Off (S5)	2.69	2.22	2.63	2.69	2.22	2.63
	Zero Power Mode (ErP)	0.92		0.99		0.96	

<i>HP Z2 G9 Mini Configuration #5</i>	Processor Info	Core i9-12900K, 16C 3.2G 125W
	Memory Info	2 x 32G DDR5 4800 ECC
	Graphics Info	NVIDIA RTX A2000
	Disks/Optical/Floppy	1T SSD Z Turbo
	Power Supply	280W

Energy Consumption (Watts)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows long Idle (S0)	18.17		18.25		18.4	
	Windows short Idle (S0)	20		20.43		20.02	
	Windows Busy Typ (S0)	277.1		248		267.7	
	Windows Busy Max (S0)	225.74		224.28		227.61	
	Sleep (S3)	1.11	1.04	1.17	1.11	1.04	1.17
	Off (S5)	0.78	0.67	0.74	0.78	0.67	0.74
	Zero Power Mode (ErP)	0.28		0.29		0.28	

Heat Dissipation (Btu/hr)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled
	Windows long Idle (S0)	61.96		62.23		62.74	
	Windows short Idle (S0)	68.2		69.67		68.27	
	Windows Busy Typ (S0)	944.91		845.68		912.86	
	Windows Busy Max (S0)	769.77		764.79		776.15	
	Sleep (S3)	3.79	3.55	3.99	3.79	3.55	3.99
	Off (S5)	2.66	2.28	2.52	2.66	2.28	2.52
	Zero Power Mode (ErP)	0.95		0.99		0.95	

Processor Info	Core i7-12700, 12C 2.1G 65W
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### System Technical Specifications

<i>HP Z2 G9 Mini Configuration #6</i>	Memory Info	2 x 8G DDR5 4800 NECC
	Graphics Info	NVIDIA T1000 8GB
	Disks/Optical/Floppy	512GB SSD Z Turbo
	Power Supply	280W

Energy Consumption (Watts)	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows long Idle (S0)	18.53		18.19		18.35	
Windows short Idle (S0)	19.89		19.76		19.93	
Windows Busy Typ (S0)	218.75		237.71		225.21	
Windows Busy Max (S0)	174.86		173.24		171.59	
Sleep (S3)	1.17	1.09	1.19	1.17	1.09	1.19
Off (S5)	0.8	0.66	0.78	0.8	0.66	0.78
Zero Power Mode (ErP)	0.28		0.29		0.27	

### Heat Dissipation (Btu/hr)

	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled
Windows long Idle (S0)	63.19		62.03		62.57	
Windows short Idle (S0)	67.82		67.38		67.96	
Windows Busy Typ (S0)	745.94		810.59		767.97	
Windows Busy Max (S0)	596.27		590.75		585.12	
Sleep (S3)	3.99	3.72	4.06	3.99	3.72	4.06
Off (S5)	2.73	2.25	2.66	2.73	2.25	2.66
Zero Power Mode (ErP)	0.95		0.99		0.92	

### Declared Noise Emissions

<b>System Configuration (Entry level)</b>	<b>Processor Info</b>	Intel® Core™ i9-12900 / 65W	
	<b>Memory Info</b>	Hynix 32GB 4800 DDR5 SODIMM	
	<b>Graphics Info</b>	NVIDIA T600	
	<b>Disks/Optical/Floppy</b>	SAMSUNG MZVL22TOHBLB-00BH7 (2048 GB) x2	
	<b>Power Supply</b>	180W	

<b>Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)</b>		<b>Sound Power (LWAd, bels)</b>	<b>Deskside Sound Pressure (LpAm, decibels)</b>
	<b>Idle</b>	2.6	15.5
	<b>Hard drive Operating (random reads)</b>	3.3	24.5
	<b>Hard drive Operating (active mode)</b>	3.4	24.8

<b>System Configuration (Entry level)</b>	<b>Processor Info</b>	Intel® Core™ i9-12900 / 65W	
	<b>Memory Info</b>	Hynix 32GB 4800 DDR5 SODIMM	
	<b>Graphics Info</b>	NVIDIA T400	
	<b>Disks/Optical/Floppy</b>	SAMSUNG MZVL22TOHBLB-00BH7 (2048 GB) x2	
	<b>Power Supply</b>	180W	

<b>Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)</b>		<b>Sound Power (LWAd, bels)</b>	<b>Deskside Sound Pressure (LpAm, decibels)</b>
	<b>Idle</b>	2.6	16.9

### System Technical Specifications

	<b>Hard drive Operating (random reads)</b>	3.4	24.3
	<b>Hard drive Operating (active mode)</b>	3.4	24.5
<b>System Configuration (Entry level, UMA)</b>	<b>Processor Info</b>	Intel® Core™ i9-12900 / 65W	
	<b>Memory Info</b>	Hynix 32GB 4800 DDR5 SODIMM	
	<b>Graphics Info</b>	Intel® UHD	
	<b>Disks/Optical/Floppy</b>	SAMSUNG MZVL22TOHBLB-00BH7 (2048 GB) x2	
	<b>Power Supply</b>	180W	
<b>Declared Noise Emissions</b> (in accordance with ISO 7779 and ISO 9296)		<b>Sound Power (LWAd, bels)</b>	<b>Deskside Sound Pressure (LpAm, decibels)</b>
	<b>Idle</b>	2.6	14.1
	<b>Hard drive Operating (random reads)</b>	3.3	23.5
	<b>Hard drive Operating (active mode)</b>	3.4	23.9
<b>System Configuration (Mid-level)</b>	<b>Processor Info</b>	Intel® Core™ i9-12900 / 65W	
	<b>Memory Info</b>	Hynix 32GB 4800 DDR5 SODIMM	
	<b>Graphics Info</b>	NVIDIA RTX A2000	
	<b>Disks/Optical/Floppy</b>	SAMSUNG MZVL22TOHBLB-00BH7 (2048 GB) x2	
	<b>Power Supply</b>	180W	
<b>Declared Noise Emissions</b> (in accordance with ISO 7779 and ISO 9296)		<b>Sound Power (LWAd, bels)</b>	<b>Deskside Sound Pressure (LpAm, decibels)</b>
	<b>Idle</b>	2.9	19.9
	<b>Hard drive Operating (random reads)</b>	3.3	25.1
	<b>Hard drive Operating (active mode)</b>	3.4	25.2
<b>System Configuration (Mid-level)</b>	<b>Processor Info</b>	Intel® Core™ i9-12900 / 65W	
	<b>Memory Info</b>	Hynix 32GB 4800 DDR5 SODIMM	
	<b>Graphics Info</b>	NVIDIA T1000	
	<b>Disks/Optical/Floppy</b>	SAMSUNG MZVL22TOHBLB-00BH7 (2048 GB) x2	
	<b>Power Supply</b>	180W	
<b>Declared Noise Emissions</b> (in accordance with ISO 7779 and ISO 9296)		<b>Sound Power (LWAd, bels)</b>	<b>Deskside Sound Pressure (LpAm, decibels)</b>
	<b>Idle</b>	2.6	15.0
	<b>Hard drive Operating (random reads)</b>	3.4	23.9
	<b>Hard drive Operating (active mode)</b>	3.4	25.0
<b>System Configuration (Mid-level)</b>	<b>Processor Info</b>	Intel® Core™ i5-12600K / 125W	
	<b>Memory Info</b>	Samsung 32GB 4800 DDR5 SODIMM	
	<b>Graphics Info</b>	NVIDIA T600	
	<b>Disks/Optical/Floppy</b>	Micron MTFDKBA2TOTFH-1BC1AABHA (2048 GB) x2	



### System Technical Specifications

	<b>Power Supply</b>	280W	
<b>Declared Noise Emissions</b> (in accordance with ISO 7779 and ISO 9296)		<b>Sound Power</b> (LWAd, bels)	<b>Deskside Sound Pressure</b> (LpAm, decibels)
	<b>Idle</b>	2.6	16.3
	<b>Hard drive Operating (random reads)</b>	3.2	24.2
	<b>Hard drive Operating (active mode)</b>	3.8	28.7
<b>System Configuration (Mid-level)</b>	<b>Processor Info</b>	Intel® Core™ i5-12600K / 125W	
	<b>Memory Info</b>	Samsung 32GB 4800 DDR5 SODIMM	
	<b>Graphics Info</b>	NVIDIA T400	
	<b>Disks/Optical/Floppy</b>	Micron MTFDKBA2TOTFH-1BC1AABHA (2048 GB) x2	
	<b>Power Supply</b>	280W	
<b>Declared Noise Emissions</b> (in accordance with ISO 7779 and ISO 9296)		<b>Sound Power</b> (LWAd, bels)	<b>Deskside Sound Pressure</b> (LpAm, decibels)
	<b>Idle</b>	2.6	17.1
	<b>Hard drive Operating (random reads)</b>	3.3	24.6
	<b>Hard drive Operating (active mode)</b>	3.7	28.7
<b>System Configuration (Mid-level, UMA)</b>	<b>Processor Info</b>	Intel® Core™ i5-12600K / 125W	
	<b>Memory Info</b>	Samsung 32GB 4800 DDR5 SODIMM	
	<b>Graphics Info</b>	Intel® UHD	
	<b>Disks/Optical/Floppy</b>	Micron MTFDKBA2TOTFH-1BC1AABHA (2048 GB) x2	
	<b>Power Supply</b>	280W	
<b>Declared Noise Emissions</b> (in accordance with ISO 7779 and ISO 9296)		<b>Sound Power</b> (LWAd, bels)	<b>Deskside Sound Pressure</b> (LpAm, decibels)
	<b>Idle</b>	2.5	14.2
	<b>Hard drive Operating (random reads)</b>	3.2	23.9
	<b>Hard drive Operating (active mode)</b>	3.7	28.5
<b>System Configuration (High-end)</b>	<b>Processor Info</b>	Intel® Core™ i5-12600K / 125W	
	<b>Memory Info</b>	32GB 4800 DDR5 SODIMM	
	<b>Graphics Info</b>	NVIDIA RTX A2000	
	<b>Disks/Optical/Floppy</b>	Micron MTFDKBA2TOTFH-1BC1AABHA (2048 GB) x2	
	<b>Power Supply</b>	280W	
<b>Declared Noise Emissions</b> (in accordance with ISO 7779 and ISO 9296)		<b>Sound Power</b> (LWAd, bels)	<b>Deskside Sound Pressure</b> (LpAm, decibels)
	<b>Idle</b>	2.9	19.7
	<b>Hard drive Operating (random reads)</b>	3.3	24.1
	<b>Hard drive Operating (active mode)</b>	3.7	27.8

### System Technical Specifications

<b>System Configuration (High-end)</b>	<b>Processor Info</b>	Intel® Core™ i5-12600K / 125W	
	<b>Memory Info</b>	32GB 4800 DDR5 SODIMM	
	<b>Graphics Info</b>	NVIDIA T1000	
	<b>Disks/Optical/Floppy</b>	Micron MTFDKBA2TOTFH-1BC1AABHA (2048 GB) x2	
	<b>Power Supply</b>	280W	
<b>Declared Noise Emissions</b> (in accordance with ISO 7779 and ISO 9296)		<b>Sound Power</b> (LWAd, bels)	<b>Deskside Sound Pressure</b> (LpAm, decibels)
	<b>Idle</b>	2.6	15.3
	<b>Hard drive Operating (random reads)</b>	3.3	23.7
	<b>Hard drive Operating (active mode)</b>	3.7	28.6

<b>Environmental Requirements</b>	<b>Temperature</b>	Operating: 5° to 35° C (40° to 95° F) 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 Cooling for details.
	<b>Dynamic</b>	Shock Operating: ½-sine: 40g, 2-3ms (~62 cm/sec) Non-operating: ½-sine: 160 cm/s, 2-3ms (~105g) square: 422 cm/s, 20g
	<b>Cooling</b>	Vibration Operating random: 0.5g (rms), 5-300 Hz, up to 0.0025g²/Hz Non-operating random: 2.0g (rms), 5-500 Hz, up to 0.0150 g²/Hz 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, up to 3048 m (10,000 feet)

### System Technical Specifications

#### Physical Security and Serviceability

<b>Access Panel</b>	Tool-less
<b>Optical Drive</b>	No
<b>Hard Drives</b>	No
<b>Expansion Cards</b>	M.2 module requires a screwdriver to service and replace. An option card requires a screwdriver to service and replace.
<b>Processor Socket</b>	Tool-less, except for the processor heatsink and fan
<b>Blue User Touch Points</b>	Yes, on 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 SSD LED</b>	The Power LED is on the front of the system, and the SSD LED is located on the rear of the system (inside)
<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 (default) or 15 seconds (can be configured by F10 BIOS setup\Advanced\System Options\Power button override)
<b>Padlock Support</b>	No
<b>Cable Lock Support</b>	Yes, Kensington Cable Lock (optional): Locks top cover from being opened and secures chassis to furniture to prevent theft 3 mm x 7 mm slot at rear of system
<b>Universal Chassis Clamp Lock Support</b>	No
<b>Solenoid Lock and Hood Sensor</b>	Only Hood Sensor(optional)
<b>Rear Port Control Cover</b>	No
<b>Serial, USB, Audio, Network, Enable/Disable Port Control</b>	Yes, enables or disables serial, USB, audio, and network ports (parallel port is not supported on the HP Z2Mini G9 Workstation Desktop PC)
<b>Power-On Password</b>	Yes, prevents an unauthorized person from booting up the workstation
<b>3.3V Aux Power LED on System PCA</b>	No
<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

### System Technical Specifications

<b>Power Supply Diagnostic LED</b>	No
<b>Front Power Button</b>	Yes
<b>Front Power LED</b>	Yes, white (normal), red (fault)
<b>Front Hard Drive Activity LED</b>	No
<b>Front ODD Activity LED</b>	No
<b>Internal Speaker</b>	Yes
<b>Cooling Solution</b>	Air cooled forced convection
<b>Power Supply Fans</b>	No
<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>	The Kensington lock slot on the chassis serves this purpose
<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>Integrated Chassis Handles</b>	No
<b>Power Supply</b>	No
<b>Flash ROM</b>	Yes
<b>Diagnostic Power Switch LED on board</b>	Yes
<b>Clear CMOS Button</b>	Yes
<b>CMOS Battery Connector</b>	Yes
<b>DIMM Connectors</b>	Yes

### BIOS

<b>BIOS 64-bit Services</b>	BIOS supports 64-bit Operating systems.
<b>PCI 3.0 Support</b>	Full BIOS support for PCI Express through industry standard interfaces.
<b>ATAPI</b>	ATAPI Removable Media Device BIOS Specification Version 1.0.
<b>BBS</b>	BIOS Boot Specification v1.01.(Not support)
<b>WMI Support</b>	WMI is Microsoft's implementation of Web-Based Enterprise Management (WBEM) for Windows. WMI is fully compliant with the Distributed Management Task Force (DMTF) Common Information Model (CIM) and WBEM specifications.
<b>BIOS Boot Spec 1.01+</b>	Provides more control over how and from what devices the workstation will boot. (Not Support)
<b>BIOS Power On</b>	Users can define a specific date and time for the system to power on.

### System Technical Specifications

<b>ROM Based Computer Setup Utility (F10)</b>	Review and customize system configuration settings controlled by the BIOS.
<b>System/Emergency ROM Flash Recovery with Video</b>	Recovers system BIOS in corrupted Flash ROM.
<b>Replicated Setup</b>	Saves BIOS settings to USB flash device in human readable file (HpSetup.txt). BiosConfigurationUtility.exe utility can then replicate these settings on machines being deployed without entering Computer Configuration Utility (F10 Setup).
<b>SMBIOS</b>	System Management BIOS 3.4, for system management information.
<b>Boot Control</b>	Disables the ability to boot from removable media on supported devices.
<b>Memory Change Alert</b>	Alerts management console if memory is removed or changed.
<b>Thermal Alert</b>	Monitors the temperature state within the chassis. Three modes: <ul style="list-style-type: none"> <li>• NORMAL – normal temperature ranges.</li> <li>• ALERTED – excessive temperatures are detected. Raises a flag so action can be taken to avoid shutdown or provide for a smoother system shutdown.</li> <li>• SHUTDOWN – excessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs.</li> </ul>
<b>Remote ROM Flash</b>	Provides secure, fail-safe ROM image management from a central network console.
<b>ACPI (Advanced Configuration and Power Management Interface)</b>	Allows the system to enter and resume from low power modes (sleep states). Enables an operating system to control system power consumption based on the dynamic workload. Makes it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system. Supports ACPI 6.0 for full compatibility with 64-bit operating systems.
<b>Ownership Tag</b>	A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen.
<b>Remote Wakeup/Remote Shutdown</b>	System administrators can power on, restart, and power off a client computer from a remote location.
<b>Instantly Available PC (Suspend to RAM – ACPI sleep state S3)</b>	Allows for very low power consumption with quick resume time.
<b>Remote System Installation via F12 (PXE 2.1) (Remote Boot from Server)</b>	Allows a new or existing system to boot over the network and download software, including the operating system.
<b>ROM revision levels</b>	Reports the system BIOS revision level in Computer Configuration Utility (F10 Setup). Version is available through an industry standard interface (SMBIOS and WMI) so that management SW applications can use and report this information.
<b>System board revision level</b>	Allows management SW to read revision level of the system board. Revision level is digitally encoded into the HW and cannot be modified.
<b>Start-up Diagnostics (Power-on Self-Test)</b>	Assesses system health at boot time with selectable levels of testing.
<b>Auto Setup when new hardware installed</b>	System automatically detects addition of new hardware.
<b>Keyboard-less Operation</b>	The system can be booted without a keyboard.
<b>Localized ROM Setup</b>	Common BIOS image supports System Configuration Utility (F10 Setup) menus in 15 languages with local keyboard mappings.
<b>Asset Tag</b>	The user or MIS to set a unique tag string in non-volatile memory.
<b>Per-slot Control</b>	Allows I/O slot parameters (option ROM enable/disable, bus latency) to be configured individually.
<b>Adaptive Cooling</b>	Control parameters are set according to detected hardware configuration for optimal acoustics.
<b>Pre-boot Diagnostics</b>	(Pre-video) critical errors are reported via beeps and blinks on the power LED.
<b>Industry Standard</b>	Revision Supported by the BIOS
<b>UEFI Specification</b>	2.7
<b>Revision</b>	2.7
<b>ACPI</b>	Advanced Configuration and Power Management Interface, Version 6.0

### System Technical Specifications

<b>ATA (IDE)</b>	AT Attachment 6 with Packet Interface (ATA/ATAPI-6), Revision 3b
<b>CD Boot</b>	“El Torito” Bootable CD-ROM Format Specification Version 1.0
<b>EDD</b>	Enhanced Disk Drive Specification Version 1.1 BIOS Enhanced Disk Drive Specification Version 3.0 (Both Not support)
<b>EHCI</b>	Enhanced Host Controller Interface for Universal Serial Bus, Revision 1.0
<b>PCI</b>	PCI Local Bus Specification, Revision 2.3 PCI Power Management Specification, Revision 1.1 PCI Firmware Specification, Revision 3.0, Draft .7
<b>PCI Express</b>	PCI Express Base Specification, Revision 2.0 PCI Express Base Specification, Revision 3.0 PCI Express Base Specification, Revision 4.0
<b>PMM</b>	POST Memory Manager Specification, Version 1.01 (Not Support)
<b>SATA</b>	Serial ATA Specification, Revision 1.0a Serial ATA 3 Gb/s: Serial ATA Specification, Revision 2.5 Serial ATA 6 Gb/s: Serial ATA Specification, Revision 3.0
<b>SPD</b>	JEDEC JESD300-5
<b>TPM</b>	Trusted Computing Group TPM Specification Version 2.0 (Infineon SLB 9670). Common Criteria EAL4+ certified. FIPS 140-2 Certification TCG TPM Certified products list: <a href="http://www.trustedcomputinggroup.org/certification/tpm-certified-products/">http://www.trustedcomputinggroup.org/certification/tpm-certified-products/</a>
<b>UHCI</b>	Universal Host Controller Interface Design Guide, Revision 1.1
<b>USB</b>	Universal Serial Bus Revision 1.1 Specification Universal Serial Bus Revision 2.0 Specification Universal Serial Bus Revision 3.1 Specification Universal Serial Bus Revision 3.2 Specification
<b>SMBIOS</b>	System Management BIOS Reference Specification, Version 3.4  External BIOS simulator found at: <a href="http://csrsm1.itcs.hp.com/">http://csrsm1.itcs.hp.com/</a>

### Service, Support, and Warranty

On-site Warranty and Service<sup>1</sup>: Three-years, limited warranty and service offering delivers on-site, next business-day<sup>2</sup> service for parts and labor and includes free telephone support<sup>3</sup> 8am – 5pm. Global coverage<sup>2</sup> ensures that any product purchased in one country and transferred to another, non-restricted country will remain fully covered under the original warranty and service offering. 24/7 operation will not void the HP warranty. Storage devices are not covered under warranty for 24/7 operation.

**NOTE 1:** Terms and conditions may vary by country. Certain restrictions and exclusions apply.

**NOTE 2:** On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.

**NOTE 3:** Technical telephone support applies only to HP-configured, HP and HP-qualified, third-party hardware and software. Toll-free calling and 24x7 support service may not be available in some countries.

HP Care Pack Services extend service contracts beyond the standard warranties. Service starts from date of hardware purchase. To choose the right level of service for your HP product, use the HP Care Pack Services Lookup Tool at: <http://www.hp.com/go/lookuptool>. Service levels and response times for HP Care Packs may vary depending on your geographic location.

### Certification and Compliance

Environmental Sustainability questions concerning:

### System Technical Specifications

- Ecolabels (EPEAT, TCO, etc.)
- ENERGY STAR, California Energy Commission (CEC)
- Compliance with Environmental legislation (EU ErP, China CECP, EU RoHS and other countries)
- Supply Chain Social Environmental Responsibility (SER) (conflict minerals; human rights, etc.)
- Product specific environmental features (material content, packaging content, recycled content, etc.)
- China Energy Label (CEL)
- 

Please contact [sustainability@hp.com](mailto:sustainability@hp.com)

For country specific Regulatory Compliance approval documents or Regulatory and Safety questions concerning:

- Declarations of Conformity (for self-service, go to [https://www.hp.com/uk-en/certifications/technical/regulations-certificates.html?jumpid=ex\\_r135\\_uk/en/any/corp/hpuk-mu\\_chev/certificates](https://www.hp.com/uk-en/certifications/technical/regulations-certificates.html?jumpid=ex_r135_uk/en/any/corp/hpuk-mu_chev/certificates))
- GS Certificates
- Product Safety Certificates (UL, CB, BIS, etc.)
- EMC Certificates, Declarations of Conformity, or Certificates of Conformity (CE, FCC, ICES, etc.)
- CCC Certificates
- Ergonomics
- 

Please contact [techregshelp@hp.com](mailto:techregshelp@hp.com)

### 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.

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

- IT ECO declaration
- US ENERGY STAR®
- US Federal Energy Management Program (FEMP)
- EPEAT<sup>®</sup> Gold registered in the United States. See <http://www.epeat.net> for registration status in your country.
- TCO Certified
- China Energy Conservation Program (CECP)
- China State Environmental Protection Administration (SEPA)
- Taiwan Green Mark
- Korea Eco-label
- Japan PC Green label\*

#### Sustainable Impact Specifications

- Product Carbon Footprint (hp.com)
- Ocean-bound plastic in Speaker<sup>1</sup>
- 55% post-consumer recycled plastic<sup>2</sup>
- Low halogen<sup>3</sup>
- Outside Box and corrugated cushions are 100% sustainably sourced and recyclable<sup>4</sup>
- Molded Paper Pulp Cushion inside box is 100% sustainably sourced and recyclable<sup>5</sup>
- Bulk packaging available

#### System Configuration

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

#### Energy Consumption (in accordance with US ENERGY STAR® test method)

	115VAC, 60Hz	230VAC, 50Hz	100VAC, 50Hz
Normal Operation (Short idle)	18.77 W	20.05 W	17.74 W

### System Technical Specifications

Normal Operation (Long idle)	13.44 W	13.59 W	13.67 W
Sleep	1.08 W	1.23 W	1.13 W
Off	0.85 W	0.95 W	0.89 W

**NOTE:**

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

Heat Dissipation*	115VAC, 60Hz	230VAC, 50Hz	100VAC, 50Hz
Normal Operation (Short idle)	64.2 BTU/hr	68.6 BTU/hr	60.7 BTU/hr
Normal Operation (Long idle)	46 BTU/hr	46.5 BTU/hr	46.8 BTU/hr
Sleep	3.7 BTU/hr	4.2 BTU/hr	3.9 BTU/hr
Off	2.9 BTU/hr	3.2 BTU/hr	3 BTU/hr

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

### Longevity and Upgrading

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

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

### Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive – 2011/65/EC.
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This product is in compliance with the IEEE 1680.1 (EPEAT) standard at the Gold level, see [www.epeat.net](http://www.epeat.net)
- Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.
- This product is 95.8% recycle-able when properly disposed of at end of life.

### Packaging Materials

<b>External:</b>	PAPER/Corrugated	269 g
	PAPER/Molded Pulp	108 g
	PAPER/Paper	3 g
<b>Internal:</b>	PLASTIC/Polyethylene low density – LDPE	13 g

The plastic packaging material contains at least 0.0% recycled content.

The corrugated paper packaging materials contains at least 59.1% recycled content.

### RoHS Compliance

HP Inc. complies fully with materials regulations. We were among the first companies to extend the restrictions in the European Union (EU) Restriction of Hazardous Substances (RoHS) Directive



### System Technical Specifications

to our products worldwide through the HP GSE. HP has contributed to the development of related legislation in Europe, as well as China, India, and Vietnam.

We believe the RoHS directive and similar laws play an important role in promoting industry-wide elimination of substances of concern. We have supported the inclusion of additional substances—including PVC, BFRs, and certain phthalates—in future RoHS legislation that pertains to electrical and electronics products.

We met our voluntary objective to achieve worldwide compliance with the new EU RoHS requirements for virtually all relevant products by July 2013, and we will continue to extend the scope of the commitment to include further restricted substances as regulations continue to evolve.

To obtain a copy of the HP RoHS Compliance Statement, see [HP RoHS position statement](#).

### Material Usage

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

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

### Packaging Usage

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

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

### System Technical Specifications

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

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

#### HP Inc. Corporate Environmental Information

For more information about HP's commitment to the environment:

Global Citizenship Report

<http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html>

Eco-label certifications

<http://www8.hp.com/us/en/hp-information/environment/ecolabels.html>

ISO 14001 certificates:

<http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842>

and

<http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf>

#### footnotes

<sup>1</sup>Percentage of ocean-bound plastic contained in each component varies by product

<sup>2</sup>Recycled plastic content percentage is based on the definition set in the IEEE 1680.1-2018 standard.

<sup>3</sup>External power supplies, WWAN modules, power cords, cables and peripherals excluded.

<sup>4</sup>100% outer box packaging and corrugated cushions made from sustainably sourced certified and recycled fibers.

<sup>5</sup>Fiber cushions made from 100% recycled wood fiber and organic materials.

### System Technical Specifications

#### Manageability

**Intel® Active Management Technology (AMT) 16<sup>1</sup>**

**Management Technology (AMT)**

An advanced set of remote management features and functionality providing IT 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 16 includes the following advanced management functions:

- Power Management (on, off, reset, graceful shutdown, sleep and hibernate)
- Hardware Inventory (includes BIOS and firmware revisions)
- Serial Over LAN (SOL)
- USB Redirect (Media Redirection)
- ME Wake-on-LAN (WOL)
- Ipv6 Support
- Host Base set-up and configuration
- Management Engine (ME) firmware roll back

**Intel® vPro® Technology** The HP Z2 G9 Mini Workstation supports Intel® vPro® technology when configured as outlined below:

- Intel® 12<sup>th</sup> Generation processors product family featuring Intel® vPro® Technology
- Intel® W680 chipset
- Intel® I219LM GbE LAN

**Remote Manageability Software Solutions** The HP Z2 G9 Workstation is supported on the following remote manageability software consoles:

- LANDesk Management Suite (HP recommended solution)
- Microsoft System Center Configuration Manager

For questions or support for manageability needs, please visit

<http://www.hp.com/go/clientmanagement>

**HP Image Assistant System Software Manager** Visit: <http://ftp.hp.com/pub/caps-softpaq/cmit/HPIA.html>

For questions or support for SSM, please visit: <http://www.hp.com/go/ssm>

<sup>1</sup>Requires activation and a system with a corporate network connection, an Intel® AMT enabled chipset, and network hardware and software. For notebooks, Intel AMT may be unavailable or limited over a host OS-based VPN, when connecting wirelessly, on battery power, sleeping, hibernating, or powered off. Results dependent upon hardware, setup, and configuration. For more information, visit: <https://www.intel.com/content/www/us/en/architecture-and-technology/intel-active-management-technology.html>

### Technical Specifications - Hard Drives

#### PCIe SSDs for HP Workstations

<b>HP Z Turbo Drv PCIe-4X4 512GB TLC PCIe SSD</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>	300TBW (TB Written)
	<b>Reliability (MTBF)</b>	1.5M Hours
	<b>Interface</b>	PCI Express 4.0 x4 electrical
	<b>Operating Temperature</b>	32° to 178° F (0° to 81° C)
	<b>Performance</b>	<b>Sequential Read</b> 6400MB/s*
		<b>Sequential Write</b> 3400MB/s*
		<b>Random Read</b> 600K IOPS*
		<b>Random Write</b> 600K IOPS*

\*Actual performance may vary.

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

<b>HP Z Turbo Drv PCIe-4X4 1TB TLC PCIe SSD</b>	<b>Capacity</b>	1TB
	<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>	400TBW (TB Written)
	<b>Reliability (MTBF)</b>	1.5M Hours
	<b>Interface</b>	PCI Express 4.0 x4 electrical
	<b>Operating Temperature</b>	32° to 178° F (0° to 81° C)
	<b>Performance</b>	<b>Sequential Read</b> 6500MB/s*
		<b>Sequential Write</b> 5000MB/s*
		<b>Random Read</b> 800K IOPS*
		<b>Random Write</b> 800K IOPS*

\*Actual performance may vary.

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

<b>HP Z Turbo Drv PCIe-4X4 2TB TLC PCIe SSD</b>	<b>Capacity</b>	2TB
	<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>	500TBW (TB Written)
	<b>Reliability (MTBF)</b>	1.5M Hours
	<b>Interface</b>	PCI Express 4.0 x4 electrical
	<b>Operating Temperature</b>	32° to 178° F (0° to 81° C)

### Technical Specifications - Hard Drives

<b>Performance</b>	<b>Sequential Read</b>	6500MB/s*
	<b>Sequential Write</b>	5000MB/s*
	<b>Random Read</b>	800K IOPS*
	<b>Random Write</b>	800K IOPS*

\*Actual performance may vary.

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

<b>HP Z Turbo Drv PCIe-4X4 4TB TLC PCIe SSD</b>	<b>Capacity</b>	4TB	
	<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>	600TBW (TB Written)	
	<b>Reliability (MTBF)</b>	1.5M Hours	
	<b>Interface</b>	PCI Express 4.0 x4 electrical	
	<b>Operating Temperature</b>	32° to 178° F (0° to 81° C)	
	<b>Performance</b>	<b>Sequential Read</b>	6500MB/s*
		<b>Sequential Write</b>	5000MB/s*
		<b>Random Read</b>	700K IOPS*
		<b>Random Write</b>	700K IOPS*

\*Actual performance may vary.

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

<b>HP Z Turbo Drv PCIe Gen4x4 4TB TLC PCIe SED OPAL2</b>	<b>Capacity</b>	4TB	
	<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>	600TBW (TB Written)	
	<b>Interface</b>	PCI Express 4.0 x4 electrical	
	<b>Operating Temperature</b>	32° to 178° F (0° to 81° C)	
	<b>Performance</b>	<b>Sequential Read</b>	6500MB/s*
		<b>Sequential Write</b>	5000MB/s*
		<b>Random Read</b>	700K IOPS*
		<b>Random Write</b>	700K IOPS*
	<b>Self-Encrypting Drive Support</b>	OPAL2	

\*Actual performance may vary.

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

<b>HP Z Turbo Drv PCIe Gen4x4 512GB TLC PCIe SED OPAL2</b>	<b>Capacity</b>	512GB
	<b>Protocol</b>	PCIe
	<b>Form Factor</b>	M.2 in native Slot on motherboard

### Technical Specifications - Hard Drives

<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 4.0 x4 electrical	
<b>Operating Temperature</b>	32° to 178° F (0° to 81° C)	
<b>Performance</b>	<b>Sequential Read</b>	6400MB/s*
	<b>Sequential Write</b>	3400MB/s*
	<b>Random Read</b>	600K IOPS*
	<b>Random Write</b>	600K IOPS*
<b>Self-Encrypting Drive Support</b>	OPAL2	

\*Actual performance may vary.

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

<b>HP Z Turbo Drv PCIE Gen4x4 1TB TLC PCIE SED OPAL2</b>	<b>Capacity</b>	1TB	
	<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>	400TBW (TB Written)	
	<b>Reliability (MTBF)</b>	1.5M Hours	
	<b>Interface</b>	PCI Express 4.0 x4 electrical	
	<b>Operating Temperature</b>	32° to 178° F (0° to 81° C)	
	<b>Performance</b>	<b>Sequential Read</b>	6500MB/s*
		<b>Sequential Write</b>	5000MB/s*
		<b>Random Read</b>	800K IOPS*
		<b>Random Write</b>	800K IOPS*
	<b>Self-Encrypting Drive Support</b>	OPAL2	

\*Actual performance may vary.

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

<b>HP Z Turbo Drv PCIE Gen4x4 2TB TLC PCIE SED OPAL2</b>	<b>Capacity</b>	2TB	
	<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>	500TBW (TB Written)	
	<b>Interface</b>	PCI Express 4.0 x4 electrical	
	<b>Operating Temperature</b>	32° to 178° F (0° to 81° C)	
	<b>Performance</b>	<b>Sequential Read</b>	6500MB/s*
		<b>Sequential Write</b>	5000MB/s*
		<b>Random Read</b>	800K IOPS*
		<b>Random Write</b>	800K IOPS*

### Technical Specifications - Hard Drives

	<b>Random Write</b>	800K IOPS*
<b>Self-Encrypting Drive Support</b>	OPAL2	

\*Actual performance may vary.

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

<b>256GB 2280 PCIe-4x4 Value M.2 SSD</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>	150TBW (TB Written)	
	<b>Reliability (MTBF)</b>	1.5M Hours	
	<b>Interface</b>	PCI Express 4.0 x4 electrical	
	<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)	
	<b>Performance</b>	<b>Sequential Read</b>	3100MB/s*
		<b>Sequential Write</b>	1400MB/s*
		<b>Random Read</b>	200K IOPS*
		<b>Random Write</b>	400K IOPS*
	<b>Self-Encrypting Drive Support</b>	OPAL2	

\*Actual performance may vary.

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

<b>512GB 2280 PCIe-4x4 Value M.2 SSD</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>	300TBW (TB Written)	
	<b>Reliability (MTBF)</b>	1.5M Hours	
	<b>Interface</b>	PCI Express 4.0 x4 electrical	
	<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)	
	<b>Performance</b>	<b>Sequential Read</b>	3400MB/s*
		<b>Sequential Write</b>	2500MB/s*
		<b>Random Read</b>	380K IOPS*
		<b>Random Write</b>	430K IOPS*
	<b>Self-Encrypting Drive Support</b>	OPAL2	

\*Actual performance may vary.

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

<b>1TB 2280 PCIe-4x4 Value M.2 SSD</b>	<b>Capacity</b>	1TB
	<b>Protocol</b>	PCIe

### Technical Specifications - Hard Drives

<b>Form Factor</b>	M.2 in native Slot on motherboard	
<b>Controller</b>	NVMe	
<b>NAND Type</b>	3D TLC	
<b>Endurance</b>	400TBW (TB Written)	
<b>Reliability (MTBF)</b>	1.5M Hours	
<b>Interface</b>	PCI Express 4.0 x4 electrical	
<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)	
<b>Performance</b>	<b>Sequential Read</b>	3400MB/s*
	<b>Sequential Write</b>	2500MB/s*
	<b>Random Read</b>	500K IOPS*
	<b>Random Write</b>	440K IOPS*

\*Actual performance may vary.

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



### Technical Specifications - Graphics

<b>NVIDIA® Quadro® T400 2GB Graphics</b>	<b>Form Factor</b>	Single Slot, Low Profile (2.7" H x 6.1" L)
	<b>Graphics Controller</b>	Turing Tu-117-825 Max Power: 30 Watts Cooling Solution: Active fan heatsink
	<b>Bus Type</b>	PCI Express 3.0 x16
	<b>Memory</b>	2GB GDDR6 Memory Memory Bandwidth: 80 GB/s Memory Interface: 64 bit
	<b>Connectors</b>	3x mDP (Mini DisplayPort™) 1.4 Connectors
	<b>Max simultaneous displays</b>	- 3x 3840 x 2160 @ 120Hz - 3x 5120 x 2880 @ 60Hz - supports Multi-Stream Transport (MST)
	<b>Shading Architecture</b>	DirectX 12 Shader Model 5.1
	<b>Supported Graphics APIs</b>	OpenGL 4.6 DirectX 12 Vulkan 1.2 API support includes: CUDA, OpenCL 1.2
	<b>Available Graphics Drivers</b>	Windows 10 64-bit Windows 11 64-bit Linux® 64-bit (selected Enterprise distributions)
		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>

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<b>NVIDIA® Quadro® T400 4GB Graphics</b>	<b>Form Factor</b>	Single Slot, Low Profile (2.7" H x 6.1" L)
	<b>Graphics Controller</b>	Turing Tu117-825 Max Power: 30 Watts Cooling Solution: Active fan heatsink
	<b>Bus Type</b>	PCI Express 3.0 x16
	<b>Memory</b>	4GB GDDR6 Memory Memory Bandwidth: 80 GB/s Memory Interface: 64 bit
	<b>Connectors</b>	3x mDP (Mini DisplayPort™) 1.4 Connectors
	<b>Max simultaneous displays</b>	- 3x 3840 x 2160 @ 120Hz - 3x 5120 x 2880 @ 60Hz - supports Multi-Stream Transport (MST)
	<b>Shading Architecture</b>	DirectX 12 Shader Model 5.1
	<b>Supported Graphics APIs</b>	OpenGL 4.6 DirectX 12 Vulkan 1.2 API support includes: CUDA, OpenCL 1.2
	<b>Available Graphics Drivers</b>	Windows 10 64-bit Windows 11 64-bit Linux® 64-bit (selected Enterprise distributions)
		HP qualified drivers may be preloaded or available from the HP support

### Technical Specifications - Graphics

Web site:

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

<b>NVIDIA® Quadro® T600 4GB Graphics</b>	<b>Form Factor</b>	Single Slot, Low Profile (2.7" H x 6.1" L)
	<b>Graphics Controller</b>	Turing Tu117-850 Max Power: 40 Watts Cooling Solution: Active fan heatsink
	<b>Bus Type</b>	PCI Express 3.0 x16
	<b>Memory</b>	4GB GDDR6 Memory Memory Bandwidth: 160 GB/s Memory Interface: 128 bit
	<b>Connectors</b>	4x mDP (Mini DisplayPort™) 1.4 Connectors
	<b>Max simultaneous displays</b>	- 4x 3840 x 2160 @ 120Hz - 4x 5120 x 2880 @ 60Hz - 2x 7680 x 4320 @ 60Hz - supports Multi-Stream Transport (MST)
	<b>Shading Architecture</b>	DirectX 12 Shader Model 5.1
	<b>Supported Graphics APIs</b>	OpenGL 4.6 DirectX 12 Vulkan 1.2 API support includes: CUDA, OpenCL 1.2
	<b>Available Graphics Drivers</b>	Windows 10 64-bit Windows 11 64-bit Linux® 64-bit (selected Enterprise distributions)
		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>NVIDIA® Quadro® T1000 4GB Graphics</b>	<b>Form Factor</b>	Single Slot, Low Profile (2.7" H x 6.1" L)
	<b>Graphics Controller</b>	Turing Tu117-875 Max Power: 50 Watts Cooling Solution: Active fan heatsink
	<b>Bus Type</b>	PCI Express 3.0 x16
	<b>Memory</b>	4GB GDDR6 Memory Memory Bandwidth: 160 GB/s Memory Interface: 128 bit
	<b>Connectors</b>	4x mDP (Mini DisplayPort™) 1.4 Connectors
	<b>Max simultaneous displays</b>	- 4x 3840 x 2160 @ 120Hz - 4x 5120 x 2880 @ 60Hz - 2x 7680 x 4320 @ 60Hz - supports Multi-Stream Transport (MST)
	<b>Shading Architecture</b>	DirectX 12 Shader Model 5.1
	<b>Supported Graphics APIs</b>	OpenGL 4.6 DirectX 12 Vulkan 1.2 API support includes: CUDA, OpenCL 1.2

### Technical Specifications - Graphics

**Available Graphics Drivers**

Windows 10 64-bit  
Windows 11 64-bit  
Linux® 64-bit (selected Enterprise distributions)

HP qualified drivers may be preloaded or available from the HP support Web site:

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

**NVIDIA® Quadro® T1000 8GB Graphics**

**Form Factor Graphics Controller**

Single Slot, Low Profile (2.7" H x 6.1" L)

Turing Tu117-875  
Max Power: 50 Watts  
Cooling Solution: Active fan heatsink

**Bus Type Memory**

PCI Express 3.0 x16  
8GB GDDR6 Memory  
Memory Bandwidth: 160 GB/s  
Memory Interface: 128 bit

**Connectors Max simultaneous displays**

4x mDP (Mini DisplayPort™) 1.4 Connectors  
- 4x 3840 x 2160 @ 120Hz  
- 4x 5120 x 2880 @ 60Hz  
- 2x 7680 x 4320 @ 60Hz  
- supports Multi-Stream Transport (MST)

**Shading Architecture Supported Graphics APIs**

DirectX 12 Shader Model 5.1  
OpenGL 4.6  
DirectX 12  
Vulkan 1.2  
API support includes:  
CUDA, OpenCL 1.2

**Available Graphics Drivers**

Windows 10 64-bit  
Windows 11 64-bit  
Linux® 64-bit (selected Enterprise distributions)

HP qualified drivers may be preloaded or available from the HP support Web site:

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

**NVIDIA® RTX-A2000 12GB Graphics**

**Form Factor Graphics Controller**

Low-Profile Double Slot (2.7" H x 6.1" L)

Ampere GA106-850  
Power: 70 Watts  
Cooling: Active Fan Heatsink

**Bus Type Memory**

PCI Express 4.0 x16  
12GB GDDR6 memory  
Memory Bandwidth: 288 GB/s  
Memory Interface: 192 bit  
Support Error-correcting code (ECC)

**Connectors Max simultaneous displays**

4x mDP (Mini DisplayPort™) 1.4 Connectors  
4x 4096 x 2160 @ 120 Hz,  
4x 5120 x 2880 @ 60 Hz  
2x 7680 x 4320 @ 60 Hz

**Shading Architecture**

Shader Model 6.5

### Technical Specifications - Graphics

**Supported Graphics APIs** OpenGL 4.6  
DirectX 12  
Vulkan 1.2  
API support includes:  
CUDA, OpenCL 1.2

**Available Graphics Drivers** Windows 10 64-bit  
Windows 11 64-bit  
Linux® 64-bit (selected Enterprise distributions)

HP qualified drivers may be preloaded or available from the HP support Web site:

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

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### Technical Specifications - Networking and Communications

<b>Integrated Intel® I219LM PCIe GbE Controller (Intel® vPro® with Intel® AMT 16.0<sup>1</sup>)</b>	<b>Connector</b>	RJ-45
	<b>Cabling</b>	Twisted pair up to 100m
	<b>Controller</b>	Intel® I219LM 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
	<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 16.0 support, Circuit Breaker, VLAN, Multicast Listener Discovery (MLD)

<sup>1</sup>Requires activation and a system with a corporate network connection, an Intel® AMT enabled chipset, and network hardware and software. For notebooks, Intel AMT may be unavailable or limited over a host OS-based VPN, when connecting wirelessly, on battery power, sleeping, hibernating, or powered off. Results dependent upon hardware, setup, and configuration. For more information, visit: <https://www.intel.com/content/www/us/en/architecture-and-technology/intel-active-management-technology.html>

<b>HP Flex 2.5GbE Single Port NIC</b>	<b>Connector</b>	RJ-45
	<b>Controller</b>	Intel® I225-V 2.5GbE platform LAN connect networking controller
	<b>Data Rates Supported</b>	10/100/1000/2500 Mbps
	<b>Compliance</b>	802.3, 802.3x, 802.3u, 802.3z, 802.1ab, 802.3ab, 802.3az, 802.3bz, 802.1Qbu, 802.3br, 802.1Qbv, 802.1AS-ver, 802.1Q, 802.1Qav
	<b>Bus Architecture</b>	PCI Express
	<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
	<b>Network Transfer Rate</b>	Integrated MAC/PHY supporting 10BASE-Te, 100BASE-TX, 1000BASE-T and 2500BASE-T 802.3 specifications
	<b>Data Path Width</b>	1 lane PCIe Gen 2 v3.1 interface for active state operation
<b>Operating Temperature</b>	0 to 70 °C Commercial temperature	
<b>Operating System Driver Support</b>	Windows 10 64-bit Linux®	

### Technical Specifications - Networking and Communications

**Management Capabilities** Error correcting memory (ECC) in packet buffers  
 Time Sensitive Network (TSN): IEEE 802.1Qbu, 802.3br, 802.1Qbv, 802.1AS-REV, 802.1p, Q, and 802.1Qav  
 Interrupt moderation, VLAN (802.1Q & 802.1P), TCP/IP checksum offload, segmentation offload  
 PXE support

#### HP 1-Port 1GbE Flex IO NIC

**Connector** RJ-45  
**Cabling** 1GbE over Category 5e (or better) up to 100m  
**Controller** Realtek RTL8153  
**Data Rates Supported** 10/100/1000 Mbps  
 802.3 (LAN)  
 802.3u (100BASE-TX)  
 802.3ab (1000BASE-T)  
 802.3x (Ethernet Flow Control)  
 802.1Q (Virtual LAN)  
 802.3az (Energy Efficient Ethernet)  
**Compliance**  
**Bus Architecture** USB  
**Power Requirement** Requires 3.3V (integrated regulators for core Vdc)  
**Boot ROM Support** Yes  
**Network Transfer Mode** Full-duplex; Half-duplex  
 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  
**Network Transfer Rate**  
**Operating Temperature** 32° to 131° F (0° to 55° C)  
**Dimensions (HxW)** 1.5 in x 1.5 in. x 0.75 in (3.81 cm x 3.81 cm x 1.9 cm)  
**Operating System Driver Support** Windows 10 64-bit  
 Linux®

#### HP Flex 1GbE Fiber LC Single Port

**Connector** Fiber  
**Cabling** 1GbE over Category OM1 (or better) up to 100m  
**Controller** Microchip LAN7801  
**Data Rates Supported** 100/1000 Mbps  
 IEEE 802.1p priority encoding/tagging (QoS, CoS)  
 IEEE 802.1q VLAN tagging  
 IEEE 802.3x flow control  
**Compliance**  
**Bus Architecture** USB  
**Power Requirement** Requires 3.3V (integrated regulators for core Vdc)  
**Boot ROM Support** Yes  
**Network Transfer Mode** Full-duplex; Half-duplex  
 100BASE-X (half-duplex) 100 Mbps  
 1000BASE-X (half-duplex) 1000 Mbps  
 1000BASE-X (full-duplex) 2000 Mbps  
**Network Transfer Rate**  
**Operating Temperature** 32° to 158° F (0°C to 70°C)

### Technical Specifications - Networking and Communications

<b>Dimensions (HxW)</b>	1.5 in x 1.7 in. x 0.75 in (3.84 cm x 4.3 cm x 1.9 cm)
<b>Operating System Driver Support</b>	Windows 10 64-bit Linux®

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**Intel® Wi-Fi 6E\* AX211  
802.11ax, BT 5.3, M.2**

<b>WLAN Standards</b>	802.11abgn+acR2+axR2(Pre-Standard) MIMO 2x2 High performance, low power dual band Pre-Standard-802.11ax R2 2x2, both with 160MHz channel support – Wi-Fi 6E
<b>Antenna</b>	2x2 Dual-Band
<b>Bluetooth Standards</b>	5.2
<b>Operating Temperature</b>	32° to 176° F (0° to 80° C)
<b>Interface</b>	M.2 CNVio2
<b>Dimensions</b>	M.2 2230
<b>Kit Contents</b>	Not Available

\*Wi-Fi 6E requires a Wi-Fi 6E router, sold separately, to function in the 6GHz band. Availability of public wireless access points limited. Wi-Fi 6E is backwards compatible with prior 802.11 specs. And available in countries where Wi-Fi 6E is supported.

### Summary of Changes

<b>Date of change:</b>	<b>Version History:</b>		<b>Description of change:</b>
April 13, 2022	From v1 to v2	<b>Changed</b>	Social and Environmental Responsibility section
May 2, 2022	From v2 to v3	<b>Changed</b>	Racking and Physical Security section
June 1, 2022	From v3 to v4	<b>Changed</b>	Operating Systems section
July 8, 2022	From v4 to v5	<b>Changed</b>	System Board section
July 11, 2022	From v5 to v6	<b>Changed</b>	Overview, Processors, Graphics, System Board sections
August 1, 2022	From v6 to v7	<b>Changed</b>	Format pages 1-3, Overview section and Supported Components
September 1, 2022	From v7 to v8	<b>Changed</b>	Racking and Physical Security, Other Hardware sections
November 1, 2022	From v8 to v9	<b>Changed</b>	Graphics Adapters and Networking and Communications sections
December 1, 2022	From v9 to v10	<b>Changed</b>	Other Hardware section
February 24, 2023	From v10 to v11	<b>Changed</b>	Operating Systems section
March 1, 2023	From v11 to v12	<b>Changed</b>	Manageability and Graphics Adapters sections
March 30, 2023	From v12 to v13	<b>Changed</b>	Processors section
April 1, 2023	From v13 to v14	<b>Changed</b>	Memory, Networking and Communications section
April 25, 2023	From v14 to v15	<b>Changed</b>	Social and Environmental Responsibility section
May 1, 2023	From v15 to v16	<b>Changed</b>	Other Hardware and System Board sections
May 11, 2023	From v16 to v17	<b>Changed</b>	Front-Side View section
June 1, 2023	From v17 to v18	<b>Changed</b>	Social and Environmental Responsibility section
July 1, 2023	From v18 to v19	<b>Changed</b>	Networking and Communications, Other Hardware, HP BIOS sections
August 1, 2023	From v19 to v20	<b>Changed</b>	ENVIRONMENTAL DATA section
October 1, 2023	From v20 to v21	<b>Changed</b>	Input Devices, HP BIOS sections
November 1, 2023	From v21 to v22	<b>Changed</b>	Input Devices section
December 1, 2023	From v22 to v23	<b>Changed</b>	Graphics, Other Hardware, Social and Environmental Responsibility sections
December 11, 2023	From v23 to v24	<b>Changed</b>	Memory section



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