Overview

HP Z2 G9 Mini Workstation Desktop PC

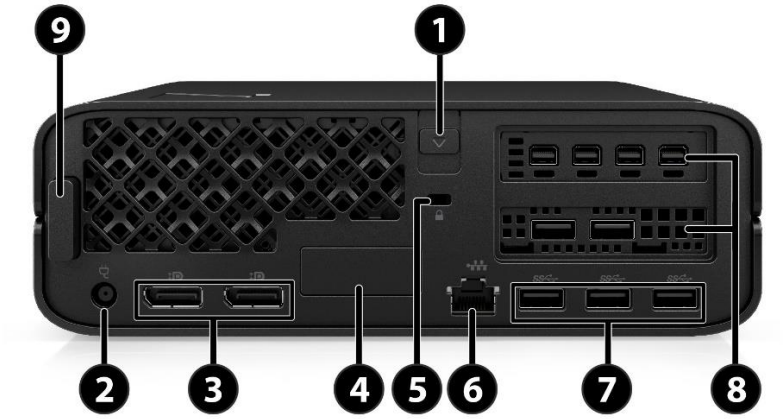




Front-Side View

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[3], (1) Dual USB-A 10Gbps port, (1) Serial port
9. Antenna

[1] Onboard Display support DP1.4/HBR2. Flex I/O module Display support DP1.4/HBR3 (Resolution support up to 5120x3200 24bpp @60Hz).
[2]Available on selected configurations only.
[3] 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

Overview

Form Factor

Mini

Operating Systems

Preinstalled:

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

Web-Supported only:

- Windows® 10 Enterprise[2]

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® Enterprise Linux® Workstation 8 and 9[5]
- SUSE Linux® Enterprise Desktop 15[5]
- Ubuntu®[4,5]
  - Intel 12th generation processors support Ubuntu 20.04 and 22.04 LTS
  - Intel 13th generation processors support Ubuntu 22.04 LTS

[1] 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).
[2] 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.
[3]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.
[4] Specific versions of certified Ubuntu® 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.
[5]For detailed Linux® OS/hardware support information, see:
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® 8 or Windows 7 operating system on products configured with Intel® and AMD® 7th generation and forward processors or provide any Windows® 8 or Windows 7 drivers on http://www.support.hp.com. 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[1,2,3,4,5]

Intel 13th 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 12th 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)

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

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

Overview

[3] 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

[4] Error Correction Memory

[5]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[1], (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 USBA 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 [1]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

Temperature	Operating: 5° to 35° C (40° to 95° F) Above 1524 m (5,000 feet) altitude, the maximum operating temperature is reduced by 1° C (1.8° F) for every 305 m (1,000 feet) increase in elevation Non-operating: -40° to 60° C (-40° to 140° F) Maximum rate of change: 10°C/hr
Humidity	Operating: 10% to 85% RH, non-condensing, 35° C maximum wet bulb Non-operating: 10% to 90% RH, non-condensing, 35° C maximum wet bulb
Maximum Altitude (non-pressurized)	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.
Power Adapters	Choice of: 180W 89% Average Efficiency 280W 89% Average Efficiency. *All power Adapters are external to the product.* • *Standard Base Unit System defaults to 180W Power Adapters. When configured with a 125W K SKU Processor, the 280W Power Adapter is required.* • *Performance Base Units require 280W Power Adapters supporting Discrete Graphics and 125W K SKU configurations.*
Workstation ISV Certifications	See the latest list of certifications at http://www.hp.com/united-states/campaigns/workstations/partnerships.html
Chipset	Intel® W680 chipset
Memory	2 SODIMM slots, supporting up to 64GB ECC/non-ECC, DDR5 5600 MT/s

Supported Components

Storage *		Factory Configured	Option Kit	Option Kit Part Number	Support Notes
	PCIe Solid State Drives				
	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
	Graphics Cable Adapters				
	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	
Discrete Graphics				
Entry 3D Graphics				
NVIDIA® T400 2GB	Y	N		1
NVIDIA® T400 4GB	Y	Y	5Z7E0AA	1
NVIDIA® T600 4GB	Y	N		1
High End 3D Graphics				
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

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) DDR5-5600 nECC SODIMM	Y	Y	4M9Y4AA/AT	1
HP 16GB (1x16GB) DDR5-5600 nECC SODIMM	Y	Y	4M9Y5AA/AT	1
HP 16GB (1x16GB) DDR5-5600 ECC SODIMM	Y	Y	4M9Y6AA/AT	1
HP 32GB (1x32GB) DDR5-5600 nECC SODIMM	Y	Y	4M9Y7AA/AT	1,2
HP 32GB (1x32GB) DDR5-5600 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
HP Slim Tray Optical Drives			
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
	HyperX Cloud MIX Wireless GAM HEADSET	N	Y	4P5K9AA
	HyperX Cloud Core BLK GAM HEADSET	N	Y	4P4F2AA
	HyperX Cloud Flight - Wireless Gaming Headset (Black-Red) (HX-HSCF-BK/AM)	N	Y	4P5L4AA
	HyperX Cloud Stinger Core GAM HEADSET PC	N	Y	4P4F4AA
	HyperX SoloCast - USB Microphone (Black) (HMIS1X-XX-BK/G)	N	Y	4P5P8AA

Supported Components

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
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
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[2]

Windows 11 Home - HP recommends Windows 11 Pro[2]

Windows 11 Pro (preinstalled with Windows 10 Pro Downgrade) [1,2,3]

Linux®-ready[5]

Red Hat® Enterprise Linux® Workstation 8 and 9[5]

SUSE Linux® Enterprise Desktop 15[5]

Ubuntu®[4,5]

- Intel 12th generation processors support Ubuntu 20.04 and 22.04 LTS
- Intel 13th generation processors support Ubuntu 22.04 LTS

[1] 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).
[2] 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.
[3]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.
[4] Specific versions of certified Ubuntu® 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.
[5]For detailed Linux® OS/hardware support information, see:
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® 8 or Windows 7 operating system on products configured with Intel® and AMD® 7th generation and forward processors or provide any Windows® 8 or Windows 7 drivers on http://www.support.hp.com. 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

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® 12th 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 and High-Performance Mode. HP recommends using High Performance Mode unless you have concerns about acoustics in an open office environment. 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 HP F10 BIOS Menu
In the F10 BIOS Menu, the setting titled “Performance Control” is adjustable to High Performance Mode, Performance 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

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 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

SOFTWARE COMPONENTS AND APPLICATIONS WITH WINDOWS

Supported Components

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

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

Client Security Software
HP Client Security Suite Gen7[4] including: (including Credential Manager, HP Password Manager[6], HP Spare Key)
HP Power On Authentication
Microsoft Defender[7]

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

[1] 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

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

[3] HP Manageability Integration Kit can be downloaded from http://www8.hp.com/us/en/ads/clientmanagement/overview.html

[4] HP Client Security Manager Gen7 requires Windows and is available on the select HP PCs.

Supported Components

[5] 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.

[6] 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.

[7] Microsoft Defender Opt in and internet connection required for updates.

[8] HP Sure Start Gen 7 is available on select HP PCs and workstations. See product specifications for availability.

[9] HP Sure Run Gen5 is available on select Windows 11 based HP Pro, Elite and Workstation PCs with select Intel® or AMD processors

[10] 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

[11] HP Sure Click requires Windows 10 Pro or higher or Enterprise. See https://bit.ly/2PrLT6A_SureClick for complete details.
[12] 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.
[13] HP BIOSphere Gen6 features may vary depending on the platform and configurations.
[14] HP Support Assistant requires Windows and Internet access.
[16] 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.
[17] 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.
[18] 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 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.
[20] 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.
[22] 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 flexIO DP 1.4/HBR3 ports: 5120x3200 @ 60Hz, 24bpp
	Network Controller	Integrated Ethernet PHY Connection I219LM. Management capabilities: WOL, PXE 2.1 and AMT 16
	External SATA (eSATA)	None
	IDE connector	None
	Floppy connector	None
	Serial	1 internal header (requires optional Serial Port Adapter Kit with PCIe Bracket)
	2nd Serial	None
	HD Integrated Audio	Yes
USB Connector(s)	**Side**	1 Type-A SuperSpeed USB 10Gbps port (support charging) 2 Type-C® SuperSpeed USB 20Gbps port (charging supported)
	Rear	3 Type-A SuperSpeed USB 10Gbps port Flex IO, choice of: 1 Dual Type-A SuperSpeed USB 5Gbps port, 1 Type-C® SuperSpeed USB 10Gbps port (Alt Mode) PCIe, choose of: Graphic Cards, 1 Dual SuperSpeed USB Type-A 10Gbps , 1 serial
HD Integrated Audio	Realtek ALC3205-A2-CG	
Flash ROM	Yes	
CPU Fan Header	Yes	
Memory Fan Header	None	
Chassis Fan Header	None	
Front PCI Fan Header	None	
Front Control Panel/Speaker Header	Yes	
CMOS Battery Holder - Lithium	Yes	
Integrated Trusted Platform Module	Integrated TPM 2.0 Convertible to FIPS 140-2 Certified mode through firmware v15.21.	
Power Supply Headers	DC Jack for adapter	
Power Switch, Power LED & Hard Drive LED Header	Yes	
Clear Password Jumper	None	
Keyboard/Mouse	USB	
Power Adapter	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.*	

- *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)[4]	ECC Memory Supported[5]	Integrated Graphics	Featuring Intel® vPro® Technology[3]	TDP (W)	Max Turbo Frequency (GHz)[2]
Intel 13th Generation Processors															
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
Intel 12th Generation Processors															
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

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

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

[3] 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

[4] 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.

[5] Error Correction Memory

System Configurations

HP Z2 G9 Mini Configuration #1

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	

HP Z2 G9 Mini Configuration #2

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	

HP Z2 G9 Mini Configuration #5

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

System Technical Specifications

HP Z2 G9 Mini Configuration #6	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

System Configuration (Entry level)	**Processor Info**	Intel® Core™ i9-12900 / 65W	
	Memory Info	Hynix 32GB 4800 DDR5 SODIMM	
	Graphics Info	NVIDIA T600	
	Disks/Optical/Floppy	SAMSUNG MZVL22T0HBLB-00BH7 (2048 GB) x2	
	Power Supply	180W	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	2.6	15.5
	Hard drive Operating (random reads)	3.3	24.5
	Hard drive Operating (active mode)	3.4	24.8
System Configuration (Entry level)	**Processor Info**	Intel® Core™ i9-12900 / 65W	
	Memory Info	Hynix 32GB 4800 DDR5 SODIMM	
	Graphics Info	NVIDIA T400	
	Disks/Optical/Floppy	SAMSUNG MZVL22T0HBLB-00BH7 (2048 GB) x2	
	Power Supply	180W	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	2.6	16.9

System Technical Specifications

	Hard drive Operating (random reads)	3.4	24.3
	Hard drive Operating (active mode)	3.4	24.5
System Configuration (Entry level, UMA)	**Processor Info**	Intel® Core™ i9-12900 / 65W	
	Memory Info	Hynix 32GB 4800 DDR5 SODIMM	
	Graphics Info	Intel® UHD	
	Disks/Optical/Floppy	SAMSUNG MZVL22T0HBLB-00BH7 (2048 GB) x2	
	Power Supply	180W	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	2.6	14.1
	Hard drive Operating (random reads)	3.3	23.5
	Hard drive Operating (active mode)	3.4	23.9
System Configuration (Mid-level)	**Processor Info**	Intel® Core™ i9-12900 / 65W	
	Memory Info	Hynix 32GB 4800 DDR5 SODIMM	
	Graphics Info	NVIDIA RTX A2000	
	Disks/Optical/Floppy	SAMSUNG MZVL22T0HBLB-00BH7 (2048 GB) x2	
	Power Supply	180W	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	2.9	19.9
	Hard drive Operating (random reads)	3.3	25.1
	Hard drive Operating (active mode)	3.4	25.2
System Configuration (Mid-level)	**Processor Info**	Intel® Core™ i9-12900 / 65W	
	Memory Info	Hynix 32GB 4800 DDR5 SODIMM	
	Graphics Info	NVIDIA T1000	
	Disks/Optical/Floppy	SAMSUNG MZVL22T0HBLB-00BH7 (2048 GB) x2	
	Power Supply	180W	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	2.6	15.0
	Hard drive Operating (random reads)	3.4	23.9
	Hard drive Operating (active mode)	3.4	25.0
System Configuration (Mid-level)	**Processor Info**	Intel® Core™ i5-12600K / 125W	
	Memory Info	Samsung 32GB 4800 DDR5 SODIMM	
	Graphics Info	NVIDIA T600	
	Disks/Optical/Floppy	Micron MTFDKBA2T0TFH-1BC1AABHA (2048 GB) x2	

System Technical Specifications

	Power Supply	280W	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	2.6	16.3
	Hard drive Operating (random reads)	3.2	24.2
	Hard drive Operating (active mode)	3.8	28.7
System Configuration (Mid-level)	**Processor Info**	Intel® Core™ i5-12600K / 125W	
	Memory Info	Samsung 32GB 4800 DDR5 SODIMM	
	Graphics Info	NVIDIA T400	
	Disks/Optical/Floppy	Micron MTFDKBA2T0TFH-1BC1AABHA (2048 GB) x2	
	Power Supply	280W	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	2.6	17.1
	Hard drive Operating (random reads)	3.3	24.6
	Hard drive Operating (active mode)	3.7	28.7
System Configuration (Mid-level, UMA)	**Processor Info**	Intel® Core™ i5-12600K / 125W	
	Memory Info	Samsung 32GB 4800 DDR5 SODIMM	
	Graphics Info	Intel® UHD	
	Disks/Optical/Floppy	Micron MTFDKBA2T0TFH-1BC1AABHA (2048 GB) x2	
	Power Supply	280W	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	2.5	14.2
	Hard drive Operating (random reads)	3.2	23.9
	Hard drive Operating (active mode)	3.7	28.5
System Configuration (High-end)	**Processor Info**	Intel® Core™ i5-12600K / 125W	
	Memory Info	32GB 4800 DDR5 SODIMM	
	Graphics Info	NVIDIA RTX A2000	
	Disks/Optical/Floppy	Micron MTFDKBA2T0TFH-1BC1AABHA (2048 GB) x2	
	Power Supply	280W	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	2.9	19.7
	Hard drive Operating (random reads)	3.3	24.1
	Hard drive Operating (active mode)	3.7	27.8

System Technical Specifications

System Configuration (High-end)	**Processor Info**	Intel® Core™ i5-12600K / 125W	
	Memory Info	32GB 4800 DDR5 SODIMM	
	Graphics Info	NVIDIA T1000	
	Disks/Optical/Floppy	Micron MTFDKBA2T0TFH-1BC1AABHA (2048 GB) x2	
	Power Supply	280W	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	2.6	15.3
	Hard drive Operating (random reads)	3.3	23.7
	Hard drive Operating (active mode)	3.7	28.6

Environmental Requirements	**Temperature**	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
	Humidity	Operating: 10% to 85% RH, non-condensing, 35° C maximum wet bulb Non-operating: 10% to 90% RH, non-condensing, 35° C maximum wet bulb
	Maximum Altitude	Operating (with Rotational Hard Drives): 3,048 m (10,000 feet) Operating (with only Solid-State Drives): 5,000 m (16,404 feet) Non-operating: 12,192 m (40,000 feet) Maximum operating temperature is reduced as altitude increases. See Cooling for details.
	Dynamic	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 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
	Cooling	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)

Physical Security and Serviceability

Access Panel	Tool-less
Optical Drive	No
Hard Drives	No
Expansion Cards	M.2 module requires a screwdriver to service and replace. An option card requires a screwdriver to service and replace.
Processor Socket	Tool-less, except for the processor heatsink and fan
Blue User Touch Points	Yes, on internal chassis mechanisms
Color-coordinated Cables and Connectors	Yes
Memory	Tool-less
System Board	Screw-In
Dual Color Power and SSD LED	The Power LED is on the front of the system, and the SSD LED is located on the rear of the system (inside)
Restore CD/DVD Set	Consists of an operating system DVD (OSDVD) and a driver DVD (DRDVD). OSDVD restores the original operating system. DRDVD will provide all drivers for the system. The DRDVD may also contain applications that originally shipped with the system for optional installation. Applications can also be obtained from HP.com. OSDVD and DRDVD are orderable with the system and available from HP Support.
Dual Function Front Power Switch	Yes, causes a fail-safe power off when held for 4 seconds (default) or 15 seconds (can be configured by F10 BIOS setup\Advanced\System Options\Power button override)
Padlock Support	No
Cable Lock Support	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
Universal Chassis Clamp Lock Support	No
Solenoid Lock and Hood Sensor	Only Hood Sensor(optional)
Rear Port Control Cover	No
Serial, USB, Audio, Network, Enable/Disable Port Control	Yes, enables or disables serial, USB, audio, and network ports (parallel port is not supported on the HP Z2Mini G9 Workstation Desktop PC)
Power-On Password	Yes, prevents an unauthorized person from booting up the workstation
3.3V Aux Power LED on System PCA	No
NIC LEDs (integrated) (Green & Amber)	Yes
CPUs and Heatsinks	A T-15 Torx or flat blade screwdriver is needed to remove the CPU heatsink before the CPU can be removed. CPU removal is tool-less

System Technical Specifications

Power Supply Diagnostic LED	No
Front Power Button	Yes
Front Power LED	Yes, white (normal), red (fault)
Front Hard Drive Activity LED	No
Front ODD Activity LED	No
Internal Speaker	Yes
Cooling Solution	Air cooled forced convection
Power Supply Fans	No
Memory Heatsink Fan	No
HP PC Hardware Diagnostics UEFI	HP PC Hardware Diagnostics (UEFI) enables hardware level testing outside the operating system on many components. The diagnostics can be invoked by pressing F2 at POST and is available as a download from HP Support.
Access Panel Key Lock	The Kensington lock slot on the chassis serves this purpose
ACPI-Ready Hardware	Advanced Configuration and Power Management Interface (ACPI). • Allows the system to wake from a low power mode. • Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system.
Integrated Chassis Handles	No
Power Supply	No
Flash ROM	Yes
Diagnostic Power Switch LED on board	Yes
Clear CMOS Button	Yes
CMOS Battery Connector	Yes
DIMM Connectors	Yes

BIOS

BIOS 64-bit Services	BIOS supports 64-bit Operating systems.
PCI 3.0 Support	Full BIOS support for PCI Express through industry standard interfaces.
ATAPI	ATAPI Removable Media Device BIOS Specification Version 1.0.
BBS	BIOS Boot Specification v1.01.(Not support)
WMI Support	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.
BIOS Boot Spec 1.01+	Provides more control over how and from what devices the workstation will boot. (Not Support)
BIOS Power On	Users can define a specific date and time for the system to power on.

System Technical Specifications

ROM Based Computer Setup Utility (F10)	Review and customize system configuration settings controlled by the BIOS.
System/Emergency ROM Flash Recovery with Video	Recovers system BIOS in corrupted Flash ROM.
Replicated Setup	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).
SMBIOS	System Management BIOS 3.4, for system management information.
Boot Control	Disables the ability to boot from removable media on supported devices.
Memory Change Alert	Alerts management console if memory is removed or changed.
Thermal Alert	Monitors the temperature state within the chassis. Three modes: • NORMAL - normal temperature ranges. • ALERTED - excessive temperatures are detected. Raises a flag so action can be taken to avoid shutdown or provide for a smoother system shutdown. • SHUTDOWN - excessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs.
Remote ROM Flash	Provides secure, fail-safe ROM image management from a central network console.
ACPI (Advanced Configuration and Power Management Interface)	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.
Ownership Tag	A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen.
Remote Wakeup/Remote Shutdown	System administrators can power on, restart, and power off a client computer from a remote location.
Instantly Available PC (Suspend to RAM - ACPI sleep state S3)	Allows for very low power consumption with quick resume time.
Remote System Installation via F12 (PXE 2.1) (Remote Boot from Server)	Allows a new or existing system to boot over the network and download software, including the operating system.
ROM revision levels	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.
System board revision level	Allows management SW to read revision level of the system board. Revision level is digitally encoded into the HW and cannot be modified.
Start-up Diagnostics (Power-on Self-Test)	Assesses system health at boot time with selectable levels of testing.
Auto Setup when new hardware installed	System automatically detects addition of new hardware.
Keyboard-less Operation	The system can be booted without a keyboard.
Localized ROM Setup	Common BIOS image supports System Configuration Utility (F10 Setup) menus in 15 languages with local keyboard mappings.
Asset Tag	The user or MIS to set a unique tag string in non-volatile memory.
Per-slot Control	Allows I/O slot parameters (option ROM enable/disable, bus latency) to be configured individually.
Adaptive Cooling	Control parameters are set according to detected hardware configuration for optimal acoustics.
Pre-boot Diagnostics	(Pre-video) critical errors are reported via beeps and blinks on the power LED.
Industry Standard	Revision Supported by the BIOS
UEFI Specification Revision	2.7
ACPI	Advanced Configuration and Power Management Interface, Version 6.0

System Technical Specifications

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

Service, Support, and Warranty

On-site Warranty and Service[1]: Three-years, limited warranty and service offering delivers on-site, next business-day[2] service for parts and labor and includes free telephone support[3] 8am - 5pm. Global coverage[2] 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

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)
- 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

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:

- This product is low halogen except for power cords, cables, and peripherals. Service parts obtained after purchase may not be Low Halogen.
- IT ECO declaration
- US ENERGY STAR®
- EPEAT® Gold registered in the United States. See http://www.epeat.net for registration status in your country.
- TCO Certified

Sustainable Impact Specifications

• Ocean-bound plastic in Speaker[1]
• 55% post-consumer recycled plastic[2]
• Low halogen[3]
• Outside Box and corrugated cushions are 100% sustainably sourced and recyclable[4]
• Molded Paper Pulp Cushion inside box is 100% sustainably sourced and recyclable[5]
• 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
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:

System Technical Specifications

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.

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)	Sound Power (L_{WAd}, bels)	Sound Pressure (L_{pAm}, decibels)
System Idle	2.9	19.7
Hard drive Operating (Drive Random Seek)	3.3	24.1
Hard drive Operating (Active mode)	3.7	27.8

***NOTE:** Noise Emissions Declared by High-end System Configration.

Batteries

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

The battery in this product does not contain:

- Mercury greater than5ppm by weight
- Cadmium greater than 10ppm by weight
- Lead greater than 40 ppm by weight

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
- 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	**External:**	PAPER/Corrugated	269 g
		PAPER/Molded Pulp	108 g
		PAPER/Paper	3 g

System Technical Specifications

	Internal:	PLASTIC/Polyethylene low density - LDPE	13 g

The plastic packaging material contains at least 50% recycled content.

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

Material Usage

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

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

Packaging Usage

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

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

End-of-life Management and Recycling

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

[1]Percentage of ocean-bound plastic contained in each component varies by product
[2]Recycled plastic content percentage is based on the definition set in the IEEE 1680.1-2018 standard.
[3]External power supplies, WWAN modules, power cords, cables and peripherals excluded.
[4]100% outer box packaging and corrugated cushions made from sustainably sourced certified and recycled fibers.
[5]Fiber cushions made from 100% recycled wood fiber and organic materials.

Manageability

Intel® Active Management Technology (AMT)	Intel® Active Management Technology (AMT) 16[1] 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® 12th 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	Visit: http://ftp.hp.com/pub/caps-softpaq/cmit/HPIA.html
System Software Manager	For questions or support for SSM, please visit: http://www.hp.com/go/ssm

[1]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

PCIe SSDs for HP Workstations

HP Z Turbo Drv PCIE-4X4 512GB TLC PCIe SSD	**Capacity**	512GB	
	Protocol	PCIe	
	Form Factor	M.2 in native Slot on motherboard	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	300TBW (TB Written)	
	Reliability (MTBF)	1.5M Hours	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 178° F (0° to 81° C)	
	Performance	**Sequential Read**	6400MB/s*
		Sequential Write	3400MB/s*
		Random Read	600K IOPS*
		Random Write	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.

HP Z Turbo Drv PCIE-4X4 1TB TLC PCIe SSD	**Capacity**	1TB	
	Protocol	PCIe	
	Form Factor	M.2 in native Slot on motherboard	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	400TBW (TB Written)	
	Reliability (MTBF)	1.5M Hours	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 178° F (0° to 81° C)	
	Performance	**Sequential Read**	6500MB/s*
		Sequential Write	5000MB/s*
		Random Read	800K IOPS*
		Random Write	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.

HP Z Turbo Drv PCIE-4X4 2TB TLC PCIe SSD	**Capacity**	2TB
	Protocol	PCIe
	Form Factor	M.2 in native Slot on motherboard
	Controller	NVMe
	NAND Type	3D TLC
	Endurance	500TBW (TB Written)
	Reliability (MTBF)	1.5M Hours
	Interface	PCI Express 4.0 x4 electrical
	Operating Temperature	32° to 178° F (0° to 81° C)

Technical Specifications - Hard Drives

	Performance	**Sequential Read**	6500MB/s*
		Sequential Write	5000MB/s*
		Random Read	800K IOPS*
		Random Write	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.

HP Z Turbo Drv PCIE-4X4 4TB TLC PCIe SSD	**Capacity**	4TB	
	Protocol	PCIe	
	Form Factor	M.2 in native Slot on motherboard	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	600TBW (TB Written)	
	Reliability (MTBF)	1.5M Hours	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 178° F (0° to 81° C)	
	Performance	**Sequential Read**	6500MB/s*
		Sequential Write	5000MB/s*
		Random Read	700K IOPS*
		Random Write	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.

HP Z Turbo Drv PCIE Gen4x4 4TB TLC PCIe SED OPAL2	**Capacity**	4TB	
	Protocol	PCIe	
	Form Factor	M.2 in native Slot on motherboard	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	600TBW (TB Written)	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 178° F (0° to 81° C)	
	Performance	**Sequential Read**	6500MB/s*
		Sequential Write	5000MB/s*
		Random Read	700K IOPS*
		Random Write	700K IOPS*
	Self-Encrypting Drive Support	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.

HP Z Turbo Drv PCIE Gen4x4 512GB TLC PCIe SED OPAL2	**Capacity**	512GB
	Protocol	PCIe
	Form Factor	M.2 in native Slot on motherboard

Technical Specifications - Hard Drives

	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	300TBW (TB Written)	
	Reliability (MTBF)	1.5M Hours	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 178° F (0° to 81° C)	
	Performance	**Sequential Read**	6400MB/s*
		Sequential Write	3400MB/s*
		Random Read	600K IOPS*
		Random Write	600K IOPS*
	Self-Encrypting Drive Support	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.

HP Z Turbo Drv PCIE Gen4x4 1TB TLC PCIe SED OPAL2	**Capacity**	1TB	
	Protocol	PCIe	
	Form Factor	M.2 in native Slot on motherboard	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	400TBW (TB Written)	
	Reliability (MTBF)	1.5M Hours	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 178° F (0° to 81° C)	
	Performance	**Sequential Read**	6500MB/s*
		Sequential Write	5000MB/s*
		Random Read	800K IOPS*
		Random Write	800K IOPS*
	Self-Encrypting Drive Support	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.

HP Z Turbo Drv PCIE Gen4x4 2TB TLC PCIe SED OPAL2	**Capacity**	2TB	
	Protocol	PCIe	
	Form Factor	M.2 in native Slot on motherboard	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	500TBW (TB Written)	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 178° F (0° to 81° C)	
	Performance	**Sequential Read**	6500MB/s*
		Sequential Write	5000MB/s*
		Random Read	800K IOPS*

		Random Write	800K IOPS*
	Self-Encrypting Drive Support	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.

256GB 2280 PCIe-4x4 Value M.2 SSD	**Capacity**	256GB	
	Protocol	PCIe	
	Form Factor	M.2 in native Slot on motherboard	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	150TBW (TB Written)	
	Reliability (MTBF)	1.5M Hours	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	3100MB/s*
		Sequential Write	1400MB/s*
		Random Read	200K IOPS*
		Random Write	400K IOPS*
	Self-Encrypting Drive Support	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.

512GB 2280 PCIe-4x4 Value M.2 SSD	**Capacity**	512GB	
	Protocol	PCIe	
	Form Factor	M.2 in native Slot on motherboard	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	300TBW (TB Written)	
	Reliability (MTBF)	1.5M Hours	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	3400MB/s*
		Sequential Write	2500MB/s*
		Random Read	380K IOPS*
		Random Write	430K IOPS*
	Self-Encrypting Drive Support	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.

1TB 2280 PCIe-4x4 Value M.2 SSD	**Capacity**	1TB
	Protocol	PCIe

Technical Specifications - Hard Drives

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

NVIDIA® Quadro® T400 2GB Graphics	**Form Factor**	Single Slot, Low Profile (2.7" H x 6.1" L)
	Graphics Controller	Turing Tu-117-825 Max Power: 30 Watts Cooling Solution: Active fan heatsink
	Bus Type	PCI Express 3.0 x16
	Memory	2GB GDDR6 Memory Memory Bandwidth: 80 GB/s Memory Interface: 64 bit
	Connectors	3x mDP (Mini DisplayPort™) 1.4 Connectors
	Max simultaneous displays	- 3x 3840 x 2160 @ 120Hz - 3x 5120 x 2880 @ 60Hz - supports Multi-Stream Transport (MST)
	Shading Architecture	DirectX 12 Shader Model 5.1
	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

NVIDIA® Quadro® T400 4GB Graphics	**Form Factor**	Single Slot, Low Profile (2.7" H x 6.1" L)
	Graphics Controller	Turing Tu117-825 Max Power: 30 Watts Cooling Solution: Active fan heatsink
	Bus Type	PCI Express 3.0 x16
	Memory	4GB GDDR6 Memory Memory Bandwidth: 80 GB/s Memory Interface: 64 bit
	Connectors	3x mDP (Mini DisplayPort™) 1.4 Connectors
	Max simultaneous displays	- 3x 3840 x 2160 @ 120Hz - 3x 5120 x 2880 @ 60Hz - supports Multi-Stream Transport (MST)
	Shading Architecture	DirectX 12 Shader Model 5.1
	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
NVIDIA® Quadro® T600 4GB Graphics	**Form Factor**	Single Slot, Low Profile (2.7" H x 6.1" L)
	Graphics Controller	Turing Tu117-850 Max Power: 40 Watts Cooling Solution: Active fan heatsink
	Bus Type	PCI Express 3.0 x16
	Memory	4GB GDDR6 Memory Memory Bandwidth: 160 GB/s Memory Interface: 128 bit
	Connectors	4x mDP (Mini DisplayPort™) 1.4 Connectors
	Max simultaneous displays	- 4x 3840 x 2160 @ 120Hz - 4x 5120 x 2880 @ 60Hz - 2x 7680 x 4320 @ 60Hz - supports Multi-Stream Transport (MST)
	Shading Architecture	DirectX 12 Shader Model 5.1
	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
NVIDIA® Quadro® T1000 4GB Graphics	**Form Factor**	Single Slot, Low Profile (2.7" H x 6.1" L)
	Graphics Controller	Turing Tu117-875 Max Power: 50 Watts Cooling Solution: Active fan heatsink
	Bus Type	PCI Express 3.0 x16
	Memory	4GB GDDR6 Memory Memory Bandwidth: 160 GB/s Memory Interface: 128 bit
	Connectors	4x mDP (Mini DisplayPort™) 1.4 Connectors
	Max simultaneous displays	- 4x 3840 x 2160 @ 120Hz - 4x 5120 x 2880 @ 60Hz - 2x 7680 x 4320 @ 60Hz - supports Multi-Stream Transport (MST)
	Shading Architecture	DirectX 12 Shader Model 5.1
	Supported Graphics APIs	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**	Single Slot, Low Profile (2.7" H x 6.1" L)
	Graphics Controller	Turing Tu117-875 Max Power: 50 Watts Cooling Solution: Active fan heatsink
	Bus Type	PCI Express 3.0 x16
	Memory	8GB GDDR6 Memory Memory Bandwidth: 160 GB/s Memory Interface: 128 bit
	Connectors	4x mDP (Mini DisplayPort™) 1.4 Connectors
	Max simultaneous displays	- 4x 3840 x 2160 @ 120Hz - 4x 5120 x 2880 @ 60Hz - 2x 7680 x 4320 @ 60Hz - supports Multi-Stream Transport (MST)
	Shading Architecture	DirectX 12 Shader Model 5.1
	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

NVIDIA® RTX-A2000 12GB Graphics	**Form Factor**	Low-Profile Double Slot (2.7" H x 6.1" L)
	Graphics Controller	Ampere GA106-850 Power: 70 Watts Cooling: Active Fan Heatsink
	Bus Type	PCI Express 4.0 x16
	Memory	12GB GDDR6 memory Memory Bandwidth: 288 GB/s Memory Interface: 192 bit Support Error-correcting code (ECC)
	Connectors	4x mDP (Mini DisplayPort™) 1.4 Connectors
	Max simultaneous displays	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

Technical Specifications - Networking and Communications

Integrated Intel® I219LM PCIe GbE Controller (Intel® vPro® with Intel® AMT 16.0[1])	**Connector**	RJ-45
	Cabling	Twisted pair up to 100m
	Controller	Intel® I219LM GbE platform LAN connect networking controller
	Memory	3 KB Tx and 3KB Rx FIFO packet buffer memory
	Data Rates Supported	10/100/1000 Mbps
	Compliance	802.1as/1588, 802.1p, 802.1Q, 802.3, 802.3ab, 802.3az, 802.3i, 802.3u, 802.3z
	Bus Architecture	PCI Express and SMBus
	Data Transfer Mode	PCIe-based interface for active state operation (S0 state) and SMBus for host and management traffic (Sx low power state)
	Power Requirement	Requires 3.3V (integrated regulators for core Vdc)
	Boot ROM Support	Yes
	Network Transfer Mode	Full-duplex; Half-duplex
	Network Transfer Rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps
	Management Capabilities	vPro®, WOL, auto MDI crossover, PXE, Muti-port teaming, RSS, ACPI, Advanced cable diagnostic, loopback modes, AMT 16.0 support, Circuit Breaker, VLAN, Multicast Listener Discovery (MLD)

[1]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

HP Flex 2.5GbE Single Port NIC	**Connector**	RJ-45
	Controller	Intel® I225-V 2.5GbE platform LAN connect networking controller
	Data Rates Supported	10/100/1000/2500 Mbps
	Compliance	802.3, 802.3x, 802.3u,802.3z,802.1ab, 802.3ab, 802.3az, 802.3bz, 802.1Qbu, 802.3br, 802.1Qbv, 802.1AS-REV, 802.1Q, 802.1Qav
	Bus Architecture	PCI Express
	Data Transfer Mode	PCIe-based interface for active state operation (S0 state) and SMBus for host and management traffic (Sx low power state)
	Power Requirement	Requires 3.3V (integrated regulators for core Vdc)
	Boot ROM Support	Yes
	Network Transfer Mode	Full-duplex; Half-duplex
	Network Transfer Rate	Integrated MAC/PHY supporting 10BASE-Te, 100BASE-TX, 1000BASE-T and 2500BASE-T 802.3 specifications
	Data Path Width	1 lane PCIe Gen 2 v3.1 interface for active state operation
	Operating Temperature	0 to 70 °C Commercial temperature
	Operating System Driver Support	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
	Compliance	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)
	Bus Architecture	USB
	Power Requirement	Requires 3.3V (integrated regulators for core Vdc)
	Boot ROM Support	Yes
	Network Transfer Mode	Full-duplex; Half-duplex
	Network Transfer Rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps
	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
	Compliance	IEEE 802.1p priority encoding/tagging (QoS, CoS) IEEE 802.1q VLAN tagging IEEE 802.3x flow control
	Bus Architecture	USB
	Power Requirement	Requires 3.3V (integrated regulators for core Vdc)
	Boot ROM Support	Yes
	Network Transfer Mode	Full-duplex; Half-duplex
	Network Transfer Rate	100BASE-X (half-duplex) 100 Mbps 1000BASE-X (half-duplex) 1000 Mbps 1000BASE-X (full-duplex) 2000 Mbps
	Operating Temperature	32° to 158° F (0°C to 70°C)

Technical Specifications - Networking and Communications

	Dimensions (HxW)	1.5 in x 1.7 in. x 0.75 in (3.84 cm x 4.3 cm x 1.9 cm)
	Operating System Driver Support	Windows 10 64-bit Linux®
Intel® Wi-Fi 6E* AX211 802.11ax, BT 5.3, M.2	**WLAN Standards**	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
	Antenna	2x2 Dual-Band
	Bluetooth Standards	5.2
	Operating Temperature	32° to 176° F (0° to 80° C)
	Interface	M.2 CNVio2
	Dimensions	M.2 2230
	Kit Contents	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

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

© 2023 HP Development Company, L.P. The information contained herein is subject to change without notice. The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein. Intel, Intel Core, Pentium, Thunderbolt, vPro and Xeon are trademarks of Intel Corporation in the U.S. and other countries. Microsoft and Windows are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries. ENERGY STAR® is a registered trademark owned by the U.S. Environmental Protection Agency. Linux® is the registered trademark of Linus Torvalds in the U.S. and other countries. NVIDIA®, Quadro and the NVIDIA logo are trademarks and/or registered trademarks of NVIDIA Corporation in the U.S. and other countries. Red Hat® is a registered trademark of Red Hat, Inc. in the United States and other countries. Bluetooth is a trademark of its proprietor used by HP Inc. under license. DisplayPort™ and the DisplayPort™ logo are trademarks owned by the Video Electronics Standards Association (VESA®) in the United States and other countries.