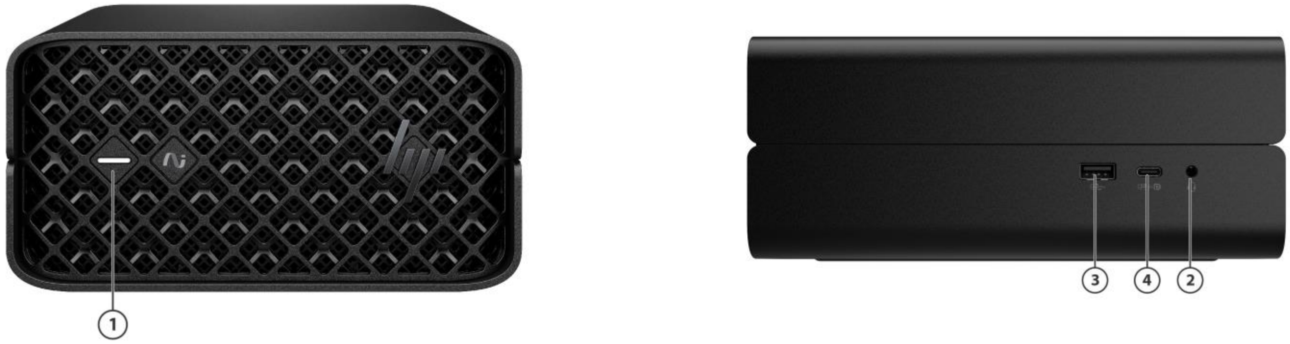
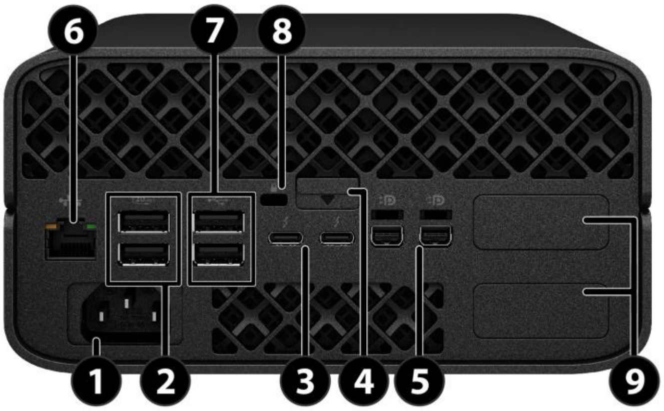
HP Z2 Mini G1a Workstation



Front-Side View

1. Power button
2. headphone/microphone combo
3. 1 SuperSpeed USB Std-A 10Gbps (charge supports up to 5V/2.1A)
4. 1 SuperSpeed USB Type-C® 10Gbps (Alt mode DisplayPort™ 2.1 with 15W output)



Rear View

1. Power connector
2. 2 SuperSpeed USB Std-A 10Gbps
3. 2 Thunderbolt™ 4 USB Type-C (40Gbps)
4. Cover release latch
5. 2 Mini DisplayPort™ 2.1
6. 1 RJ-45
7. 2 Hi-Speed USB Std-A 480Mbps ports
8. Security cable slot
9. 1st Flex IO (top side) – choose one of the following options: 1 Dual SuperSpeed USB Std-A 5Gbps, (1) 1GbE NIC, USB-based Serial port option;
   2nd Flex IO (bottom side) – choose one of the following options: 1) 1GbE NIC, Serial port option, External Power Button, HP Remote System Controller

Form Factor Mini

Operating Systems Preinstalled:

- Windows 11 Pro 64[1]
- Windows 11 Home 64[1]
- Linux®-ready[2]

Supported:

- SUSE Linux® Enterprise Desktop 15[2]

[1] 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 11 is automatically updated, which is always enabled. ISP fees may apply and additional requirements may apply over time for updates. See http://www.windows.com.

[2] For detailed OS/hardware support information for Linux, 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

Processors

Name	Cores	CPU CLK GHz (Max Boost/base)	Cache (MB)	Memory Speed (MT/s)	Threads	Integrated Graphics	GPU CLK GHz (Max)	NPU	TDP (W)
Ryzen AI MAX+ PRO 395	16	5.10/3.00	64	8000	32	Radeon 8060S	2.9	Yes	120
Ryzen AI MAX PRO 390	12	5.00/3.20	64	8000	24	Radeon 8050S	2.8	Yes	85
Ryzen AI MAX PRO 385	8	5.00/3.60	32	8000	16	Radeon 8050S	2.8	Yes	65
Ryzen AI MAX PRO 380	6	4.90/3.60	16	8000	12	Radeon 8040S	2.8	Yes	55

Overview

[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. AMD's numbering is not a measurement of higher performance.

[2] In accordance with Microsoft's support policy, HP does not support the Windows 8 or Windows 7 operating system on products configured with Intel and AMD 7th generation and forward processors or provide any Windows 8 or Windows 7 drivers on http://www.support.hp.com.

Color	Black
Side I/O	1 headphone/microphone combo 1 SuperSpeed USB Std-A 10Gbps (charge supports up to 5V/2.1A) 1 SuperSpeed USB Type-C® 10Gbps (Alt mode DisplayPort™ 2.1 with 15W output)
Internal I/O	Internal Slot M.2-E: 1 PCIe Gen 3 x2 Internal Slot M.2-M: 2 PCIe Gen4 x4
Rear I/O	1 RJ-45; 2 Mini DisplayPort™ 2.1; 2 SuperSpeed USB Std-A 10Gbps ports; 2 Hi-Speed USB Std-A 480Mbps ports; 2 Thunderbolt™ 4 USB Type-C (40Gbps)
Optional I/O	1st Flex IO (top side) – choose one of the following options: 1 Dual SuperSpeed USB Std-A 5Gbps, 1 GbE LAN, USB-based Serial port option, (1) 1GbE NIC; 2nd Flex IO (bottom side) – choose one of the following options: (1) 1GbE NIC, Serial port option, External Power Button, HP Remote System Controller
Interfaces Supported	2 PCIe Gen4 x4 interface
On-board RAID Support	Factory integrated RAID 0, 1 for NVME drives
Chassis Dimensions (H x W x D)	Footprint: H: 3.4" [8.55cm] W: 6.6" [16.8cm] D: 7.9" [20cm] (Standard desktop orientation)
Packaged Dimensions	L: 19.6" (49.9cm) W: 7.35" (18.5cm) H: 11.9" (30.1cm)
Rack Dimensions	4U, 5 units per shelf
Weight	Exact weights depend upon configuration (System weight only). Starting at 2.3kg (5.07lbs.) Exact weights depend upon configuration (Packaged weight). Starting at 4.1kg (9.0lbs.)
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: 8% to 85% RH, non-condensing, 35° C maximum wet bulb Non-operating: 8% to 90% RH, non-condensing, 35° C maximum wet bulb
Maximum Altitude (non-pressurized)	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 Supply	300W 92% Efficiency wide-range, active Power Factor Correction.
Memory	Solder-down LPDDR5x, up to 128GB depending on APU selection , up to 8000MT/s speed

Supported Components

Processors		Factory Configured	Option Kit	Option Kit Part Number	Support Notes
	AMD Ryzen AI MAX Processors				
	AMD Ryzen AI MAX+ PRO 395	Y	N		
	AMD Ryzen AI MAX PRO 390	Y	N		
	AMD Ryzen AI MAX PRO 385	Y	N		
	AMD Ryzen AI MAX PRO 380	Y	N		

PCIe Solid State Drives		Factory Configured	Option Kit	Option Kit Part Number
	Z Turbo 512GB 2280 PCIe-4x4 TLC M.2 Z2 Mini Kit SSD	Y	Y	4M9Z5AA
	Z Turbo 1TB 2280 PCIe-4x4 TLC M.2 Z2 Mini Kit SSD	Y	Y	4M9Z6AA
	HP Z Turbo 2TB 2280 PCIe-4x4 TLC M.2 Z2 Mini Kit SSD	Y	Y	4M9Z7AA
	Z Turbo 512GB 2280 PCIe-4x4 SED OPAL2 TLC M.2 Z2 Mini Kit SSD	Y	Y	4M9Z9AA
	Z Turbo 1TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 Z2 Mini Kit SSD	Y	Y	4N000AA
	Z Turbo 2TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 Z2 Mini Kit SSD	Y	Y	4N001AA
	HP 512GB 2280 PCIe-4x4 Value M.2 Z2 MINI Kit SSD	Y	Y	4N008AA
	HP 256GB 2280 PCIe-4x4 Value M.2 Z2 MINI Kit SSD	Y	Y	4N009AA
	HP 1TB 2280 PCIe-4x4 Value M.2 Z2 MINI Kit SSD	Y	Y	4N010AA
	Z Turbo 4TB 2280 PCIe-4x4 TLC M.2 Z2 MINI Kit SSD	Y	Y	5S493AA
	Z Turbo 4TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 Z2 MINI Kit SSD	Y	Y	5S499AA

Graphics		Factory Configured	Option Kit	Option Kit Part Number	Supported # of cards
Graphics Cable Adapters	HP DisplayPort to DVI Adapter	N	Y	FH973AA	
	HP DisplayPort To VGA Adapter	N	Y	AS615AA	
	HP USB-C to DisplayPort Adapter	N	Y	4SH08AA	
	HP USB-C to HDMI Adapter	N	Y	4SH07AA	
	HP USB-C to VGA Adapter	N	Y	4SH06AA	
	HP Single miniDP-to-DP Adapter Cable	Y	Y	2MY05AA	

Memory		Factory Configured	Option Kit	Option Kit Part Number	Support Notes
	16GB LPDDR5x (4x4GB) FBGA315	Y	N		
	32GB LPDDR5x (8x4GB) FBGA315	Y	N		

Supported Components

	64GB LPDDR5x (8x8GB) FBGA315	Y	N	
	128GB LPDDR5x (8x16GB) FBGA315	Y	N	

Optical and Removable Storage		**Factory Configured**	**Option Kit**	**Option Kit Part Number**
	HP USB External DVDRW Drive	N	Y	F2B56AA
	HP USB External DVDRW Drive	N	Y	Y3T76AA

Networking and Communications		**Factory Configured**	**Option Kit**	**Option Kit Part Number**
	HP 1GbE LAN Flex Port 2020	Y	Y	141J6AA
	HP Z2 2.5GbE LAN Flex Port	Y	Y	B96W7AA
	HP Serial Port v3 Flex IO	Y	Y	5B895AA
	MediaTek Wi-Fi 7 MT7925 BT 5.4 wireless card M.2 AIM-T	Y	N	

NOTE: Specific Network on Modern standby feature Support limitation
HP 10GBase-T Flex IO NIC does not support modern standby. And system equipped with those non modern standby network card, when monitor off and it is not really entered Modern standby state for wake-up function support, another path suggestion is Customer can use Onboard Lan for Wake event instead of legacy function WOL limitation because those commodities might not meet the required compliance standards in system modern standby configuration.

HP Remote System Controller		**Factory Configured**	**Option Kit**	**Option Kit Part Number**
	HP Z2 Mini Remote System Controller	Y	Y	7K6E4AA
	HP Z2 Mini Remote System Controller Main Board Adapter	Y	Y	A6QT4AA

Racking and Physical Security		**Factory Configured**	**Option Kit**	**Option Kit Part Number**
	HP Z2 G1A Mini Rail Rack Kit	N	Y	A6QT3AA
	HP Rack Cable Management Arm	N	Y	35Z34AA

Input Devices		**Factory Configured**	**Option Kit**	**Option Kit Part Number**
	HP 685 Comfort Dual-Mode Keyboard	N	Y	8T6L9UT
	HP 725 Multi-Device Rechargeable Wireless Keyboard	N	Y	9T5B2AA
	HP Bus Slim v2 Smart Card USB Keyboard	Y	Y	A71J9AA

Supported Components

HP 125 G2 USB Wired Keyboard	Y	Y	AY2Y7AA
HP 320K G2 USB Wired Keyboard	Y	Y	9SR37UT
HP 685 Comfort Dual-Mode Keyboard and Mouse Combo	N	Y	8T6L7UT
HP 725 Multi-Device Rechargeable Wireless Keyboard and Mouse Combo	Y	Y	9T5B0UT
HP 655 Wireless Keyboard and Mouse Combo G2	N	Y	4R009UT
HP Wired Desktop 320MK Mouse and Keyboard G2	N	Y	9SR36UT
HP Wired 320M Mouse	Y	Y	9VA80AA
HP Creator 935 Black Wireless Mouse	N	Y	1D0K8AA
HP 128 LSR Wired Mouse	Y	Y	265D9AA
HP 125 Wired Mouse	Y	Y	265A9AA/AT/UT

Other Hardware	**Factory Configured**	**Option Kit**	**Option Kit Part Number**
HP Z2 Mini G1a Serial Port Adapter	Y	Y	A6QT1AA
HP B550 Z Display PC Mounting Bracket	N	Y	16U00AA
HP Z Display B600 PC Mounting Bracket	N	Y	529H3AA
HP Z2 G1A Mini Arm/Wall VESA Mount Solution	N	Y	A6QT2AA
HP Rack Cable Management Arm	N	Y	35Z34AA

Software	**Factory Configured**	**Option Kit**	**Support Notes**
HP AI Companion	Y	N	
HP PC Hardware Diagnostics UEFI	Y	N	1
HP PC Hardware Diagnostics Windows	Y	N	
HP Wolf Security	Y	N	
HP Notifications	Y	N	
HP Desktop Support Utility	Y	N	
HP Documentation	Y	N	
myHP	Y	N	
Kingsoft WPS Office	Y	N	2
Z by HP Data Science Stack Manager	Y	N	3
HP Image Assistant	N	N	
HP Support Assistant	N	N	

[1] Windows OS only

[2] Only available in China

[3] Optional software

Supported Components

Operating Systems	Windows 11 Home[1] Windows 11 Pro[1] Linux Ready[2]

[1] 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 11 is automatically updated, which is always enabled. ISP fees may apply and additional requirements may apply over time for updates. See http://www.windows.com.

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

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.

HP Performance Control Modes

HP Z Desktop Workstations offers Performance Control Modes in the F10 BIOS menu. Z2 G1a offers Quiet Mode, Performance Mode, Rack Mode, and High-Performance Mode. HP recommends using High Performance Mode unless you have concerns about acoustics in an open office environment. Customers can achieve CPU performance gains in multithreaded workloads using High Performance Mode over Performance Mode*. High Performance Mode is configured as default from the factory."

How to Set HP Performance Control Modes:

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

At startup, push the F10 key while system is booting to get to the BIOS Menu. Go to → Advanced -> System Options ->scroll down and choose “Performance Control”

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

In HP Performance Advisor software, select BIOS Settings -> Advanced -> System Options -> Performance Controls

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

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

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

SOFTWARE COMPONENTS AND APPLICATIONS WITH WINDOWS

Software
HP AI Companion
HP Support Assistant [1]
HP Image Assistant
HP Desktop Support Utility
HP Documentation
HP Notifications
HP PC Hardware Diagnostics UEFI
HP PC Hardware Diagnostics Windows
myHP
WSL/Ubuntu Data Science Stack
HP Privacy Settings

Manageability Features
HP Driver Packs[2]
HP UWP Pack
HP System Software Manager (SSM)
HP Manageability Integration Kit Gen4[3]
HP Client Catalog (download)
HP Image Assistant (download)
HP Cloud Recovery
HP Client Management Script Library (download)
HP BIOSphere Gen6 [4]

HP BIOS Configuration Utility (download)

Client Security Software
HP Client Security Suite Gen7[5] including: (including Credential Manager, HP Password Manager[6], HP Spare Key)
HP Power On Authentication
Microsoft Defender[7]

Security Management
HP Secure Erase [8]
HP Wolf Pro Security Edition (optional) [9]
HP Wolf Security for Business[10] Includes:
HP Sure Click[11]
HP Sure Sense[12]
HP Sure Run Gen5[13]
HP Sure Recover Gen6 [14]
HP Sure Start Gen7[15]
HP Tamper Lock
HP Sure Admin [16]
HP Client Security Manager Gen 7[5,17]
Hood Sensor Optional Kit

[1] HP Support Assistant requires Windows and Internet access.

[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 BIOSphere features may vary depending on the platform and configurations.

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

[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 Secure Erase - –or the methods outlined in the National Institute of Standards and Technology Special Publication 800-88 “C“ear” ”anitation method. HP Secure Erase does not support platforms with Intel® Optane.

[9] HP Wolf Pro Security Edition is available preloaded on select SKUs, and, depending on the HP product purchased, includes a license with a term length communicated to you at purchase and in your order confirmation email. 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 is effective upon 4 months after the date the HP Product was shipped by HP and will continue for the term communicated to you at purchase and in your order confirmation email (“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. Notwithstanding the foregoing, the license shall expire no later than one year after the fixed term of the subject license ends.

[10] 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
[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 Sure Run is available on select Windows 11 based HP Pro, Elite and Workstation PCs with select Intel® or AMD processors
[14] HP Sure Recover 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
[15] HP Sure Start is available on select HP PCs and workstations. See product specifications for availability.
[16] 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.
[17] HP Client Security Manager requires Windows and is available on the select HP PCs.

System Technical Specifications

System Board

System Board Form Factor	182 x 160.57 mm	
Processor Socket	Single BGA-2077	
Super I/O Controller	Nuvoton SIO24	
Memory Type Supported	LPDDR5x, Solder-down	
Memory Modes	LPDDR5x 256b (up to 8x 32b Channels)	
Memory Speed Supported	8000MT/s LPDDR5x	
Memory Protection	Link ECC (default enabled, user configurable)	
Maximum Memory	128GB	
Memory Configuration (Supported)	16GB, 32GB, 64GB, 128GB depending on APU selection	
Supported Interfaces	**Integrated RAID**	RAID 0/1
	Integrated Graphics	AMD Radeon ™ 8060S Graphics for AMD Ryzen ™ AI MAX+ PRO 395 processor; AMD Radeon ™ 8050S Graphics (on AMD Ryzen ™ AI MAX+ PRO 390/ AMD Ryzen ™ AI MAX+ PRO 385 processors) ; AMD Radeon ™ 8040S Graphics for AMD Ryzen ™ AI MAX+ PRO 380 processor. Based on Unified Memory Architecture (UMA) - a region of system memory is reserved and dedicated to the graphics display. Support for Microsoft DirectX 12 and OpenGL 4.6 ; 2x Mini DisplayPort™ 2.1 ports (mDP), 1x USB Type-C® port (USB-C), and 2x Thunderbolt™ 4 (TBT4) TBT4 ports integrated in motherboard; Supports up to four simultaneous displays with Multiple Stream Transport (MST) across VGA*/DVI*/HDMI* outputs. Max resolution with DSC supported on mDP / USB-C ports: 7680*4320 (8K) @60Hz and TBT4 port:7680*4320 (8K) @120Hz (* The 8K output requires the additional 8K adapters or cables.); non-DSC supported on mDP / USB-C ports: 3840x2160 (4K) @120Hz and TBT4 port: 3840*2160 @240Hz.
	Network Controller	2.5GbE controller RTL8125BPH Management capabilities: WOL and AIM-T
	Serial	1 internal header requires optional Serial Port Adapter Kit
	HD Integrated Audio	Yes
USB Connector(s)	**Side**	1 headphone/microphone combo; 1 SuperSpeed USB Std-A 10Gbps (charge supports up to 5V/2.1A); 1 SuperSpeed USB Type-C® 10Gbps (Alt mode DisplayPort™ 2.1 with 15W Output)

System Technical Specifications

	Rear	1 RJ-45; 2 Mini DisplayPort™ 2.1; 2 SuperSpeed USB Std-A 10Gbps ports; 2 Hi-Speed USB Std-A 480Mbps ports; 2 Thunderbolt™ 4 USB Type-C (40Gbps) 1st Flex IO (top side) – choose one of the following options: 1 Dual SuperSpeed USB Std-A 5Gbps, 1 GbE LAN; 2nd Flex IO (bottom side) – choose one of the following options: 1 GbE LAN, Serial port option, External Power Button, Remote Manageability kit
HD Integrated Audio	Yes	
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 The TPM module disabled where restricted by law	
Power Supply Headers	Yes	
Power Switch, Power LED & Hard Drive LED Header	Yes; 1 Header for power switch and power LED	
Keyboard/Mouse	USB or PS/2 (option)	
Power Supply	300W internal power supply	

System Configurations

HP Z2 Mini G1a Configuration #1	Processor Info	AMD Ryzen AI MAX PRO 380 APU 6C 3.6G
	Memory Info	1x 16GB LPDDR5X
	Graphics Info	Integrated graphics
	Disks/Optical/Floppy	1x 512GB PCIe 2280 Val M.2 SSD
	Power Supply	300W

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)	5.2		5.82		4.98	
	Windows short Idle (S0)	5.56		6.40		5.75	
	Windows Busy Typ (S0)	80.31		83.38		81.27	
	Windows Busy Max (S0)	97.41		109.66		93.73	
	Sleep (S3)	2.31	2.31	2.28	2.28	2.32	2.32
	Off (S5)	0.64	0.49	0.65	0.5	0.64	0.49
	Zero Power Mode (ErP)	0.23		0.25		0.22	

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)	17.74		19.86		16.69	
	Windows short Idle (S0)	18.97		21.84		19.62	
	Windows Busy Typ (S0)	274.03		284.5		277.3	
	Windows Busy Max (S0)	332.38		374.18		319.82	
	Sleep (S3)	7.88	7.88	7.78	7.78	7.92	7.92
	Off (S5)	2.18	1.67	2.22	1.71	2.18	1.67
	Zero Power Mode (ErP)	0.78		0.85		0.75	

HP Z2 Mini G1a Configuration #2	Processor Info	AMD Ryzen AI MAX PRO 385 APU 8C 3.6G
	Memory Info	1x 32GB LPDDR5X
	Graphics Info	Integrated graphics
	Disks/Optical/Floppy	1x 1TB 2280 PCIe-4x4 Val M.2 SSD
	Power Supply	300W

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)	5.74		5.23		6.41	
	Windows short Idle (S0)	6.84		6.55		7.09	
	Windows Busy Typ (S0)	93.12		107.7		111.02	
	Windows Busy Max (S0)	125.78		125.36		128.18	
	Sleep (S3)	1.36	1.36	1.35	1.35	1.36	1.36
	Off (S5)	0.59	0.49	0.61	0.51	0.59	0.49
	Zero Power Mode (ErP)	0.26		0.28		0.26	

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)	19.59		17.85		21.87	
	Windows short Idle (S0)	23.34		22.35		24.19	

System Technical Specifications

	Windows Busy Typ (S0)	317.74		367.49		378.82	
	Windows Busy Max (S0)	429.18		427.75		437.37	
	Sleep (S3)	4.64	4.64	4.61	4.61	4.64	4.64
	Off (S5)	2.01	1.67	2.08	1.74	2.01	1.67
	Zero Power Mode (ErP)	0.89		0.96		0.89	

HP Z2 Mini G1a Configuration #3	Processor Info	AMD Ryzen AI MAX PRO 395 APU 16C 2.9G
	Memory Info	1x 128GB LPDDR5X
	Graphics Info	Integrated graphics
	Disks/Optical/Floppy	2x 4TB 2280 PCIe-4x4 OPAL2 M.2 SSD
	Power Supply	300W

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)	4.98		5.54		4.76	
	Windows short Idle (S0)	5.54		7.05		5.57	
	Windows Busy Typ (S0)	128.85		129.36		121.32	
	Windows Busy Max (S0)	177.73		176.62		177.3	
	Sleep (S3)	1.34	1.32	1.35	1.33	1.34	1.31
	Off (S5)	0.54	0.46	0.59	0.49	0.51	0.45
	Zero Power Mode (ErP)	0.24		0.28		0.23	

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)	16.99		18.9		16.24	
	Windows short Idle (S0)	18.9		24.06		19.01	
	Windows Busy Typ (S0)	439.65		441.39		413.96	
	Windows Busy Max (S0)	606.44		602.65		604.97	
	Sleep (S3)	4.57	4.5	4.61	4.54	4.57	4.47
	Off (S5)	1.84	1.57	2.01	1.67	1.74	1.54
	Zero Power Mode (ErP)	0.82		0.96		0.78	

Declared Noise Emissions

System Configuration (Entry level)	**Processor Info**	AMD FP11 Strix Halo 55W	
	Memory Info	Hynix 32G	
	Disks/Optical	PHISON 4TB x2	
	Power Supply	300W	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	2.7	16.7
	Hard drive Operating (random reads)	3.3	24.4
	Hard drive Operating	3.4	25.3

System Technical Specifications

	(active mode)		
System Configuration (Mid-level)	**Processor Info**	AMD FP11 Strix Halo 85W	
	Memory Info	Samsung 64G	
	Disks/Optical	PHISON 4TB x2	
	Power Supply	300W	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	2.7	16.2
	Hard drive Operating (random reads)	3.3	24.6
	Hard drive Operating (active mode)	3.5	25.8
System Configuration (High-level)	**Processor Info**	AMD FP11 Strix Halo 120W	
	Memory Info	Samsung 128G	
	Disks/Optical	PHISON 4TB x2	
	Power Supply	300W	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	2.7	16.8
	Hard drive Operating (random reads)	3.4	25.3
	Hard drive Operating (active mode)	3.5	26.5

System Technical Specifications

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: 8% to 85% RH, non- condensing, 35° C maximum wet bulb Non-operating: 8% to 90% RH, non-condensing, 35° C maximum wet bulb
	Maximum Altitude	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, 2ms Non-operating: ½-sine: 165 cm/s, 2-3ms square: 422 cm/s, 30g Vibration Operating random: 0.5g (rms), 5-300 Hz, up to 0.00025g²/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 for Top Panel (Includes replacement storage and remote system controller information) #1 Philip screwdriver is needed for Bottom Panel
Optical Drive	None
Hard Drives	None
Expansion Cards	M.2 module requires a screwdriver to be serviced and replaced.
Processor Socket	None
Blue User Touch Points	None
Color-coordinated Cables and Connectors	Yes
Memory	Solder-down
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	None
Dual Function Front Power Switch	Yes, causes a fail-safe power off when held for 4 seconds or 15 seconds (can be configured by F10 BIOS setup\Advanced\System Options\Power button override)
Cable Lock Support	Yes, Kensington Cable Lock (optional): Locks top cover and secures chassis from theft 3 mm x 7 mm slot at rear of system
Solenoid Lock and Hood Sensor	Only Hood Sensor(optional)
Serial, USB, Audio, Network, Enable/Disable Port	Yes, enables or disables serial, USB, audio, and network ports
Removable Media Write/Boot Control	Yes, prevents ability to boot from removable media on supported devices (and can disable writes to media)
Power-On Password	Yes, prevents an unauthorized person from booting up the workstation
Admin Password	Yes, prevents an unauthorized person from changing the workstation configuration
3.3V Aux Power LED on System PCA	Yes
NIC LEDs (integrated) (Green & Amber)	Yes

System Technical Specifications

CPUs and Heatsinks	A T-15 Torx or flat blade screwdriver is needed to remove the APU heatsink
Power Supply Diagnostic LED	Yes (rear side)
Front Power Button	Yes, ACPI multi-function
Front Power LED	Yes, white (normal), red (fault)
Internal Speaker	Yes
System/Emergency ROM Flash Recovery	Recovers corrupted system BIOS.
Cooling Solution	Air cooled forced convection
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	None
Power Supply	Requires T15 Torx or flat blade screwdriver
Flash ROM	Yes
Diagnostic Power Switch LED on board	Yes
Clear Password Jumper	None
Clear CMOS Button	Yes
CMOS Battery Holder	Yes

BIOS

BIOS 64-bit Services	BIOS supports 64-bit Operating systems.
PCI 4.0 Support	Full BIOS support for PCI Express through industry standard interfaces.
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.

System Technical Specifications

BIOS Power On	Users can define a specific date and time for the system to power on.
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.
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 5.0 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.
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.
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 14 languages with local keyboard mappings.
Asset Tag	The user or MIS to set a unique tag string in non-volatile memory.

System Technical Specifications

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.
UEFI Specification Revision	2.8
ACPI	Advanced Configuration and Power Management Interface, Version 6.0
xHCI	eXtensible Host Controller Interface for Universal Serial Bus, Revision 1.2
PCI	PCI Local Bus Specification, Revision 2.3 PCI Power Management Specification, Revision 1.1 PCI Firmware Specification, Revision 3.0
PCI Express	PCI Express Base Specification, Revision 3.0 PCI Express Base Specification, Revision 4.0
TPM	Trusted Computing Group TPM Specification Version 2.0 (Nuvoton NPCT760HACYX or Infineon SLB9672). Common Criteria EAL4+ certified. FIPS 140-2 Certification TCG TPM Certified products list: http://www.trustedcomputinggroup.org/certification/tpm-certified-products/
USB	Universal Serial Bus Revision 1.1 Specification Universal Serial Bus Revision 2.0 Specification Universal Serial Bus Revision 3.2 Specification Universal Serial Bus Revision 4.0 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]: One-year (1-1-1), 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 except for Enterprise class HDDs.

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:

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

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

System Technical Specifications

- Japan PC Green label*

Sustainable Impact Specifications

- Product Carbon Footprint
- At least 25% ITE-Derived closed loop plastic[2]
- At least 65% post-consumer recycled plastic[2]
- At least 15% recycled metal[3]
- Low Halogen[4]
- 100% of HP paper-based packaging is from recycled or certified sustainable sources[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)	4.63 W	4.60 W	4.38 W
Normal Operation (Long idle)	4.05 W	3.88 W	4.27 W
Sleep	1.14 W	1.12 W	2.06 W
Off	0.55 W	0.85 W	0.85 W

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

Heat Dissipation*	**115VAC, 60Hz**	**230VAC, 50Hz**	**100VAC, 50Hz**
Normal Operation (Short idle)	16 BTU/hr	16 BTU/hr	15 BTU/hr
Normal Operation (Long idle)	14 BTU/hr	13 BTU/hr	15 BTU/hr
Sleep	3.9 BTU/hr	4 BTU/hr	7 BTU/hr
Off	1.9 BTU/hr	3 BTU/hr	2.9 BTU/hr

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

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)	**Sound Power (L_{WAd}, bels)**	**Sound Pressure (L_{pAm}, decibels)**
Typically Configured – Idle	2.7	16.8
Fixed Disk – Random writes	3.4	25.3
Optical Drive – Sequential reads	3.5	26.5

Longevity and Upgrading

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

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

Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive – 2011/65/EC.
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This product is in compliance with the IEEE 1680.1 (EPEAT) standard at the Gold level, see www.epeat.net
- Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.
- This product is 96.8% recycle-able when properly disposed of at end of life.

Packaging Materials			
	External:	PAPER/Corrugated	730 g
		PAPER/Molded Pulp	378 g
	Internal:	PLASTIC/Polyethylene low density – LDPE	18 g

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

The corrugated paper packaging materials contains at least 93.0% recycled content.

RoHS Compliance

HP Inc. complies fully with materials regulations. We were among the first companies to extend the restrictions in the European Union (EU) Restriction of Hazardous Substances (RoHS) Directive to our products worldwide through the HP GSE. HP has contributed to the development of related legislation in Europe, as well as China, India, and Vietnam.

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

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

To obtain a copy of the HP RoHS Compliance Statement, see HP RoHS position statement.

Material Usage

This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at https://h20195.www2.hp.com/v2/GetDocument.aspx?docname=c05998906):

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants – may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Bis(2-Ethylhexyl) phthalate (DEHP)
- Benzyl butyl phthalate (BBP)
- Dibutyl phthalate (DBP)
- Diisobutyl phthalate (DIBP)
- 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, and certain retail packaging 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:
https://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c05403198
or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: HP Product Disassembly Instruction Website. 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:

- Sustainable Impact Report
  - https://h20195.www2.hp.com/v2/GetDocument.aspx?docname=c06040843
- Eco-label certifications
  - https://www.hp.com/us-en/sustainable-impact/document-reports.html#filters_documents_reports-=document_type-type_energy_star,type_epeat,type_tcoISO
- ISO 14001 certificates
  - https://h20195.www2.hp.com/v2/GetDocument.aspx?docname=c04777932

footnotes

2. Recycled plastic is expressed as a percentage of the total weight plastic. Post-consumer recycled is based on the definition set in the EPEAT standard for computers, IEEE 1680.1-2018 standard.
3. Recycled metal is expressed as a percentage of the total weight of the metal according to ISO 14021 definitions for metal parts over 25 grams.
4. External power supplies, WWAN modules, power cords, cables and peripherals excluded. Service parts obtained after purchase may not be Low Halogen.
5. HP paper and fiber-based packaging for PCs, displays, home and office print, and supplies is reported by suppliers as recycled or certified, with a minimum of 97% by volume verified by HP. Packaging is the box that comes with the product and all paper-based materials inside the box. Packaging for personal systems accessories and spare parts is not included. Plastic cushions are made from >90% recycled plastic.

STORAGE

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	150TBW (TB Written)
	Reliability	1.5M Hours
	Interface	PCI Express 4.0 x4 electrical
	Operating Temperature	32° to 158° F (0° to 70° 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	300TBW (TB Written)
	Reliability	1.5M Hours
	Interface	PCI Express 4.0 x4 electrical
	Operating Temperature	32° to 158° F (0° to 70° 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	600TBW (TB Written)
	Reliability	1.5M Hours
	Interface	PCI Express 4.0 x4 electrical
	Operating Temperature	32° to 158° F (0° to 70° 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 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	1.5M Hours
	Interface	PCI Express 4.0 x4 electrical
	Operating Temperature	32° to 158° F (0° to 70° 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 Gen4x4 512GB TLC PCIe SED OPAL2	**Capacity**	512GB
	Protocol	PCIe
	Form Factor	M.2 in native Slot on motherboard
	Controller	NVMe
	NAND Type	3D TLC
	Endurance	150TBW (TB Written)
	Reliability	1.5M Hours

	Interface	PCI Express 4.0 x4 electrical
	Operating Temperature	32° to 158° F (0° to 70° 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	300TBW (TB Written)
	Reliability	1.5M Hours
	Interface	PCI Express 4.0 x4 electrical
	Operating Temperature	32° to 158° F (0° to 70° 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	600TBW (TB Written)
	Interface	PCI Express 4.0 x4 electrical
	Operating Temperature	32° to 158° F (0° to 70° 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 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 158° F (0° to 70° 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	200TBW (TB Written)
	Reliability	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*

*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	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*

*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
	Form Factor	M.2 in native Slot on motherboard
	Controller	NVMe
	NAND Type	3D TLC
	Endurance	400TBW (TB Written)
	Reliability	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.

512GB TLC PCIE Gen3x4 SED	**Capacity**	512GB

FIPS 140-2	**Protocol**	PCIe
	Form Factor	M.2 in native Slot on motherboard
	Controller	NVMe
	NAND Type	3D TLC
	Endurance	320 TBW (TB Written)
	Reliability	1.5M Hours
	Interface	PCI Express 3.0 x4 electrical
	Operating Temperature	32° to 158° F (0° to 70° C)
	Performance	
	Sequential Read	up to 3400MB/s [1]
	Sequential Write	up to 2500MB/s [1]
	Random Read	420K IOPS [1]
	Random Write	635K IOPS[1]
	Self-Encrypting Drive Support	OPAL2/FIPS 140-2

*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 TLC PCIE Gen3x4 SED FIPS 140-2	**Capacity**	1TB
	Protocol	PCIe
	Form Factor	M.2 in native Slot on motherboard
	Controller	NVMe
	NAND Type	3D TLC
	Endurance	1620 TBW (TB Written)
	Reliability	1.5M Hours
	Interface	PCI Express 3.0 x4 electrical
	Operating Temperature	32° to 158° F (0° to 70° C)
	Performance	
	Sequential Read	3400MB/s* [1]
	Sequential Write	3000MB/s* [1]
	Random Read	720K IOPS* [1]
	Random Write	690K IOPS* [1]
	Self-Encrypting Drive Support	OPAL2/FIPS 140-2

*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.

2TB TLC PCIE Gen3x4 SED FIPS 140-2	**Capacity**	2TB
	Protocol	PCIe
	Form Factor	M.2 in native Slot on motherboard
	Controller	NVMe

NAND Type	3D TLC
Endurance	3140 TBW (TB Written)
Interface	PCI Express 3.0 x4 electrical
Operating Temperature	32° to 158° F (0° to 70° C)
Performance	
Sequential Read	3400MB/s*
Sequential Write	3000MB/s*
Random Read	720K IOPS*
Random Write	690K IOPS*
Self-Encrypting Drive Support	OPAL2/FIPS 140-2

*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.

Citadel 512GB TLC PCIE Gen3x4 Advence FIPS 140-2	**Capacity**	512GB
	Protocol	PCIe
	Form Factor	M.2 in native Slot on motherboard
	Controller	NVMe
	NAND Type	3D TLC
	Endurance	320 TBW (TB Written)
	Reliability	1.5M Hours
	Interface	PCI Express 3.0 x4 electrical
	Operating Temperature	32° to 158° F (0° to 70° C)
	Performance	
	Sequential Read	up to 3400MB/s [1]
	Sequential Write	up to 2500MB/s [1]
	Random Read	420K IOPS [1]
	Random Write	635K IOPS[1]
	Self-Encrypting Drive Support	OPAL2/FIPS 140-2

*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.

Citadel 1TB TLC PCIE Gen3x4 Advence FIPS 140-2	**Capacity**	1TB
	Protocol	PCIe
	Form Factor	M.2 in native Slot on motherboard
	Controller	NVMe
	NAND Type	3D TLC
	Endurance	1620 TBW (TB Written)
	Reliability	1.5M Hours
	Interface	PCI Express 3.0 x4 electrical

Technical Specifications - Storage Drives

Operating Temperature	32° to 158° F (0° to 70° C)
Performance	
Sequential Read	3400MB/s* [1]
Sequential Write	3000MB/s* [1]
Random Read	720K IOPS* [1]
Random Write	690K IOPS* [1]
Self-Encrypting Drive Support	OPAL2/FIPS 140-2

*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 - Storage Drives

Citadel 2TB TLC PCIE Gen3x4 Advence FIPS 140-2	**Capacity**	2TB
	Protocol	PCIe
	Form Factor	M.2 in native Slot on motherboard
	Controller	NVMe
	NAND Type	3D TLC
	Endurance	3140 TBW (TB Written)
	Interface	PCI Express 3.0 x4 electrical
	Operating Temperature	32° to 158° F (0° to 70° C)
	Performance	
	Sequential Read	3400MB/s*
	Sequential Write	3000MB/s*
	Random Read	720K IOPS*
	Random Write	690K IOPS*
	Self-Encrypting Drive Support	OPAL2/FIPS 140-2

*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.

NETWORKING / COMMUNICATION

Realtek RTL 8125BP (Integrated)	**Connector**	RJ-45 (Single Port)
	Cabling	Twisted Pair Cabling, up to 100 meter, 2.5GbE on CAT 5e UTP and up, 1GbE/10Mbps on CAT 5 UTP and up
	Controller	Realtek RTL8125BP-CG 2.5GbE platform LAN networking controller
	Memory	512 bit Tx Buffer, 1024 bit Rx buffer
	Data Rates Supported	10/100/1000 M/2500 Mbps
	Compliance	802.1as/1588, 802.1p, 802.1Qav, 802.1Q, 802.3, 802.3ab, 802.1ad, 802.3az, 802.3x, 802.3u, 802.3bz NDIS5, NDIS6 (IPv4, IPv6, TCP, UDP) Checksum and Segmentation Task-offload, PCIe 3.0 LTR
	Bus Architecture	PCI Express, USB 2.0 interface, and SMBus
	Data Transfer Mode	PCIe-based interface for active state operation (S0 state) and SMBus for host and management traffic (Sx and low power states)
	Power Requirement	3.3V supplied by platform
	Boot ROM Support	Yes
	Network Transfer Mode	Full-duplex; Half-duplex
	Network Transfer Rate	2500BASE-T Full-Duplex 1000BASE-T Full-Duplex 100BASE-TX Full-Duplex 100BASE-TX Half-Duplex 10BASE-T Full-Duplex 10BASE-T Half-Duplex
	Management Capabilities	WOL, PXE, UEFI, ASF 2.0, DASH
	Notes	onboard LAN support RDP Wake on LAN function, if some networking device does not support Modern standby feature for WOL limitation, suggest using this Function for alternate solution for WOL G3-S5/ S5/S4/MSC wake.
HP Flex 1GbE Single Port NIC	**Connector**	RJ-45 (Single Port)
	Cabling	Twisted Pair Cabling, up to 100 meter, 2.5GbE on CAT 5e UTP and up, 1GbE/10Mbps on CAT 5 UTP and up
	Controller	Realtek 8153 Ethernet Controller
	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) 802.1P Layer 2 Priority Encoding 802.3az (Energy Efficient Ethernet)
	Bus Architecture	USB
	Power Requirement	3.8 Watts
	Boot ROM Support	Yes
	Network Transfer Mode	Full duplex; Half-duplex

Technical Specifications - Networking and Communications

	Network Transfer Rate	2500BASE-T Full-Duplex 1000BASE-T Full-Duplex 100BASE-TX Full-Duplex 100BASE-TX Half-Duplex 10BASE-T Full-Duplex 10BASE-T Half-Duplex
HP 2.5GbE LAN Flex Port	**Connector**	RJ-45 (Single Port)
	Cabling	Twisted Pair Cabling, up to 100 meter, 2.5GbE on CAT 5e UTP and up, 2.5Gbe/1GbE/10Mbps on CAT 5 UTP and up
	Controller	I226
	Data Rates Supported	10/100/1000Mbps and 2.5Gbps BASE-T
	Compliance	IEEE: 802.3 (Ethernet Interface for 2500BASE-T, 1000BASE-T, 100BASE-TX, and 10BASE-TE) 802.1AS-Rev 802.1Q (Virtual LAN) 802.1Qav 802.1Qbu 802.1Qbv 1588 802.1AS-REV 802.1p/Q 802.3br 802.3az (Energy Efficient Ethernet) 802.3x (Ethernet Flow Control) 802.3z CB Certification (International Safety) NRTL UL Certification (North America Safety) FCC Class B (USA) CE (European Union) ICES-003 Class B (Canada) BSMI (Taiwan) VCCI (Japan) KCC (Korea) CTICK (Australia/New Zealand) UKCA (UK) UL (Safety) RoHS (Restricted or Hazardous Substances)
	Bus Architecture	PCIe-based interface for active state operation (S0 state) and SMBus for host and management traffic (Sx and low power states)
	Power Requirement	2.5W
	Network Transfer Mode	Full-duplex; Half-duplex
	Network Transfer Rate	2500BASE-T Full-Duplex 1000BASE-T Full-Duplex 100BASE-TX Full-Duplex 100BASE-TX Half-Duplex 10BASE-T Full-Duplex 10BASE-T Half-Duplex
MediaTek Wi-Fi 7 MT7925 802.11be AIM-T BT 5.4	**WLAN Standards**	IEEE 802.11 a/b/g/n/ac/ax/be compliant Support 20/40 MHz bandwidth in 2.4 GHz band Support 20/40/80/160 MHz bandwidth in 5 GHz band and 6 GHz band Support MU-MIMO RX Security support for WFA WPA/WPA2/WPA3 personal / enterprise,WPS2.0, FIPS
	Antenna	2x2 Dual-Band
	Bluetooth Standards	5.4
	Operating Temperature	14° to 158° F (-10° to 70°C)

Technical Specifications - Networking and Communications

Interface	M.2 PCIe
Dimensions	M.2 2230
Kit Contents	Not Available

Date of change	Version History		Description of change
April 16, 2025	From v1 to v2	Changed	Social and Environmental Responsibility section
May 27, 2025	From v2 to v3	Changed	NETWORKING / COMMUNICATION section
June 1, 2025	From v3 to v4	Changed	Format