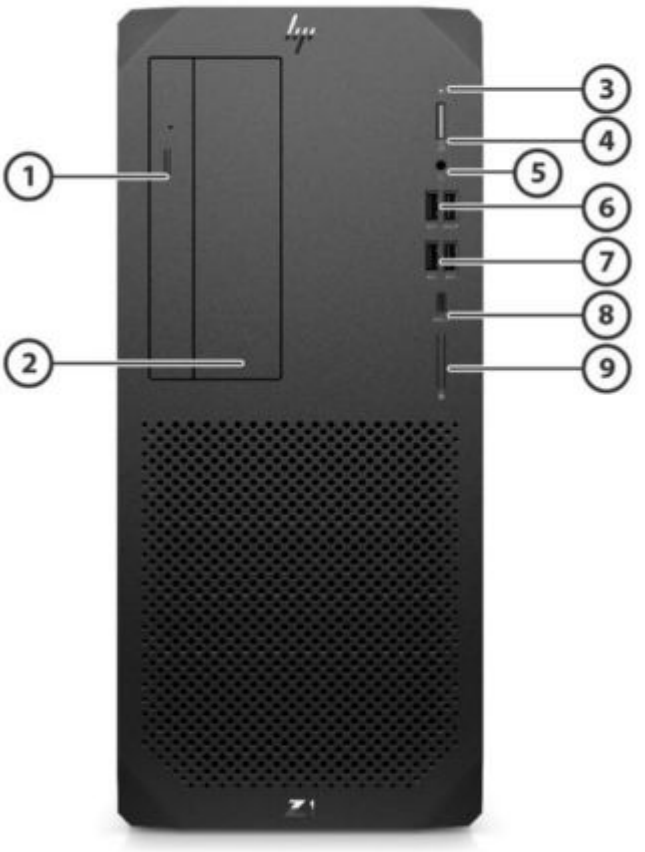
Overview

HP Z1 G8 Tower Desktop PC



1. Slim optical drive (optional)
2. External 5.25-inch Half-Height Drive Bay (behind bezel)
3. Hard drive activity light
4. Dual-state power button
5. Combo Audio Jack with CTIA and OMTP headset support
6. (2) Type A SuperSpeed USB 5Gbps signaling rate port (1 with charge support up to 5V/1.5A)
7. (2) Type-A SuperSpeed USB 10Gbps signaling rate port
8. Type-C® SuperSpeed USB 20Gbps signaling rate port (charge support up to 5V/3A)
9. SD card 4.0 reader (optional)

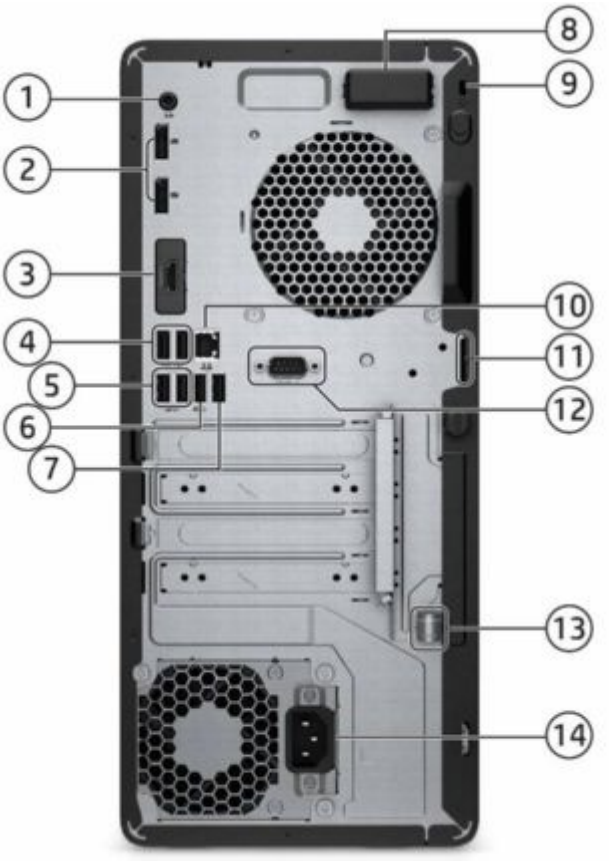
Not Shown

Slots

(2) PCI Express x16 graphics connectors (one wired as x4)
(3) M.2 (1 as M.2 2230 socket for WLAN/BT and 2 as M.2 2280 socket for storage)

Overview

HP Z1 G8 Tower Desktop PC



1. Audio line-out jack connector
2. (2) Dual-Mode DisplayPort™ 1.4 (DP++)
3. Flex port, choice of (shown here HDMI installed):
   - ~~D~~isplayPort™ 1.4
   - ~~H~~DMI 2.0b
   - ~~V~~GA
   - ~~D~~ual Type-A SuperSpeed USB 5Gbps signaling rate port
   - ~~S~~erial
   - ~~U~~SB-C® SuperSpeed USB 10Gbps signaling rate port (USB-C® option has alt mode DisplayPort™ 1.4 and 15W output)
4. (2) Type A Hi-Speed USB 480 Mbps signaling rate port with wake from S4/S5
5. (2) Type A SuperSpeed USB 10Gbps signaling rate port
6. (1) Type A SuperSpeed USB 5Gbps signaling rate port
7. (1) Type A Hi-Speed USB 480 Mbps signaling rate port
8. Internal WLAN antenna (optional, shown here installed)
9. Standard cable lock slot
10. RJ-45 (network) jack
11. Intrusion sensor/hood lock (optional, shown here not installed)
12. Serial port (optional, shown here not installed)
13. Integrated keyboard/mouse wire hoop
14. Power cord connector

Not shown

Optional ports

Thunderbolt™ 3 card[1]

PS/2 & serial port card (connected to mainboard via a flyer cable)[1]

Parallel Port[1]

Bays

(1) 2.5" internal storage drive bay

(2) 3.5” internal storage drive bay (convertible to 2.5”)

(1) 5.25” half-height drive bay

(1) 9.5mm slim optical drive bay

1. Each of the legacy options will occupy one rear slot.

Features

At A Glance

- HP developed and engineered UEFI V2.7 BIOS supporting security, manageability and software image stability
- Intel® Q570 chipset supporting Intel® 11th generation Core™ processors, featuring integrated Intel® UHD Graphics and Intel® vPro® Technology (available with Core i5-11500 and above processors) [1,4]
- Intel® Optane™ Memory H10 with Solid State Storage
- Intel® UHD graphics with optional discrete graphics configure systems to up to 7 monitors
- Intel® Ethernet Connection I219LM GbE LOM integrated network connection
- Intel® Wi-Fi 6 + BT5.1 (802.11AX 2x2)
- DDR4 Synchronous Dynamic Random Access Memory (SDRAM) (Transfer rates up to 3200 MT/s)[2]
- Support for up to 7 monitors via two standard DisplayPort™ 1.4 ports, a configurable Flex I/O port for video options and a discrete graphics card
- Configurable FlexPort which provides the following choices: HDMI 2.0b, Serial, VGA, DisplayPort™ 1.4, or USB Type-C® with DisplayPort™ 1.4 (USB Type-C® with DisplayPort™ 1.4 with Power Delivery [PD] on DMs), Thunderbolt™ 3 and Dual USB Type·
- Configurable AMD® Radeon, NVIDA® Quadro® and NVIDA® GeForce® VR Ready discrete graphics[5]
- Compatible with HP Reverb G2 VR Headset when configured with VR Ready GeForce discrete graphics
- Models can be configured with multiple data drives in a RAID array
- Enhanced Security with HP Security Suite (Refer to Security Section for details)
- ENERGY STAR® certified. EPEAT® 2019 registered where applicable. Based on US EPEAT® registration according to IEEE 1680.1-2018 EPEAT®. Status varies by country. Visit http://www.epeat.net for more information.
- CCC, CECP and SEPA Certified
- TCO
- PC chassis and all internal components and modules are manufactured with low halogen content[3]
- Dust filter available
- Protected by HP Services, including limited warranties up to 3-3-3 (terms and conditions vary by country; certain restrictions exclusions apply); Care Packs available with up to 5 years Next Business Day Onsite Hardware Support
- Compliance with CE (Class B) / FCC (Class B) / UL (UL60950-1 /UL62368-1) / CSA (CSA C22.2 No.60950-1-07 / CSA C22.2 No. 62368-1-14) / ICES-003 / CCC / VCCI (Class B) / KCC (Class B)

1. Multi core 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. Maximum transfer rate only available with specific configurations. Details please refer to Memory section.
3. External power supplies, power cords, cables and peripherals are not low halogen. Service parts obtained after purchase may not be low halogen.
4. For full Intel® vPro® functionality, Windows 10 Pro 64 bit, a vPro supported processor, vPro enabled chipset, vPro enabled wired LAN and/or WLAN card and TPM 2.0 are required. Some functionality requires additional 3rd party software in order to run. See http://intel.com/vpro
5. VR Ready is an optional feature which requires supported discrete graphics.

NOTE: See important legal disclosures for all listed specs in their respective feature sections

PRODUCT NAME

Features

HP Z1 G8 Tower Desktop PC

OPERATING SYSTEM

Preinstalled	Windows 10 Pro 64 - HP recommends Windows 10 Pro for business[1] Windows 10 Pro 64 (National Academic only)[2] Windows 10 Home 64[1] Windows 10 Home Single Language 64[1] Windows 10 Pro (Windows 10 Enterprise available with a Volume Licensing Agreement)[1] FreeDOS
Web-supported only	Windows10 Enterprise 64 (Web Support)[1]

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 10 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. Some devices for academic use will automatically be updated to Windows 10 Pro Education with the Windows 10 Anniversary Update. Features vary; see https://aka.ms/ProEducation for Windows 10 Pro Education feature information.

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

Supported Versions

HP tested Windows 10, version 1909 on this platform. For testing information on newer versions of Windows 10, please see https://support.hp.com/document/c05195282.

CHIPSET

Intel® Q570

PROCESSORS

Intel® 11th Generation Core™ Processors

Intel® Core™ i9-11900 Processor with Intel® UHD Graphics 750 (2.5GHz, up to 5.1 GHz with Intel® Turbo Boost Technology[3], 16MB cache, 8 cores) 65W[1]
Supports Intel® vPro® Technology[4]

Intel® Core™ i7-11700 processor with Intel® UHD Graphics 750 (2.5 GHz, up to 4.9 GHz with Intel® Turbo Boost Technology[3], 16 MB cache, 8 cores) 65W[1]
Supports Intel® vPro® Technology[4]

Intel® Core™ i5-11600 processor with Intel® UHD Graphics750 (2.8 GHz, up to 4.8 GHz with Intel Turbo Boost Technology[3], 12 MB cache, 6 cores) 65W[1]
Supports Intel® vPro® Technology[4]

Intel® Core™ i5-11500 processor with Intel® UHD Graphics 750 (2.7GHz, up to 4.6 GHz with Intel Turbo Boost Technology[3], 12 MB cache, 6 cores) 65W[1]
Supports Intel® vPro® Technology[4]

Intel® Core™ i5-11400 processor with Intel® UHD Graphics 730 (2.6 GHz, up to 4.4 GHz with Intel Turbo Boost Technology[3], 12 MB cache, 6 cores) 65W[1]

Features

1: Multi-core 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 configuration measurement of higher performance.
3. Intel® Turbo Boost technology requires a PC with a processor with Intel Turbo Boost capability. Intel Turbo Boost performance varies depending on hardware, software and overall system. See http://www.intel.com/technology/turboboost for more information.
4. For full Intel® vPro® functionality, Windows 10 Pro 64 bit, a vPro supported processor, vPro enabled chipset, vPro enabled wired LAN and/or WLAN card and TPM 2.0 are required. Some functionality requires additional 3rd party software in order to run. See http://intel.com/vpro

GRAPHICS

Integrated Intel® Graphics

Intel® UHD Graphics 750 (integrated on 11th gen Core i9/i7/i5-11500 and above)

Intel® UHD Graphics 730 (integrated on 11th gen Core i5-11400)

Optional Discrete Graphics Solutions

NVIDIA® GeForce® RTX 3070 8GB FH 3DP+HDMI Graphics Card*

NVIDIA® Quadro P2200 5GB 4DP Graphics Card

NVIDIA® Quadro P1000 4GB 4mDP Graphics Card

NVIDIA® Quadro P620 2GB 4mDP Graphics Card

NVIDIA® Quadro P400 2GB 3mDP w/ 2mDP to DVI Graphics Card

NVIDIA® Quadro P400 2GB 3mDP w/ 2mDP to DP Graphics Card

AMD® Radeon™ RX 550X 4GB FH DP+HDMI Graphics Card*

AMD® Radeon™ R7 430 2GB DP+VGA**

AMD® Radeon™ R7 430 2GB 2DP**

* Requires 550W chassis
**Not available in all regions

Adapters and Cables

HP DisplayPort Cable

HP DisplayPort to DVI-D Adapter

HP DisplayPort to HDMI True 4K Adapter

HP DisplayPort to VGA Adapter

HP USB to Serial Port Adapter

HP USB-C® to DisplayPort Adapter

STORAGE

Features

3.5 inch SATA Hard Disk Drives (HDD)

- 500GB 7200RPM 3.5in SATA HDD
- 1TB 7200RPM 3.5in SATA HDD
- 2TB 7200RPM 3.5in SATA HDD

NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

2.5 inch SATA Hard Disk Drives (HDD)

- 500GB 7200RPM 2.5in SATA HDD
- 1TB 7200RPM 2.5in SATA HDD
- 2TB 5400RPM 2.5in SATA HDD
- 500GB 7200RPM 2.5in Self Encrypted OPAL2 SATA HDD*
- 500GB 7200RPM 2.5in Self Encrypted Federal Information Processing Standard SATA HDD*

* Storage DriveLock does not work with Self Encrypting or Optane based storage
NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

M.2 PCIe NMVe Solid State Drives (SSD)

- 256GB M.2 2280 PCIe NVMe SSD
- 512GB M.2 2280 PCIe NVMe SSD
- 256GB M.2 2280 PCIe 3NVMe Three Layer Cell SSD
- 256GB M.2 2280 PCIe 4NVMe Three Layer Cell SSD
- 512GB M.2 2280 PCIe 3 NVMe Three Layer Cell SSD
- 512GB M.2 2280 PCIe 4 NVMe Three Layer Cell SSD
- 1TB M.2 2280 PCIe 3 NVMe Three Layer Cell SSD
- 1TB M.2 2280 PCIe 4 NVMe Three Layer Cell SSD
- 2TB M.2 2280 PCIe 3 NVMe Three Layer Cell SSD
- 2TB M.2 2280 PCIe 4NVMe Three Layer Cell SSD
- 256GB M.2 2280 PCIe NVMe Self Encrypted OPAL2 Three Layer Cell SSD*
- 512GB M.2 2280 PCIe NVMe Self Encrypted OPAL2 Three Layer Cell SSD*
- 256GB Intel® Optane™ Memory H10 with Solid State Storage*
- 512GB Intel® Optane™ Memory H10 with Solid State Storage*

* Storage DriveLock does not work with Self Encrypting or Optane based storage
NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

Optical Disc Drives

- HP 9.5mm Slim DVD-ROM Drive[1]
- HP 9.5mm Slim DVD Writer Drive[1]

1. HD-DVD disks cannot be played on this drive. No support for DVD-RAM. Actual speeds may vary. Don't copy copyright-protected materials. Double Layer discs can store more data than single layer discs. Discs burned with this drive may not be compatible with many existing single-layer DVD drives and players.

Features

Media Card Reader

SD 4.0 with 5-in-1 Interface (Supports SD, SDXC, SDHC, UHS-I, UHS-II)

MEMORY

Memory Type

DDR4-3200 (Transfer rates up to 3200 MT/s), 4 DIMM

Memory Configuration

4 GB (1 x 4 GB)

8 GB (2 x 4 GB)

8 GB (1 x 8 GB)

16 GB (2 x 8 GB)

16 GB (1 x 16 GB)

32 GB (2 x 16 GB)

32 GB (1 x 32 GB)

64 GB (2 x 32 GB)

128 GB (4 x 32 GB)[1]

1. For 128 GB (4 x 32 GB) configuration, only 2933 MT/s speed can be achieved.

NOTE: Memory modules support data transfer rates up to 3200 MT/s; actual data rate is determined by the system configured.
NOTE: When more than one memory slot is populated, symmetric configurations are required for 2 DIMMs per channel. Mix of different part numbers or mix of single and dual ranks within a channel is not allowed.
NOTE: All memory slots are customer accessible / upgradeable.
NOTE: For systems configured with more than 3 GB of memory and a 32-bit operating system, all memory may not be available due to system resource requirements. Addressing memory above 4 GB requires a 64-bit operating system.

NETWORKING/COMMUNICATIONS

Ethernet (RJ-45)

Intel® I219-LM Gigabit Network Connection LOM (standard)

Wireless[1,2]

Intel® Wi-Fi 6 AX201 + BT5.1 (802.11AX 2x2 vPro®, supporting gigabit data rate)

Intel® Wi-Fi 6 AX201 + BT5.1 (802.11AX 2x2 non-vPro®, supporting gigabit data rate)

Realtek RTL8852AE 802.11ax 2x2 Wi-Fi 6 + BT5.2

1. Wireless access point and Internet service required and not included. Availability of public wireless access points limited. The specifications for the 802.11ax WLAN are draft specifications and are not final. If the final specifications differ from the draft specifications, it may affect the ability of the PC to communicate with 802.11ax WLAN devices. Wi-Fi 6 requires a wireless router, sold separately, that supports 802.11ax (Wi-Fi 6). Only available in countries where 802.11ax is supported.
2. Wi-Fi 5 or 6 is designed to support gigabit data rate when transferring files between two devices connected to the same router. Requires a wireless router, sold separately, that supports 80MHz and higher channels.

KEYBOARDS AND POINTING DEVICES

Features

Keyboards

- HP Wired Desktop 320K Keyboard
- HP 125 Wired Keyboard
- HP USB Wired Keyboard
- HP USB & PS/2 Washable Wired Keyboard
- HP USB Business Slim Wired CCID Smart Card Keyboard
- HP PS/2 Business Slim Keyboard
- HP USB Business Slim Antimicrobial Keyboard[1]
- 1. Not available in all regions

Mouse

- HP Wired 320M Mouse
- HP PS/2 Mouse
- HP USB Fingerprint Reader Wired Mouse
- HP USB PS/2 Washable Wired Mouse
- HP Wired 125 Mouse
- HP Wired 128 Laser Mouse
- HP Wired 125 Antimicrobial Mouse

Keyboard and Mouse Combo

- HP Wireless Keyboard and Mouse Business Slim Keyboard
- HP USB Keyboard and Mouse Healthcare Edition
- HP USB Wired Keyboard and Mouse Premium Keyboard
- HP Wireless Keyboard and Mouse Premium Keyboard

SECURITY

Features

TPM 2.0 endpoint security controller (Infineon SLB9670) shipped with Windows 10. Common Criteria EAL4+ Certified. FIPS 140-2 Level 2 Certified.
Solenoid Lock & Intrusion Sensor
Support for chassis cable lock devices
Support for chassis padlocks devices
SATA port disablement (via BIOS)
Serial, USB enable / disable (via BIOS)
Intel® Identify Protection Technology (IPT)[1]
Serial, parallel, USB enable / disable (via BIOS)
Optional USB Port Disable at factory (user configurable via BIOS)
Removable media write/boot control
Power-on password (via BIOS)
Setup password (via BIOS)
1. Models configured with Intel® Core™ processors have the ability to utilize advanced security protection for online transactions. IPT, used in conjunction with participating web sites, provides double identity authentication by adding a hardware component in addition to the usual user name and password. IPT is initialized through an HP Client Security module.

PORTS

I/O Ports - Internal Ports

PCI Express 4.0 x16	1
PCI Express 3.0 x16 (wired as x4)	1
PCI Express 3.0 x1	2
SATA port	4
M.2 PCIe	(1) M.2 PCIe 3 x1 2230 (for WLAN) (1) M.2 PCIe 4 x4 2280 (for storage) (1) M.2 PCIe 3 x4 2280 (for storage)[1]
1: M.2 SSD attached to CPU is PCIe Gen 4, the other two M.2 are PCIe Gen 3.	

Standard User Accessible Ports

Type-A Hi-Speed USB 480Mbps signaling rate port	3(rear)
Type-A SuperSpeed USB 5 Gbps signaling rate port	2 (front, 1 fast charging), 1 (rear)
Type-A SuperSpeed USB 10 Gbps signaling rate port	2 (front); 2 (rear)
Type-C® SuperSpeed USB 20Gbps signaling rate port	1 (front)
Video	1 DisplayPort™ 1.4 (rear)
Audio	1 Universal Audio Jack with CTIA and OMPT headset support (front); 1 Audio-Line out (rear)

Features

(1) Flexible Port 1, choice of one of the following...

Dual Type-A SuperSpeed USB 5 Gbps signaling rate port	1 (rear)
Type-C® SuperSpeed USB 10Gbps signaling rate port	1 SuperSpeed USB 10Gbps signaling rate port w/ DisplayPort™ Alt Mode (rear)
Thunderbolt™ 3[1]	1 (rear)
Video	1 DisplayPort™ 1.4 or HDMI 2.0b or VGA (rear)
Serial	1 (rear)
RJ-45 Ethernet NIC	1 (rear)
1. Occupies a PCIe slot. Available in Q3, 2021.	

Bays

5.25" Half Height (External)	1
9mm Slim Optical Disc Drive (ODD)	1
SD Card Reader	1
2.5" Internal Storage Drive	1
3.5" Internal Storage Drive	2

USB SPECIFICATION AND MARKETING NAME MAPPING TABLE

Marketing Name	Technical Terminology
Hi-Speed USB 480Mbps signaling rate	USB 2.0
SuperSpeed USB 5Gbps signaling rate	USB 3.2 Gen 1
SuperSpeed USB 10Gbps signaling rate	USB 3.2 Gen 2
SuperSpeed USB 20Gbps signaling rate	USB 3.2 Gen 2x2

SOFTWARE COMPONENTS AND APPLICATIONS WITH WINDOWS

BIOS
HP BIOSphere Gen6 [16]
HP Secure Erase [18]
Absolute Persistence Module [19]
HP Drive Lock & Automatic Drive Lock[20]
BIOS Update via Network
HP Wake on WLAN

Software
HP Desktop Support Utilities
HP Connection Optimizer[21]
HP Easy Clean

Features

myHP
HP Privacy Settings
HP PC Hardware Diagnostics
Touchpoint Customizer for Commercial
HP Notifications
HP Presence Aware[22]
HP Setup Integrated OOBE
HP Support Assistant [23]
HP Noise Cancellation Software
HP QuickDrop[24]
HP WorkWell
Microsoft Defender
Buy Microsoft Office (sold separately)

Manageability Features
HP Driver Packs (download) [25]
HP Client Catalog (download)
HP Image Assistant (download)
HP Manageability Integration Kit for Microsoft System Center Configuration Management Gen4 (download) [26]
Ivanti Management Suite (download)[27]
HP Cloud Recovery[28]
HP Client Management Script Library (download)

Security Management
HP Pro Security Edition (optional)[29]
HP Client Security Manager Gen7[37]
HP Sure Sense[30]
HP Sure Click[32]
HP Sure Run Gen4[35]
HP Sure Recover Gen4[36]
HP Sure Start Gen6[33]
HP Sure Admin[31]
HP Tamper Lock
TPM 2.0 Embedded Security Chip (Common Criteria EAL4+ Certified) (FIPS 140-2 Level 2 Certified)

16. HP BIOSphere Gen6 requires Windows 10 and is available on select HP Pro and Elite PCs. Features may vary depending on the platform and configurations.
18. HP 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™.
19. Absolute agent is shipped turned off, and will be activated when customers activate a purchased subscription. Subscriptions can be purchased for terms ranging multiple years. Service is limited, check with Absolute for availability outside the U.S. The Absolute Recovery Guarantee is a limited warranty. Certain conditions apply. For full details visit: http://www.absolute.com/company/legal/agreements/computrace-agreement. Data Delete is an optional service provided by Absolute Software. If utilized, the Recovery Guarantee is null and void. In order to use the Data Delete service, customers must first sign a Pre-Authorization Agreement and either obtain a PIN or purchase one or more RSA SecurID tokens from Absolute Software.
20. Drive Lock is not supported on NVMe drives.
21. HP Connection Optimizer requires Windows 10.
22. HP Presence Aware requires a proximity sensor that is available on select EliteBooks and requires Windows Hello for authentication.
23. HP Support Assistant requires Windows and Internet access.
24. HP Quick Drop requires Internet access and Windows 10 PC preinstalled with HP QuickDrop app and either an Android device (phone or tablet) running Android 7 or higher with the Android HP QuickDrop app, and /or an iOS device (phone or tablet) running iOS 12 or higher with the iOS HP QuickDrop app.
25. HP Driver Packs not preinstalled, however available for download at http://www.hp.com/go/clientmanagement.
26. HP Manageability Integration Kit can be downloaded from http://www8.hp.com/us/en/ads/clientmanagement/overview.html.
27. Ivanti Management Suite subscription required.
28. HP Cloud Recovery is available for HP Elite and Pro desktops and laptops PCs with Intel® or AMD processors and requires an open, wired network connection. Note: You must back up important files, data, photos, videos, etc. before use to avoid loss of data. Detail please refer to: https://support.hp.com/us-en/document/c05115630.
29. HP Pro Security Edition is available preloaded on select HP PCs and includes HP Sure Click Pro and HP Sure Sense Pro. 3-year license required. The HP Pro Security Edition software is licensed under the license terms of the HP End User License Agreement (EULA) that can be found at: https://h30670.www3.hp.com/ecommerce/common/disclaimer.do#EN_US as modified by the following: “7. Term. Unless otherwise

Features

terminated earlier pursuant to the terms contained in this EULA, the license for the HP Pro Security Edition (HP Sure Sense Pro and HP Sure Click Pro) is effective upon activation and will continue for thirty-six (36) months thereafter ("Initial Term"). At the end of the Initial Term you may either (a) purchase a renewal license for the HP 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." HP Pro Security Edition is optimized for the SMB environment and ships pre-configured - manageability is optional. The HP Pro Security Edition supports a limited tool set that can be used by the HP Manageability Integration Kit which can be downloaded from http://www.hp.com/go/clientmanagement.
30. HP Sure Sense is available on select HP PCs and is not available with Windows10 Home.
31. HP Sure Admin requires Windows 10, 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.
32. HP Sure Click requires Windows 10. See https://bit.ly/2PrLT6A_SureClick for complete details.
33. HP Sure Start Gen6 is available on select HP PCs and requires Windows 10.
35. HP Sure Run Gen4 is available on select HP PCs and requires Windows 10.
36. 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.
37. HP Client Security Manager Gen7 requires Windows and is available on the select HP Elite and Pro PCs.

ENVIRONMENTAL & INDUSTRY

ENERGY STAR® certified models available

ENERGY STAR® certified. EPEAT® 2019 registered where applicable. Based on US EPEAT® registration according to IEEE 1680.1-2018 EPEAT®. Status varies by country. Visit http://www.epeat.net for more information.
Low halogen (chassis, all internal components and modules)[1]
TAA compliant models available

1. External power supplies, power cords, cables and peripherals are not Low Halogen. Service parts obtained after purchase may not be Low Halogen.

UNIT ENVIRONMENT AND OPERATING CONDITIONS

General Unit Operating Guidelines

- Keep the computer away from excessive moisture, direct moisture and the extremes of heat and cold, to ensure that unit is operated within the specified operating range.
- Leave a 10.2 cm (4 in) clearance on all vented sides of the computer to permit the required airflow.
- Never restrict airflow into the computer by blocking any vents or air intakes.
- Do not stack computers on top of each other or place computers so near each other that they are subject to each other's re-circulated or preheated air.
- Occasionally clean the air vents on the front, back, and any other vented side of the computer. Lint, dust and other foreign matter can block the vents and limit the airflow.
- If the computer is to be operated within a separate enclosure, intake and exhaust ventilation must be provided on the enclosur and the same operating guidelines listed above will still apply.

Temperature Range	Operating: 50° to 95° F (10° to 35° C)[1] Non-operating: -22° to 149° F (-30° to 65° C)
Relative Humidity	Operating: 10% to 90% (non-condensing at ambient) Non-operating: 5% to 95% (non-condensing at ambient)
Maximum Altitude (unpressurized)	Operating: 5000m Non-operating: 50000ft (15240 m)

1. Operating temperature is de-rated 1.0 deg C per 300 m (1000 ft) to 3000 m (10,000 ft) above sea level, no direct sustained sunlight. Maximum rate of change is 10 deg C/Hr. The upper limit may be limited by the type and number of options installed.

HP Z1 G8 Tower Desktop PC

Eco-Label Certifications &	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:

Features

declarations	• IT ECO declaration • US ENERGY STAR® • ENERGY STAR® certified. EPEAT® 2019 registered where applicable. Based on US EPEAT® registration according to IEEE 1680.1-2018 EPEAT®. Status varies by country. Visit www.epeat.net for more information.		
Sustainable Impact Specifications	• 45% post-consumer recycled plastic[4] • Molded Paper Pulp Cushion inside box is 100% sustainably sourced and recyclable[5] • 5% ITE-derived closed loop plastic[1] • 80 Plus® Platinum power supplies available 92% Efficient PSU • Bulk packaging available • Ocean-Bound Plastic in speaker enclosure[2]		
System Configuration	The configuration used for the Energy Consumption and Declared Noise Emissions data for the Desktop model is based on a Typically Configured Desktop.		
Energy Consumption (in accordance with US ENERGY STAR® test method)	**115VAC, 60Hz**	**230VAC, 50Hz**	**100VAC, 60Hz**
Normal Operation (Short idle)	11.67 W	11.24 W	11.53 W
Normal Operation (Long idle)	9.83 W	10.55 W	9.69 W
Sleep	0.84 W	0.81 W	0.86 W
Off	0.57 W	0.53 W	0.57 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, 60Hz**
Normal Operation (Short idle)	39.91 BTU/hr	38.44 BTU/hr	39.43 BTU/hr
Normal Operation (Long idle)	33.62 BTU/hr	36.08 BTU/hr	33.14 BTU/hr
Sleep	2.87 BTU/hr	2.77 BTU/hr	2.94 BTU/hr
Off	1.95 BTU/hr	1.81 BTU/hr	1.95 BTU/hr
	NOTE: Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.		
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)	Sound Power (L_{WAd}, bels)	Sound Pressure (L_{pAm}, decibels)	
Typically Configured - Idle	3.3	21	
Fixed Disk-Random writes	3.3	22	
Longevity and Upgrading	This product can be upgraded, possibly extending its useful life by several years. Upgradeable features and/or components contained in the product may include: Spare parts are available throughout the warranty period and or for up to “5” years after the end of production.		
Batteries	This battery(s) in this product comply with EU Directive 2006/66/EC		

Features

	Batteries used in the product do not contain: Mercury greater the1ppm by weight Cadmium greater than 20ppm by weight Battery size: CR2032 (coin cell) Battery type: Lithium		
Additional Information	• This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC. • This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive - 2002/96/EC. • This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986). • ENERGY STAR® certified. EPEAT® 2019 registered where applicable. Based on US EPEAT® registration according to IEEE 1680.1-2018 EPEAT®. Status varies by country. Visit http://www.epeat.net for more information. • Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043. • This product contains a minimum of 35% post-consumer recycled plastic (by wt.); Including 10% ITE-derived post-consumer recycled plastic* • This product is 95.1% recycle-able when properly disposed of at end of life. ***NOTE:** Recycled plastic content percentage is based on the definition set in the IEEE 1680.1-2018 standard.		
Packaging Materials	**External:**	PAPER/Corrugated	1114 g
		PAPER/Molded Pulp	788 g
	Internal:	PLASTIC/Polyethylene low density - LDPE	44 g
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, 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		

Features

	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 Inc. offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/go/reuse-recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner. The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: http://www.hp.com/go/recyclers. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment. 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://www.hp.com/hpinfo/globalcitizenship/environment/pdf/PC_GBU_Product_Design_ISO_14K_Certificate.pdf and http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf
Footnotes	[1]ITE Derived Closed Loop Plastic percentage is based on the definition set in the IEEE 1680.1-2018 standard. [2]Percentage of ocean-bound plastic contained in each component varies by product [4]Recycled plastic content percentage is based on the definition set in the IEEE 1680.1-2018 standard. [5]Molded pulp cushions are made from 100% recycled wood fiber and organic materials.

SERVICE AND SUPPORT

On-site Warranty[15]: Three-year (3-3-3) limited warranty delivers three years of on-site, next business day[16] service for parts an labor and includes free support 24 x 7[17]. Three-year onsite and labor are not available in all countries. Service offers terms up to years by choosing an optional HP Care Pack. To choose the right level of service for your HP product, visit HP Care Pack Central: http://www.hp.com/go/cpc.[18]

15. Terms and conditions may vary by country. Certain restrictions and exclusions apply. Other warranty variations may be offered in your region.
16. 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.
17. Technical telephone support applies only to HP-configured and third-party HP qualified hardware and software. Toll-free calling and 24 x 7 support may not be available in some countries.
18. Service levels and response times for HP Care Packs may vary depending on your geographic location. Service starts on date of hardware purchase. Restrictions and limitations apply. For details, visit www.hp.com/go/cpc. HP services are governed by the applicable HP terms and conditions of service provided or indicated to Customer at the time of purchase. Customer may have additional statutory rights according to applicable local laws, and such rights are not in any way affected by the HP terms and conditions of service or the HP Limited Warranty provided with your HP Product.

Features

CERTIFICATION AND COMPLIANCE

Energy Efficiency Compliance

ENERGY STAR® certified. EPEAT® 2019 registered where applicable. Based on US EPEAT® registration according to IEEE 1680.1-2018 EPEAT®. Status varies by country. Visit http://www.epeat.net for more information.

PROCESSORS

Intel® 11th Generation Core™ Processors

HP Z1 G8 Tower Desktop PC model featuring this technology include processors that are part of the Intel® Stable Image Platform Program (SIPP) designed to ensure the stability promise inherent in the value proposition.

Intel® Advanced Management Technology (AMT) v12 - An advanced set of remote management features and functionality which provides network administrators the latest and most effective tools to remotely discover, heal, and protect networked client systems regardless of the system's health or power state. AMT 12 includes the following advanced management functions:

- Support for configuration of Intel AMT 12.0 capabilities
- No reset after provisioning
- Support for Intel Enterprise Digital Fence
- The Platform Discovery Utility can now discover these additional Intel products:
    - Intel Identity Protection Technology with One Time Password
    - Public Key Infrastructure
    - Multi Factor Authentication
- Profile Editor and Profile Editor Plugin Interface
    - Required Permissions for Solutions Framework

GRAPHICS

Intel® UHD Graphics (integrated)	
VGA Controller	Integrated
DisplayPort™ 1.4	Multimode capable; supports HDCP, Display Port Audio (2 streams), HBR2 link rates and Multi-Stream Technology for a maximum of 3 displays connected to any output controlled by Intel® Graphics
HDMI (optional)	Supports HDMI 2.0b features Supports HDCP 2.3 Supports BT2020 and HDR playback (7th Gen processors only)
VGA (optional)	VGA ouput
USB-C® DP Alt Mode (optional)	DisplayPort™ over the optional USB-C® module
Memory	The actual amount of maximum graphics memory can be >4GB. System memory is allocated for graphics as needed using Intel's Dynamic Video Memory Technology (DVMT), to provide an optimal balance between graphics and system memory use.
Maximum Color Depth	up to 16 bits/color
Graphics/Video API Support	HEVC 10b Enc/12b Dec HW VP9 12b Dec HW HDR Rec. 2020 DX12
Max. Resolution (VGA)	2048 x 1536@60Hz
Max. Resolution (HDMI)	4096 x 2160@60Hz
Max. Resolution (DP)	4096 x 2160@60Hz

NVIDIA® GeForce® RTX 3070 8GB Graphics Card

Engine Clock	1730 MHz
Memory Clock	8000 MHz
Memory Size(width)	8 GB (256-bit)
Max. Resolution (HDMI)	4096x2160@60Hz
Max. Resolution (DP)	7680x4320@60Hz
Multi Display Support	4 displays
HDCP Compliance	Yes
Rear I/O connectors (bracket)	HDMIx1+ DPx3
Cooling (active/passive)	Active fan-sink (Active cooling with dynamic speed)
Total power consumption (W)	<220W

Technical Specifications – Graphics

AMD® Radeon™ RX 550X 4 GB FH PCIe x16

Engine Clock	1183MHz
Memory Clock	6 Gbps
Memory Size (width)	4 GB (128-bit)
Max. Resolution (HDMI)	4096x2160 @ 60Hz
Max. Resolution (DP)	5120x2880 @ 60Hz
Multi Display Support	2 displays
HDCP Compliance	Yes
Rear I/O connectors (bracket)	HDMI, DPx2
Cooling (active/passive)	Active fan-sink (Active cooling with dynamic speed)
Total power consumption (W)	<50W

NVIDIA® Quadro P620 2GB Graphics Card

Engine Clock	1354 MHz
Memory Clock	2500 MHz
Memory Size (width)	2GB (128-bit)
Max. Resolution (DP)	5120x2880@60Hz
Multi Display Support	4 displays
HDCP Compliance	Yes
Rear I/O connectors (bracket)	mDPx4
Cooling (active/passive)	Active fan-sink (Active cooling with dynamic speed)
Total power consumption (W)	<40W

NVIDIA® Quadro P400 2GB Graphics Card

Engine Clock	1252 MHz
Memory Clock	2000 MHz
Memory Size (width)	2GB (64-bit)
Max. Resolution (DP)	5120x2880@60Hz
Multi Display Support	3 displays
HDCP Compliance	Yes
Rear I/O connectors (bracket)	mDPx3
Cooling (active/passive)	Active fan-sink (Active cooling with dynamic speed)
Total power consumption (W)	<30W

Technical Specifications – Graphics

AMD® Radeon™ R7 430 2GB VGA+DP 64bit Graphics Card

Engine Clock	780 MHz
Memory Clock	1100 MHz
Memory Size (width)	2 GB (64-bit)
Max. Resolution (HDMI)	2048x1536
Max. Resolution (DP)	4096x2160@60Hz
Multi Display Support	2 displays
HDCP Compliance	Yes
Rear I/O connectors (bracket)	VGA+DP
Cooling (active/passive)	Active fan-sink (Active cooling with dynamic speed)
Total power consumption (W)	<50W

AMD® Radeon™ R7 430 2GB GDDR5 2DP 64 bit Graphics Card

Engine Clock	780 MHz
Memory Clock	1100 MHz
Memory Size (width)	2 GB (64-bit)
Max. Resolution (DP)	4096x2160@60Hz
Multi Display Support	2 displays
HDCP Compliance	yes
Rear I/O connectors (bracket)	DPx2
Cooling (active/passive)	Active fan-sink (Active cooling with dynamic speed)
Total power consumption (W)	<50W

NVIDIA® Quadro P2200 5GB 4DP Graphics Card

Engine Clock	1000 MHz
Memory Clock	1251 MHz
Memory Size (width)	5GB (160-bit)
Max. Resolution (DP)	Up to 4x 4096 x 2160 x 24 bpp @ 120Hz Up to 4x 5120 x 2880 x 24 bpp @ 60Hz
Multi Display Support	4 displays
HDCP Compliance	Yes
Rear I/O connectors (bracket)	4x mDP 1.4
Cooling (active/passive)	Active fan-sink (Active cooling with dynamic speed)
Total power consumption (W)	<75W

Technical Specifications – Graphics

NVIDIA® Quadro P1000 4GB 4mDP Graphics Card	
Engine Clock	1354 MHz
Memory Clock	1502 MHz
Memory Size (width)	4GB (128-bit)
Max. Resolution (DP)	Up to 4x 5120 x 2880 x 24 bpp @ 60Hz
Multi Display Support	4 displays
HDCP Compliance	Yes
Rear I/O connectors (bracket)	4 mDP
Cooling (active/passive)	Active fan-sink (Active cooling with dynamic speed)
Total power consumption (W)	<47W

STORAGE

500 GB 7200RPM 3.5in SATA HDD

Capacity	500 GB
Rotational Speed	7,200 rpm
Interface	SATA 6.0 Gb/s
Buffer Size	32 MB
Logical Blocks	976,773,168
Seek Time	11 ms (Average)
Height	1 in/2.54 cm
Width	Media diameter: 3.5 in/8.89 cm Physical size: 4 in/10.2 cm
Operating Temperature	41° to 131° F (5° to 55° C)

NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

1 TB 7200RPM 3.5in SATA HDD

Capacity	1 TB
Rotational Speed	7,200 rpm
Interface	SATA 6 Gb/s
Buffer Size	64 MB
Logical Blocks	1,953,525,168
Seek Time	11 ms (Average)
Height	1 in/2.54 cm
Width (nominal)	Media diameter: 3.5 in/8.89 cm Physical size: 4 in/10.2 cm
Operating Temperature	41° to 131° F (5° to 55° C)

NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

Technical Specifications – Storage

2 TB 7200RPM 3.5in SATA HDD

Capacity	2 TB
Rotational Speed	7,200 rpm
Interface	SATA 6 Gb/s
Buffer Size	128 MB
Logical Blocks	3,907,050,336
Seek Time	11 ms (Average)
Height	1.028 in/26.11 mm
Width (nominal)	Media diameter: 3.5 in/88.9 mm Physical size: 4 in/102 mm
Operating Temperature	41° to 131° F (5° to 55° C)

NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

500 GB 7200RPM 2.5in SATA HDD

Capacity	500 GB
Rotational Speed	7,200 rpm
Interface	SATA 6 Gb/s
Buffer Size	Up to 128 MB
Logical Blocks	976,773,168
Seek Time	12 ms (Average)
Height	0.283 in/7.2 mm (Max.)
Width (nominal)	2.75 in/70 mm (nominal)
Operating Temperature	41° to 131° F (5° to 55° C)

NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

1 TB 7200RPM 2.5in SATA HDD

Capacity	1 TB
Rotational Speed	7,200 rpm
Interface	SATA 6 Gb/s
Buffer Size	Up to 128 MB
Logical Blocks	1,953,525,168
Seek Time	12 ms (Average)
Height	0.283 in/7.2 mm (Max.)
Width (nominal)	2.75 in/70 mm (nominal)
Operating Temperature	41° to 131° F (5° to 55° C)

NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

Technical Specifications – Storage

2 TB 5400RPM 2.5in SATA HDD

Capacity	2 TB
Rotational Speed	5,400 rpm
Interface	SATA 6 Gb/s
Buffer Size	128 MB
Logical Blocks	3,907,050,336
Seek Time	12 ms (Average)
Height	0.374 in/9.5 mm (nominal)
Width (nominal)	2.75 in/70 mm (nominal)
Operating Temperature	41° to 131° F (5° to 55° C)

NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

500 GB 7200RPM 2.5in Self Encrypted OPAL2 SATA HDD

Capacity	500 GB
Architecture	Self-Encrypting (SED) Solid State Drive with SATA interface
Interface	SATA 6 Gb/s
Buffer Size	128 MB
Logical Blocks	976,773,168
Seek Time	12 ms (Average)
Height	0.283 in/7.2 mm (Max.)
Width	2.75 in/70 mm (nominal)
Operating Temperature	41° to 131° F (5° to 55° C)

NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

500 GB 7200RPM 2.5in Self Encrypted Federal Information Processing Standard SATA HDD

Capacity	500 GB
Architecture	Self-Encrypting (SED) Solid State Drive with SATA interface
Interface	SATA 6 Gb/s
Buffer Size	128 MB
Logical Blocks	976,773,168
Seek Time	12 ms (Average)
Height	0.283 in/7.2 mm (Max.)
Width	2.75 in/70 mm (nominal)
Operating Temperature	41° to 131° F (5° to 55° C)

NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

Technical Specifications – Storage

256 GB M.2 2280 PCIe NVMe SSD

Drive Weight	< 10g
Capacity	256 GB
Height	2.38mm
Length	80mm
Width	22mm
Interface	PCIE Gen3
Maximum Sequential Read	Up to 1600MB/s
Maximum Sequential Write	Up to 780MB/s
Logical Blocks	500,118,192
Operating Temperature	0° to 70°C (32° to 158°F) [ambient temp]
Features	APST; ASPM L1.2; NVME spec 1.2

NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

512 GB M.2 2280 PCIe NVMe SSD

Drive Weight	< 10g
Capacity	512 GB
Height	2.38mm
Length	80mm
Width	22mm
Interface	PCIE Gen3
Maximum Sequential Read	Up to 1600MB/s
Maximum Sequential Write	Up to 860MB/s
Logical Blocks	1,000,215,216
Operating Temperature	0° to 70°C (32° to 158°F) [ambient temp]
Features	APST; ASPM L1.2; NVME spec 1.2

NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

Technical Specifications – Storage

1 TB M.2 2280 PCIe NVMe SSD

Drive Weight	< 10g
Capacity	1 TB
Height	2.38mm
Length	80mm
Width	22mm
Interface	PCIE Gen3
Maximum Sequential Read	Up to 2200MB/s
Maximum Sequential Write	Up to 1800MB/s
Logical Blocks	1,000,215,216
Operating Temperature	0° to 70°C (32° to 158°F) [ambient temp]
Features	APST; ASPM L1.2; NVME spec 1.2

NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

256 GB M.2 2280 PCIe NVMe Three Layer Cell SSD

Drive Weight	< 10g
Capacity	256GB
Height	2.38mm
Length	80mm
Width	22mm
Interface	PCIE Gen3
Maximum Sequential Read	Up to 2700MB/s
Maximum Sequential Write	Up to 1000MB/s
Logical Blocks	500,118,192
Operating Temperature	0° to 70°C (32° to 158°F) [ambient temp]
Features	APST; ASPM L1.2; NVME spec 1.2

NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

Technical Specifications – Storage

512 GB M.2 2280 PCIe NVMe Three Layer Cell SSD

Drive Weight	< 10g
Capacity	512 GB
Height	2.38mm
Length	80mm
Width	22mm
Interface	PCIE Gen3
Maximum Sequential Read	Up to 2900MB/s
Maximum Sequential Write	Up to 1100MB/s
Logical Blocks	1,000,215,216
Operating Temperature	0° to 70°C (32° to 158°F) [ambient temp]
Features	APST; ASPM L1.2; NVME spec 1.2

NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

1 TB M.2 2280 PCIe NVMe Three Layer Cell SSD

Drive Weight	< 10g
Capacity	1 TB
Height	2.38mm
Length	80mm
Width	22mm
Interface	PCIE Gen3
Maximum Sequential Read	Up to 3480MB/s
Maximum Sequential Write	Up to 3037MB/s
Logical Blocks	2,000,409,264
Operating Temperature	0° to 70°C (32° to 158°F) [ambient temp]
Features	TRIM; ASPM L1.2

NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

Technical Specifications – Storage

2 TB M.2 2280 PCIe NVMe Three Layer Cell SSD

Drive Weight	< 10g
Capacity	2 TB
Height	2.38mm
Length	80mm
Width	22mm
Interface	PCIE Gen3
Maximum Sequential Read	Up to 3500MB/s
Maximum Sequential Write	Up to 3000MB/s
Logical Blocks	3,907,029,168
Operating Temperature	0° to 70°C (32° to 158°F) [ambient temp]
Features	TRIM; ASPM L1.2

NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

256 GB M.2 2280 PCIe NVMe Self Encrypted OPAL2 Three Layer Cell SSD

Drive Weight	< 10g
Capacity	256 GB
Height	2.38mm
Length	80mm
Width	22mm
Interface	PCIE Gen3
Maximum Sequential Read	Up to 2700MB/s
Maximum Sequential Write	Up to 1000MB/s
Logical Blocks	500,118,192
Operating Temperature	0° to 70°C (32° to 158°F) [ambient temp]
Features	APST; ASPM L1.2; NVME spec 1.2; TCG-OPAL2 security

NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

Technical Specifications – Storage

512 GB M.2 2280 PCIe NVMe Self Encrypted OPAL2 Three Layer Cell SSD

Drive Weight	< 10g
Capacity	512 GB
Height	2.38mm
Length	80mm
Width	22mm
Interface	PCIE Gen3
Maximum Sequential Read	Up to 2900MB/s
Maximum Sequential Write	Up to 1100MB/s
Logical Blocks	1,000,215,216
Operating Temperature	0° to 70°C (32° to 158°F) [ambient temp]
Features	APST; ASPM L1.2; NVME spec 1.2; TCG-OPAL2 security

NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

256 GB Intel® PCIe® NVMe™ QLC + 16 GB Intel® Optane™

Drive Weight	< 10g
Capacity	256 GB
Height	2.38mm
Length	80mm
Width	22mm
Interface	PCIe Gen3
Maximum Sequential Read	Up to 1450MB/s
Maximum Sequential Write	Up to 500MB/s
Logical Blocks	500,118,192
Operating Temperature	0° to 70°C (32° to 158°F) [ambient temp]
Features	TRIM; ASPM L1.2

NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

Technical Specifications – Storage

512 GB Intel® PCIe® NVMe™ QLC + 32 GB Intel® Optane™

Drive Weight	< 10g
Capacity	512 GB
Height	2.38mm
Length	80mm
Width	22mm
Interface	PCIe Gen3
Maximum Sequential Read	Up to 2400MB/s
Maximum Sequential Write	Up to 1300MB/s
Logical Blocks	1,000,215,215
Operating Temperature	0° to 70°C (32° to 158°F) [ambient temp]
Features	TRIM; ASPM L1.2

NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

256 GB M.2 2280 PCIe NVMe Three Layer Cell SSD

Drive Weight	< 10g
Capacity	256GB
Height	2.38mm
Length	80mm
Width	22mm
Interface	PCIE Gen4
Maximum Sequential Read	Up to 6400MB/s
Maximum Sequential Write	Up to 2700MB/s
Logical Blocks	500,118,192
Operating Temperature	0° to 70°C (32° to 158°F) [ambient temp]
Features	APST; ASPM L1.2; NVME spec 1.2

NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

Technical Specifications – Storage

512 GB M.2 2280 PCIe NVMe Three Layer Cell SSD

Drive Weight	< 10g
Capacity	512 GB
Height	2.38mm
Length	80mm
Width	22mm
Interface	PCIE Gen4
Maximum Sequential Read	Up to 6600MB/s
Maximum Sequential Write	Up to 5100MB/s
Logical Blocks	1,000,215,216
Operating Temperature	0° to 70°C (32° to 158°F) [ambient temp]
Features	APST; ASPM L1.2; NVME spec 1.2

NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

1 TB M.2 2280 PCIe NVMe Three Layer Cell SSD

Drive Weight	< 10g
Capacity	1 TB
Height	2.38mm
Length	80mm
Width	22mm
Interface	PCIE Gen4
Maximum Sequential Read	Up to 7100MB/s
Maximum Sequential Write	Up to 5200MB/s
Logical Blocks	2,000,409,264
Operating Temperature	0° to 70°C (32° to 158°F) [ambient temp]
Features	TRIM; ASPM L1.2

NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

Technical Specifications – Storage

2 TB M.2 2280 PCIe NVMe Three Layer Cell SSD

Drive Weight	< 10g
Capacity	2 TB
Height	2.38mm
Length	80mm
Width	22mm
Interface	PCIE Gen4
Maximum Sequential Read	Up to 7100MB/s
Maximum Sequential Write	Up to 5200MB/s
Logical Blocks	4,000,797,360
Operating Temperature	0° to 70°C (32° to 158°F) [ambient temp]
Features	TRIM; ASPM L1.2

NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

OPTICAL DISC DRIVES

HP 9.5mm Slim DVD-ROM Drive

Height	9.5 mm height
Orientation	Either horizontal or vertical
Interface type	SATA/ATAPI
Dimensions (W x H x D)	5.04 x 0.37 x 5.0 in (128 x 9.5 x 127 mm) without bezel
Weight (max)	Up to 0.31 lb (140g) without bezel
Read Speeds	DVD+R/-R/+RW/ -RW/+R DL /-R DL Up to 8X DVD-ROM Up to 8X CD-ROM, CD-R Up to 24X CD-RW Up to 24X
Access time (typical reads, including settling)	Random: DVD-ROM: 170 ms (typical), CD-ROM: 170 ms (typical) Full stroke: DVD-ROM: 320 ms (typical), CD-ROM: 320 ms (typical)
Power	Source Slimline SATA DC power receptacle DC Power Requirement 5 VDC ± 5%-100 mV ripple p-p DC Current 5 VDC (< 1000 mA typical, 1600 mA maximum)
Environmental conditions (operating - non-condensing)	Temperature 41° to 122° F (5° to 50° C) Relative Humidity 10% to 80% Maximum Wet Bulb Temperature 84° F (29° C)

Technical Specifications – Storage

HP 9.5mm Slim DVD Writer Drive

Height	9.5 mm height
Orientation	Either horizontal or vertical
Interface type	SATA/ATAPI
Disc recording capacity	Up to 8.5 GB DL or 4.7 GB standard
Dimensions (W x H x D)	5.04 x 0.37 x 5.0 in (128 x 9.5 x 127 mm) without bezel
Weight (max)	0.31 lb (140 g)
Write Speeds	DVD-R DL - Up to 6X DVD+R - Up to 8X DVD+RW - Up to 8X DVD+R DL - Up to 6X DVD-R - Up to 8X DVD-RW - Up to 6X CD-R - Up to 24X CD-RW - Up to 10X DVD-RW, DVD+RW - Up to 8X
Read Speeds	DVD-R DL, DVD+R DL - Up to 8X DVD+R, DVD-R - Up to 8X DVD-ROM DL, DVD-ROM - Up to 8X CD-ROM, CD-R - Up to 24X CD-RW - Up to 24X
Access time (typical reads, including settling)	Random DVD-ROM: 170 ms (typical), CD-ROM: 170 ms (typical) Full Stroke DVD-ROM: 320 ms (typical), CD-ROM: 320 ms (typical) Stop Time 6 seconds (typical)
Power	Source Slimline SATA DC power receptacle DC Power Requirement 5 VDC ± 5%-100 mV ripple p-p DC Current 5 VDC (< 1000 mA typical, 1600 mA maximum)
Environmental conditions (operating - non-condensing)	Temperature 41° to 122° F (5° to 50° C) Relative Humidity 10% to 80% Maximum Wet Bulb Temperature 84° F (29° C)

NETWORKING AND COMMUNICATIONS

Intel® I225-LM 2.5 Gigabit Network Connection LOM (non-vPro®)*	
Connector	RJ-45
System Interface	PCI (Intel proprietary) + SMBus
Data rates supported	1. 10 Mbit/s operation (10BASE-T; IEEE 802.3i; IEEE 802.3 clauses 13-14) 2. 100 Mbit/s operation (100BASE-TX; IEEE 802.3u; IEEE 802.3 clauses 21-30) 3. 1000 Mbit/s operation (1000BASE-T; IEEE 802.3ab; IEEE 802.3 clauses 40) 4. 2.5 Gbit/s operation(2.5GBASE-T; IEEE 802.3bz Clause 126) 5. Auto-Negotiation (Automatic Speed Selection) Full Duplex Operation at all Speeds, Half Duplex operation at 10, 100 & 1000 Mbit/s
IEEE Compliance	IEEE 802.1p QoS (Quality of Service) Support IEEE 802.1q VLAN support IEEE 802.3x Flow Control (IEEE 802.3 clauses 31-32; configurable) IEEE 802.3az EEE (Energy Efficient Ethernet) IEEE 802.3i 10BASE-T IEEE 802.3u 100BASE-TX IEEE 802.3ab 1000BAE-T IEEE 802.3bz 2.5GBASE-T
Performance	TCP/IP/UDP Checksum Offload (configurable) Protocol Offload (ARP & NS) Large send offload and Giant send offload Receiving Side Scaling Jumbo Frame 9K
Power consumption	Cable Disconnetion: 25mW 100Mbps Full Run: 450mW 1000bp Full Run: 1000mW WoL Enable(S3/S4/S5): 50mW WoL Disable(S3/S4/S5): 25mW
Power Management	ACPI compliant - multiple power modes Situation-sensitive features reduce power consumption Advanced link down power saving for reducing link down power consumption
Management Interface	Auto MDI/MDIX Crossover cable detection
IT Manageability	Wake-on-LAN from modern standby or sleep state (Magic Packet and Microsoft Wake-Up Frame); Wake-on-LAN from off (Magic Packet only) PXE 2.1 Remote Boot Statistics Gathering (SNMP MIB II, Ethernet-like MIB, Ethernet MIB (802.3x, clause 30)) Comprehensive diagnostic and configuration software suite Virtual Cable Doctor for Ethernet cable status
Security & Manageability	Intel® vPro® support with appropriate Intel® chipset components
*will be available in Q3, 2021	

Technical Specifications – Networking and Communications

Intel® I219-LM 1 Gigabit Network Connection LOM (standard)	
Connector	RJ-45
System Interface	PCI (Intel proprietary) + SMBus
Data rates supported	10 Mbit/s operation (10BASE-T; IEEE 802.3i; IEEE 802.3 clauses 13-14) 100 Mbit/s operation (100BASE-TX; IEEE 802.3u; IEEE 802.3 clauses 21-30) 1000 Mbit/s operation (1000BASE-T; IEEE 802.3ab; IEEE 8023 clauses 40) Auto-Negotiation (Automatic Speed Selection) Full Duplex Operation at all Speeds, Half Duplex operation at 10 and 100 Mbit/s
IEEE Compliance	IEEE 802.1p QoS (Quality of Service) Support IEEE 802.1q VLAN support IEEE 802.3x Flow Control (IEEE 802.3 clauses 31-32; configurable) IEEE 802.3az EEE (Energy Efficient Ethernet)
Performance	TCP/IP/UDP Checksum Offload (configurable) Protocol Offload (ARP & NS) Large send offload and Giant send offload Receiving Side Scaling Jumbo Frame 9K
Power consumption	Cable Disconnetion: 25mW 100Mbps Full Run: 450mW 1000bp Full Run: 1000mW WoL Enable(S3/S4/S5): 50mW WoL Disable(S3/S4/S5): 25mW
Power Management	ACPI compliant - multiple power modes Situation-sensitive features reduce power consumption Advanced link down power saving for reducing link down power consumption
Management Interface	Auto MDI/MDIX Crossover cable detection
IT Manageability	Wake-on-LAN from modern standby or sleep state (Magic Packet and Microsoft Wake-Up Frame); Wake-on-LAN from off (Magic Packet only) PXE 2.1 Remote Boot Statistics Gathering (SNMP MIB II, Ethernet-like MIB, Ethernet MIB (802.3x, clause 30)) Comprehensive diagnostic and configuration software suite Virtual Cable Doctor for Ethernet cable status
Security & Manageability	Intel® vPro® support with appropriate Intel® chipset components

Intel Wi-Fi 6 AX201 + BT5.1 (802.11ax 2x2, vPro®, supporting gigabit data rate[1]) vPro®	
Wireless LAN Standards	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11ac IEEE 802.11ax IEEE 802.11d IEEE 802.11e IEEE 802.11h IEEE 802.11i IEEE 802.11k IEEE 802.11r IEEE 802.11v

Technical Specifications – Networking and Communications

Interoperability	Wi-Fi® certified
Frequency Band	802.11b/g/n/ax • 2.402 - 2.482 GHz 802.11a/n/ac/ax • 4.9 - 4.95 GHz (Japan) • 5.15 - 5.25 GHz • 5.25 - 5.35 GHz • 5.47 - 5.725 GHz • 5.825 - 5.850 GHz
Data Rates	• 802.11b: 1, 2, 5.5, 11 Mbps • 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps\ • 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz) • 802.11ac : MCS0 ~ MCS9, (1SS, and 2SS) (20MHz, 40MHz, ,80MHz & 160MHz) • 802.11ax : MCS0 ~ MCS11, (1SS and 2SS) (20MHz, 40MHz, ,80MHz & 160MHz)
Modulation	Direct Sequence Spread Spectrum OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM
Security[3]	IEEE and WiFi compliant 64/128bit WEP encryption for a/b/g mode only AES-CCMP: 128 bit in hardware 802.1x authentication WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. WPA2 certification WPA3 certification IEEE 802.11i WAPI
Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between access points
Output Power[2]	802.11b : +17dBm minimum 802.11g : +16dBm minimum 802.11a : +17dBm minimum 802.11n HT20(2.4GHz) : +14dBm minimum 802.11n HT40(2.4GHz) : +13dBm minimum 802.11n HT20(5GHz) : +14dBm minimum 802.11n HT40(5GHz) : +13dBm minimum 802.11ac VHT80(5GHz) : +10dBm minimum 802.11ac VHT160(5GHz) : +10dBm minimum 802.11ax HE40(2.4GHz) : +12dBm minimum 802.11ax HE80(5GHz) : +10dBm minimum 802.11ax HE160(5GHz) : +10dBm minimum
Power Consumption	• Transmit mode: 2.0 W • Receive mode: 1.6 W • Idle mode (PSP) 180 mW (WLAN Associated) • Idle mode: 50 mW (WLAN unassociated) • Connected Standby: 10mW • Radio disabled: 8 mW
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity[3]	•802.11b, 1Mbps : -93.5dBm maximum •802.11b, 11Mbps : -84dBm maximum 802.11a/g, 6Mbps : -86dBm maximum 802.11a/g, 54Mbps : -72dBm maximum 802.11n, MCS07 : -67dBm maximum 802.11n, MCS15 : -64dBm maximum 802.11ac, MCS0(VHT80) : -84dBm maximum

Technical Specifications – Networking and Communications

	802.11ac, MCS9(VHT80) : -59dBm maximum 802.11ac, MCS9(VHT160) : -58.5dBm maximum •802.11ax, MCS11(HE40): -57dBm maximum •802.11ax, MCS11(HE80): -54dBm maximum •802.11ax, MCS11(HE160): -53.5dBm maximum	
Antenna type	High efficiency antenna with spatial diversity, mounted in the display enclosure Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications	
Form Factor	PCI-Express M.2 MiniCard with CNVi Interface	
Dimensions	1. Type 2230: 2.3 x 22.0 x 30.0 mm 2. Type 1216: 1.67 x 12.0 x 16.0 mm	
Weight	1. Type 2230: 2.8g 2. Type 126: 1.3g	
Operating Voltage	3.3v +/- 9%	
Temperature	Operating Non-operating	14° to 158° F (-10° to 70° C) -40° to 176° F (-40° to 80° C)
Humidity	Operating Non-operating	10% to 90% (non-condensing) 5% to 95% (non-condensing)
Altitude	Operating Non-operating	0 to 10,000 ft (3,048 m) 0 to 50,000 ft (15,240 m)
LED Activity	LED Amber - Radio OFF; LED White - Radio ON	
HP Integrated Module with Bluetooth® 4.0/4.1/4.2/5.0/5.1 Wireless Technology		
Bluetooth® Specification	4.0/4.1/4.2/5.0/5.1 Compliant	
Frequency Band	2402 to 2480 MHz	
Number of Available Channels	Legacy: 0~79 (1 MHz/CH) BLE: 0~39 (2 MHz/CH)	
Data Rates and Throughput	Legacy: 3 Mbps data rate; throughput up to 2.17 Mbps	
	BLE: 1 Mbps data rate; throughput up to 0.2 Mbps	
	Legacy: Synchronous Connection Oriented links up to 3, 64 kbps, voice channels. Legacy: Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)	
Transmit Power	The Bluetooth® component shall operate as a Class II Bluetooth® device with a maximum transmit power of +9.5 dBm for BR and EDR.	
Power Consumption	Peak (Tx) 330 mW Peak (Rx) 230 mW Selective Suspend 17 mW	
Bluetooth® Software Supported Link Topology	Microsoft Windows Bluetooth® Software	
Power Management	Microsoft Windows ACPI, and USB Bus Support	
Certifications	FCC (47 CFR) Part 15C, Section 15.247 & 15.249	
Power Management Certifications	ETS 300 328, ETS 300 826 Low Voltage Directive IEC950 UL, CSA, and CE Mark	
Bluetooth Profiles Supported	BT4.1-ESR 5/6/7 Compliance LE Link Layer Ping LE Dual Mode LE Link Layer LE Low Duty Cycle Directed Advertising LE L2CAP Connection Oriented Channels Train Nudging & Interlaced Scan BT4.2 ESR08 Compliance LE Secure Connection- Basic/Full LE Privacy 1.2 -Link Layer Privacy LE Privacy 1.2 -Extended Scanner Filter Policies	

	LE Data Packet Length Extension FAX Profile (FAX) Basic Imaging Profile (BIP)2 Headset Profile (HSP) Hands Free Profile (HFP) Advanced Audio Distribution Profile (A2DP)
Security & Manageability	Intel® vPro® support with appropriate Intel® chipset components

Note1: Wi-Fi 5 or 6 is designed to support gigabit data rate when transferring files between two devices connected to the same route Requires a wireless router, sold separately, that supports 80MHz and higher channels.

Intel Wi-Fi 6 AX201 + BT5.1 (802.11ax 2x2, non-vPro®, supporting gigabit data rate[1]) non-vPro®	
Wireless LAN Standards	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11ac IEEE 802.11ax IEEE 802.11d IEEE 802.11e IEEE 802.11h IEEE 802.11i IEEE 802.11k IEEE 802.11r IEEE 802.11v
Interoperability	Wi-Fi® certified
Frequency Band	802.11b/g/n/ax 2.402 - 2.482 GHz 802.11a/n/ac/ax 4.9 - 4.95 GHz (Japan) 5.15 - 5.25 GHz 5.25 - 5.35 GHz 5.47 - 5.725 GHz 5.825 - 5.850 GHz
Data Rates	802.11b: 1, 2, 5.5, 11 Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz) 802.11ac : MCS0 ~ MCS9, (1SS, and 2SS) (20MHz, 40MHz, ,80MHz & 160MHz) 802.11ax : MCS0 ~ MCS11, (1SS and 2SS) (20MHz, 40MHz, ,80MHz & 160MHz)
Modulation	Direct Sequence Spread Spectrum OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM
Security[3]	IEEE compliant 64 / 128 bit WEP encryption for a/b/g mode only AES-CCMP: 128 bit in hardware 802.1x authentication WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. WPA2 certification IEEE 802.11i WAPI
Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between access points
Output Power[2]	• 802.11b: +17dBm minimum • 802.11g: +16dBm minimum • 802.11a: +17dBm minimum • 802.11n HT20(2.4GHz): +14dBm minimum • 802.11n HT40(2.4GHz): +13dBm minimum • 802.11n HT20(5GHz): +14dBm minimum • 802.11n HT40(5GHz): +13dBm minimum

Technical Specifications – Networking and Communications

	• 802.11ac VHT80(5GHz): +10dBm minimum • 802.11ac VHT160(5GHz): +10dBm minimum • 802.11ax HE40(2.4GHz): +12dBm minimum • 802.11ax HE80(5GHz): +10dBm minimum • 802.11ax HE160(5GHz): +10dBm minimum	
Power Consumption	Transmit mode 2.0 W Receive mode 1.6 W Idle mode (PSP) 180 mW (WLAN Associated) Idle mode 50 mW (WLAN unassociated) Connected Standby:10mW Radio disabled 8 mW	
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode	
Receiver Sensitivity[3]	• •802.11b, 1Mbps: -93.5dBm maximum • •802.11b, 11Mbps: -84dBm maximum • 802.11a/g, 6Mbps: -86dBm maximum • 802.11a/g, 54Mbps: -72dBm maximum • 802.11n, MCS07: -67dBm maximum • 802.11n, MCS15: -64dBm maximum • 802.11ac, MCS0(VHT80): -84dBm maximum • 802.11ac, MCS9(VHT80): -59dBm maximum • 802.11ac, MCS9(VHT160): -58.5dBm maximum • •802.11ax, MCS11(HE40): -57dBm maximum • •802.11ax, MCS11(HE80): -54dBm maximum • •802.11ax, MCS11(HE160): -53.5dBm maximum	
Antenna type	High efficiency antenna with spatial diversity, mounted in the display enclosure Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications	
Form Factor	PCI-Express M.2 MiniCard with CNVi Interface	
Dimensions	1. Type 2230: 2.3 x 22.0 x 30.0 mm 2. Type 1216: 1.67 x 12.0 x 16.0 mm	
Weight	1. Type 2230: 2.8g 2. Type 126: 1.3g	
Operating Voltage	3.3v +/- 9%	
Temperature	Operating Non-operating	14° to 158° F (-10° to 70° C) -40° to 176° F (-40° to 80° C)
Humidity	Operating Non-operating	10% to 90% (non-condensing) 5% to 95% (non-condensing)
Altitude	Operating Non-operating	0 to 10,000 ft (3,048 m) 0 to 50,000 ft (15,240 m)
LED Activity	LED Amber - Radio OFF; LED Off - Radio ON	

HP Integrated Module with Bluetooth® 4.0/4.1/4.2/5.0/5.1 Wireless Technology

Bluetooth® Specification	4.0/4.1/4.2/5.0/5.1 Compliant
Frequency Band	2402 to 2480 MHz
Number of Available Channels	Legacy : 0~79 (1 MHz/CH) BLE : 0~39 (2 MHz/CH)
Data Rates and Throughput	Legacy : 3 Mbps data rate; throughput up to 2.17 Mbps
	BLE : 1 Mbps data rate; throughput up to 0.2 Mbps
	Legacy : Synchronous Connection Oriented links up to 3, 64 kbps, voice channels. Legacy : Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)
Transmit Power	The Bluetooth® component shall operate as a Class II Bluetooth® device with a maximum transmit power of +9.5 dBm for BR and EDR.
Power Consumption	Peak (Tx) 330 mW Peak (Rx) 230 mW Selective Suspend 17 mW

Technical Specifications – Networking and Communications

Bluetooth® Software Supported Link Topology	Microsoft Windows Bluetooth® Software
Power Management	Microsoft Windows ACPI, and USB Bus Support
Certifications	FCC (47 CFR) Part 15C, Section 15.247 & 15.249
Power Management Certifications	ETS 300 328, ETS 300 826 Low Voltage Directive IEC950 UL, CSA, and CE Mark
Bluetooth Profiles Supported	BT4.1-ESR 5/6/7 Compliance LE Link Layer Ping LE Dual Mode LE Link Layer LE Low Duty Cycle Directed Advertising LE L2CAP Connection Oriented Channels Train Nudging & Interlaced Scan BT4.2 ESR08 Compliance LE Secure Connection- Basic/Full LE Privacy 1.2 -Link Layer Privacy LE Privacy 1.2 -Extended Scanner Filter Policies LE Data Packet Length Extension FAX Profile (FAX) Basic Imaging Profile (BIP)2 Headset Profile (HSP) Hands Free Profile (HFP) Advanced Audio Distribution Profile (A2DP)
Note1: Wi-Fi 5 or 6 is designed to support gigabit data rate when transferring files between two devices connected to the same route Requires a wireless router, sold separately, that supports 80MHz and higher channels.	

Realtek RTL8852AE 802.11ax 2x2 Wi-Fi 6+ BT5.2 (802.11ax 2x2, supporting gigabit data rate[1])	
Wireless LAN Standards	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11ac IEEE 802.11ax IEEE 802.11d IEEE 802.11e IEEE 802.11h IEEE 802.11i IEEE 802.11k IEEE 802.11r IEEE 802.11v
Interoperability	Wi-Fi® certified modules
Frequency Band	802.11b/g/n/ax 2.402 - 2.482 GHz 802.11a/n/ac/ax 4.9 - 4.95 GHz (Japan) 5.15 - 5.25 GHz 5.25 - 5.35 GHz 5.47 - 5.725 GHz 5.825 - 5.850 GHz
Data Rates	802.11b: 1, 2, 5.5, 11 Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz) 802.11ac : MCS0 ~ MCS9, (1SS, and 2SS) (20MHz, 40MHz & 80MHz) 802.11ax : MCS0 ~ MCS11, (1SS and 2SS) (20MHz, 40MHz, ,80MHz)

Technical Specifications – Networking and Communications

Modulation	Direct Sequence Spread Spectrum BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM
Security[3]	IEEE and WiFi certified 64 / 128 bit WEP encryption for a/b/g mode only AES-CCMP: 128 bit in hardware 802.1x authentication WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. WPA2 certification WPA3 certification IEEE 802.11i WAPI
Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between access points
Output Power[2]	802.11b : +18.5dBm minimum 802.11g : +17.5dBm minimum 802.11a : +18.5dBm minimum 802.11n HT20(2.4GHz) : +15.5dBm minimum 802.11n HT40(2.4GHz) : +14.5dBm minimum 802.11n HT20(5GHz) : +15.5dBm minimum 802.11n HT40(5GHz) : +14.5dBm minimum 802.11ac VHT80(5GHz) : +11.5dBm minimum 802.11ax HE40(2.4GHz) : +10dBm minimum 802.11ax HE80(5GHz) : +10dBm minimum
Power Consumption	Transmit mode:2.5 W Receive mode:2 W Idle mode (PSP) 180 mW (WLAN Associated) Idle mode :50 mW (WLAN unassociated) Connected Standby/Modern Standby: 10mW Radio disabled: 8 mW
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity[3]	• 802.11b, 1Mbps: -93.5dBm maximum • 802.11b, 11Mbps: -84dBm maximum • 802.11a/g, 6Mbps: -86dBm maximum • 802.11a/g, 54Mbps: -72dBm maximum • 802.11n, MCS07: -67dBm maximum • 802.11n, MCS15: -64dBm maximum • 802.11ac, MCS0: -84dBm maximum • 802.11ac, MCS9: -59dBm maximum • 802.11ax, MCS11(HE40): -57dBm maximum • 802.11ax, MCS11(HE80): -54dBm maximum
Antenna type	High efficiency antenna with spatial diversity, mounted in the display enclosure Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications
Form Factor	PCI-Express M.2 MiniCard
Dimensions	1. Type 2230: 2.3 x 22.0 x 30.0 mm 2. Type 1216: 1.67 x 12.0 x 16.0 mm
Weight	1. Type 2230: 2.8g 2. Type 126: 1.3g
Operating Voltage	3.3v +/- 9%

Technical Specifications – Networking and Communications

Temperature	Operating Non-operating	14° to 158° F (-10° to 70° C) -40° to 176° F (-40° to 80° C)
Humidity	Operating Non-operating	10% to 90% (non-condensing) 5% to 95% (non-condensing)
Altitude	Operating Non-operating	0 to 10,000 ft (3,048 m) 0 to 50,000 ft (15,240 m)
LED Activity	LED Amber - Radio OFF; LED OFF - Radio ON	

HP Integrated Module with Bluetooth® 4.0/4.1/4.2/5.0 Wireless Technology

Bluetooth® Specification	4.0/4.1/4.2/5.0 Compliant
Frequency Band	2402 to 2480 MHz
Number of Available Channels	Legacy: 0~79 (1 MHz/CH) BLE: 0~39 (2 MHz/CH)
Data Rates and Throughput	Legacy: 3 Mbps data rate; throughput up to 2.17 Mbps
	BLE: 1 Mbps data rate; throughput up to 0.2 Mbps
	Legacy: Synchronous Connection Oriented links up to 3, 64 kbps, voice channels Legacy: Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)
Transmit Power	The Bluetooth® component shall operate as a Class II Bluetooth® device with a maximum transmit power of +4 dBm for BR and EDR.
Power Consumption	Peak (Tx) 330 mW Peak (Rx) 230 mW Selective Suspend 17 mW
Bluetooth® Software Supported Link Topology	Microsoft Windows Bluetooth® Software
Power Management	Microsoft Windows ACPI, and USB Bus Support
Certifications	FCC (47 CFR) Part 15C, Section 15.247 & 15.249
Power Management Certifications	ETS 300 328, ETS 300 826 Low Voltage Directive IEC950 UL, CSA, and CE Mark
Bluetooth Profiles Supported	BT4.1-ESR 5/6/7 Compliance LE Link Layer Ping LE Dual Mode LE Link Layer LE Low Duty Cycle Directed Advertising LE L2CAP Connection Oriented Channels Train Nudging & Interlaced Scan BT4.2 ESR08 Compliance LE Secure Connection- Basic/Full LE Privacy 1.2 -Link Layer Privacy LE Privacy 1.2 -Extended Scanner Filter Policies LE Data Packet Length Extension FAX Profile (FAX) Basic Imaging Profile (BIP)2 Headset Profile (HSP) Hands Free Profile (HFP) Advanced Audio Distribution Profile (A2DP)

Note1: Wi-Fi 5 or 6 is designed to support gigabit data rate when transferring files between two devices connected to the same route Requires a wireless router, sold separately, that supports 80MHz and higher channels.

I/O DEVICES

HP Wired Desktop 320K Keyboard		
Physical Characteristics	Keys	104, 105, 107, 109 layout (depending on country)
	Dimensions (L x W x H)	16.77 x 4.36 x 0.65 in (426.2 x 110.9 x 16.7 mm)
	Weight	14.57 oz (413g)
	Cable length	6 ft. (1.8 m)
Electrical	Operating voltage	5V
	Power consumption	50mA - 100 mA
	System interface	USB
Mechanical	Keycaps	Low-profile design
	Switch actuation	60±10g nominal peak force with tactile feedback
	Switch life	10 million keystrokes (Life tester)
	Switch type	Plunger
Environmental		
	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 149° F (-30° to 65° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	0% to 90% (non-condensing at ambient)
Approvals	FCC, ICES, CULus, CE, GS, EAC, Ukraine, India BIS, KCC, RCM, BSMI, VCCI	
Ergonomic compliance	TUVGS	
Kit contents	Keyboard, QSP, Warranty Card, Product Notice	

HP USB Premium Keyboard		
Physical Characteristics	Keys	104, 105 layout (depending upon country)
	Dimensions (L x W x H)	17.04 x 5.55 x 0.52 in (433 x 141 x13.2 mm)
	Weight	1.54 lb. (698g)
Electrical	Operating voltage	5 VDC, +/-5%
	Power consumption	35mA (All LED on)
	System interface	USB Type A plug connector
	ESD	Contact Discharge: 8 KV Air Discharge: 15 KV
	EMI - RFI	Conforms to FCC rules for a Class B computing device
	Microsoft® PC 99 - 2001	Functionally compliant
Mechanical	Keycaps	Low-profile design
	Switch actuation	60±10g nominal peak force with tactile feedback
	Switch life	10 million keystrokes (Life tester)
	Switch type	Contamination-resistant switch membrane

Technical Specifications – Input/Output Devices

	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft. (1.8 m)
	Microsoft PC 99 - 2001	Mechanically compliant
Environmental	Acoustics	43-dBA maximum sound pressure level
	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	20% to 80% (non-condensing at ambient)
	Operating shock	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	30 in (76.2 cm) on concrete, 16-drop sequence
Approvals	UL, FCC, CE Mark, TUV GS, VCCI, BSMI, RCM, KCC	
Ergonomic compliance	TUVGS	
Kit contents	Keyboard, QSP	
Warranty Card	Product Notice	

HP Wired Desktop 320M Mouse		
Dimensions (H x L x W)	4.08 x 2.49 x 1.39 in (103.8 x 63.4 x 35.5 mm)	
Weight	2.67 oz (75.8 g)	
Mechanical	Connector	USB
	Resolution	1000 DPI
	Sensor	Optical Red Sensor
Tracking speed	Tracking acceleration	8G(max), 1G=9.8m/s2
	Cable length	6 ft. (1.8 m)
	Color	Jack Black
Regulatory approvals	Compliant	FCC, ICES, CULus, CE, GS, EAC, Ukraine. India BIS, KCC, RCM, BSMI, VCCI

Technical Specifications – Input/Output Devices

HP USB Premium Mouse		
Dimensions (H x L x W)	4.21 x 2.64 x 1.52 in (107 x 67 x 38.7 mmm)	
Weight	0.19lb (90g)	
Environmental	Operating temperature	50° to 122°F (10° to 50° C)
	Non-operating temperature	-22° to 140°F (-30° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	20% to 80% (non-condensing at ambient)
	Operating shock	50 g, 6 surfaces
	Non-operating shock	80 g, 6 surfaces
	Operating vibration	2 g peak acceleration
	Non-operating vibration	4 g peak acceleration
Electrical	Operating voltage	5 VDC, +/-5%
	Power consumption	12mA
Mechanical	Connector	USB 2.0
	Type	3D mouse (3 keys and wheel)
	Resolution	800, 1200, 1600 DPI
	Sensor	Pixart PAN3606DL
Tracking speed	Tracking acceleration	8G(max), 1G=9.8m/s2
	Cable length	6 ft. (1.8 m)
	Color	Jack Black
Regulatory approvals	Compliant	UL, FCC, CE Mark, TUV GS, VCCI, BSMI, RCM, KCC

HP USB Mouse		
Dimensions (H x L x W)	37mm x 115mm x 62.9mm	
Weight	90 +10g/- 5 g	
Color	Black	
Connector	USB	
Mechanical	Resolution	800 DPI sensitivity
	Buttons	Two primary buttons and clickable scroll wheel

AUDIO/MULTIMEDIA

Type	Integrated
HD Stereo Codec	Realtek ALC3205
Audio I/O Ports	Front: Headset connector supports a CTIA and OMTP style headset and is re-taskable as a Line-in, Line-out, Microphone-in or Headphone-out port
Internal Speaker Amplifier	2W class D mono amplifier for the internal speaker only. External speakers must be powered
Multi-streaming Capable	Playback multi-streaming can be enabled in the audio control panel to allow independent audio streams to be sent to/from the front and rear jacks or integrated speaker.
Sampling	Independent sampling rates for DAC's and ADC's; supports resolutions from 16 to 24-bit; 44.1 kHz t 192 kHz for DAC and 44.1 kHz to 192 kHz for ADC
Wavetable Syntheses	Yes - Uses OS soft wavetable
Analog Audio	Yes
# of Channels on Line-Out	Stereo (Left & Right channels)

POWER

HP Z1 G8 Tower Desktop PC

Unit Environment and Operating Conditions	
Temperature Range	Operating: 5°C ~35°C Non-Operating: -40°C ~66°C
Relative Humidity	Operating 5% to 90% relative humidity at max inlet temperature Non-Operating 5% to 90% relative humidity at max inlet temperature
Maximum Altitude (unpressurized)	Operating: 5000m Non-operating: 50,000 ft. (15240 m)
80 PLUS Platinum	550W active PFC / 80 PLUS Platinum 260W active PFC / 80 PLUS Platinum 90/92/89% efficient at 20/50/100% load (115V) 91/93/90% efficient at 20/50/100% load (230V)
Operating Voltage Range	90Vac~264Vac
Rated Voltage Range	100Vac~240Vac
Rated Line Frequency	50HZ~60HZ
Operating Line Frequency	47HZ~63HZ
Rated Input Current	
Rated Input Current with Energy Efficient* Power Supply	260W Platinum?3.1A 350W Platinum?4A 550W Platinum?6.6A
DC Output	+12V
Current Leakage (NFPA 99: 2102)	Less than 500 microamps of leakage current at 120 Vac with the ground wire disconnected, as required for Non-patient Electrical Appliances and Equipment used in a patient care facility or that contact patients in normal use. Per section 10.3.5.1. Less than 100 microamps of leakage current at 120 Vac with the ground wire intact with normal polarity, as required for Non-patient Electrical Appliances and Equipment used in a patient care facility or that contact patients in normal use. Per section 10.3.5.1.
Power Supply Fan	70mm variable speed
Power cord length	6.0 ft. (1.83 m)
External Power Adapter	Internal power supply
Dimensions	165mm x 95mm x 73mm
Total Cord Length	6.0 ft. (1.83 m)

The power supply shall comply with harmonic input current requirements as detailed in EN61000-3-2 and JEIDA MITI standards. The harmonic input current requirements must be met under the following operating conditions:
Load Requirements: 50% and 100%
Input Voltage: 230Vac/50Hz.
For active power factor correction the power factor at 50% &100% loads shall be greater than 0.9 over the entire nominal input volta range (100-127VAC and 200-240VAC).

Technical Specifications – Power

Condition	Standard Efficiency	82/85/82%	85/88/85%	87/90/87%	90/92/89%	Input Voltage
10% of Rated Load	-	75%	81%	84%	86%	115Vac/60HZ
20% of Rated Load	-	82%	85%	87%	90%	115Vac/60HZ
50% of Rated Load	-	85%	88%	90%	92%	115Vac/60HZ
	PF>0.9	PF>0.9	PF>0.9	PF>0.9	PF>0.95	
100% of Rated Load	70%	82%	85%	87%	89%	115Vac/60HZ
	PF>0.9	PF>0.9	PF>0.9	PF>0.9	PF>0.9	230Vac/50HZ

WEIGHTS & DIMENSIONS

Chassis (W x D x H)	6.61 x 12.13 x 14.57 in 168 x 308 x 370 mm
System Volume	1168 cu in 19.14 L
System Weight	13.11 lb 5.95 kg
Max Supported Weight (desktop orientation)	77 lb 35 kg
Stand Dimensions	N/A
Packaging (W x D x H)	11.77 x 18.82 x 20.35 in 299 x 478 x 517 mm
Shipping Weight	11.34 kg 24.98 lb
Palletization Profile	8 units per layer 4 layers ax 32 units per pallet 1200 x 1000 x 2203 mm (include the pallet)

MISCELLANEOUS FEATURES

Management Features

- Advanced Configuration and Power Management Interface (ACPI). Allows the system to wake from a low power mode. Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system.
- Intel® Wired for Management support; industry wide initiative to make Intel® architecture based PCs, servers and mobile computers more inherently manageable out-of-the-box and over the network
- Dual State Power Button; acts as both an on/off button and a suspend-to-sleep button

Serviceability Features

- Dual colored power LED on front of computer to indicate either normal or fault condition
- Diagnostic LED Explanation Table:
  - Power LED will blink red 2 to 5 times, then blink white 2 or more times, then repeat (with beep tones for each blink initially):
    - 2 red + 2 white User must provide file for BIOS recovery (USB storage typically)
    - 2 red + 3 white User must enter a key sequence to proceed with recovery by policy
    - 2 red + 4 white BIOS recovery is in progress
    - 3 red + 2 white Memory could not be initialized
    - 3 red + 3 white Graphics adaptor could not be found
    - 3 red + 4 white Power supply failure / not connected
    - 3 red + 5 white Processor not installed
    - 3 red + 6 white Current processor does not support an enabled feature
    - 4 red + 2 white Processor has exceeded its temperature threshold / system thermal shutdown
    - 4 red + 3 white System internal temperature has exceeded its threshold
    - 5 red + 2 white System controller firmware is not valid
    - 5 red + 3 white System controller detected BIOS is not executing
    - 5 red + 4 white BIOS could not complete initialization / PCA failure
    - 5 red + 5 white System controller rebooted the system after a health or recovery timer triggered

Technical Specifications – Miscellaneous Features

- HP PC Hardware Diagnostics UEFI:
  - This utility enables hardware level testing outside the operating system on many components. The diagnostics can be invoked by pressing F2 at POST, and is available as a download from HP Support
- System/Emergency ROM
- Flash ROM
- CMOS Battery Holder for easy replacement
- 1 Aux Power LED on System PCA
- Processor ZIF Socket for easy Upgrade
- Over-Temp Warning on Screen (Requires IM Agents)
- DIMM Connectors for easy Upgrade
- Clear CMOS Button
- NIC LEDs (integrated) (Green & Amber)
- Dual Color Power and HD LED - To Indicate Normal Operations and Fault Conditions
- Color coordinated cables and connectors
- Tool-less Hood Removal
- Front power switch
- System memory can be upgraded without removing the system board or any internal components
- Tool-less Hard Drive, CD & Diskette Removal (For MT, SFF, and DM only)
- Green Pull Tabs, and Quick Release Latches for easy Identification

Additional Features	Description
Drive Lock	Implementation of the industry standard ATA Security feature set. When enabled, it prevents software access to user data on the drive until one or two user-defined passwords are provided.
Boot Sectors Protection	MBR and GPT sectors of the hard drive are critical to booting the operating system. By saving the MBR or GPT data (depending on the how the OS was installed), the BIOS will b able to monitor for changes and allow the user to override them with the backup copy a boot-up.
Drive Protection System	DPS Access through F10 Setup during Boot (for SATA hard drive only)
	A diagnostic hard drive self- test. It scans critical physical components and every sector of the hard drive for physical faults and then reports any faults to the user
	Running independently of the operating system, it can be accessed through a Windows-based diagnostics utility or through the computer's setup procedure. It produces an evaluation on whether the hard drive is the source of the problem and needs to be replaced
	The system expands on the Self-Monitoring, Analysis, and Reporting Technology (SMART), a continuously running systems diagnostic that alerts the user to certain type of failures
SMART Technology (Self-Monitoring, Analysis and Reporting Technology)	Allows hard drives to monitor their own health and to raise flags if imminent failures were predicted
SMART I - Drive Failure Prediction	Predicts failures before they occur. Tracks fault prediction and failure indication parameters such as re-allocated sector count, spin retry count, calibration retry count
SMART II - Off-Line Data Collection	By avoiding actual hard drive failures, SMART hard drives act as "insurance" against unplanned user downtime and potential data loss from hard drive failure
SMART III - Off-Line Read Scanning with Defect Reallocation	IOEDC: I/O Error Detection Circuitry
SMART IV - End-to-End CRC for hard drives	Detects errors in Read/Write buffers on HDD cache RAM

AFTER MARKET OPTIONS

Graphics Solutions	Part Number
AMD® Radeon™ R7 430 2GB 2 Display Port Card	5JW82AA
AMD® Radeon™ R7 430 2GB DP+VGA Card	5JW81AA
Data Storage Drives	**Part Number**
HP PCIe NVME TLC M.2 256GB SS	1CA51AA
HP PCIe NVME TLC M.2 512GB SSD	X8U75AA
HP PCIe Gen 4 NVME TLC M.2 512GB SSD	TBD
HP PCIe Gen 4 NVME TLC M.2 1TB SSD	TBD
HP 500GB 7200PRM SATA 3.5” Hard Drive	QK554AA
HP 1TB 7200rpm SATA 3.5” Hard Drive	QK555AA
HP DVD-Writer 9.5mm ODD	1CA53AA
Input Devices	**Part Number**
HP Desktop Wired 320K Keyboard	9SR37AA
HP 125 Wired Keyboard	266C9AA
HP 225 Antimicrobial Wired Mouse and Keyboard Combo	286K3AA
HP 225 Wired Mouse and Keyboard Combo	286J4AA
HP 125 Wired Mouse	265A9AA
HP Wired Desktop 320K Keyboard	9SR37AA
HP Wired Desktop 320M Mouse	9VA80AA
HP Wired Desktop 320MK Mouse and Keyboard	9SR36AA
HP USB Business Slim CCID SmartCard Keyboard	Z9H48AA
HP USB Keyboard	QY776AA
HP USB Keyboard and Mouse Healthcare Edition	1VD81AA
HP USB Premium Keyboard	Z9N40AA
HP USB PS/2 Washable Keyboard & Mouse	BU207AA
HP Wireless Business Slim Keyboard and Mouse	N3R88AA
HP Wireless Premium Keyboard	Z9N41AA
HP PS/2 Business Slim Keyboard	N3R86AA
HP USB Fingerprint Mouse	4TS44AA
HP USB Premium Mouse	1JR32AA
HP PS/2 Mouse	QY775AA
HP Wireless Premium Mouse	1JR31AA

Technical Specifications – After Market Options

System Memory	Part Number
HP 4GB DDR4-3200 UDIMM	13L78AA
HP 8GB DDR4-3200 UDIMM	13L76AA
HP 16GB DDR4-3200 UDIMM	13L74AA
HP 32GB DDR4-3200 UDIMM	13L72AA
Multimedia Devices	**Part Number**
HP Business Headset v2	T4E61AA
HP S101 Speaker Bar	5UU40AA
Security Devices	**Part Number**
HP Business PC Security Lock v3 Kit	3XJ17AA
I/O Devices	**Part Number**
HP DisplayPort Port Flex IO v2	13L54AA
HP HDMI Port Flex IO v2	13L55AA
HP Type-C® USB 3.1 Gen2 Port Flex IO v2	13L59AA
HP VGA Port Flex IO v2	13L53AA
HP Serial Port Flex IO v2	13L56AA
HP PCIe x1 Parallel Port Card	N1M40AA
HP Serial/PS/2 Adapter Kit (in PCIe slot)	1VD82AA
HP USB to Serial Port Adapter	J7B60AA
HP USB-C to Display Port Adapter	N9K78AA
HP USBC to HDMI Adapter	4SH07AA
HP HDMI Standard Cable Kit	T6F94AA
HP DisplayPort Cable Kit	VN567AA
HP DisplayPort To VGA Adapter	AS615AA
HP DisplayPort To DVI-D Adapter	FH973AA
HP DisplayPort to HDMI Adapter	2JA63AA
NOTE: For more detail on HP I/O Devices please refer to the HP FLEX IO Option Cards QuickSpecs. URL is: http://h20195.www2.hp.com/v2/GetDocument.aspx?docname=c06042607	
Communication Devices	**Part Number**
Intel I225V Single Port 2.5GbE PCIe NIC*	406L9AA
*Will be available in Q3,2021	

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Date	Version History	Action	Description of Change
May 13, 2021	From v1 to v2	Added	Intel Q570 chipset