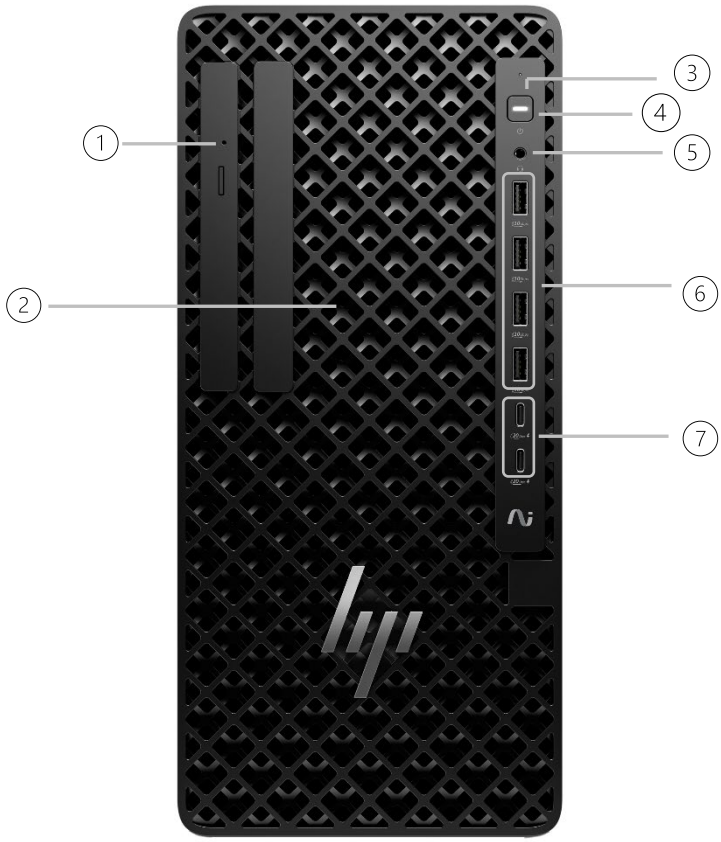
Overview

HP Z1 Tower G1i Desktop PC



Front view

1. Slim optical drive bay (optional)
2. Slim optical bay for M.2 SSD (optional)
3. Hard drive activity light
4. Dual-state power button
5. Combo Audio Jack with CTIA and OMTP headset support
6. (4) Type-A SuperSpeed USB 10Gbps signaling rate port
7. (2) Type C SupperSpeed USB 20Gps (charge support 15W

Not shown

(1) PCI Express Gen5 x16

(2) PCI Express Gen3 x1

(1) PCI Express Gen4 x16 (wired as x4)

(4) M.2 (1 as M.2 2230 socket for WLAN/Bluetooth® and 3 as M.2 2280 socket for storage)

Overview

HP Z1 Tower G1i Desktop PC



Rear view

1. Audio line-out jack (supports line-in re-tasking)
2. (2) Dual-Mode DisplayPort™ 2.1 HBR3
3. HDMI port 2.1
4. Flex port, choice of:
   - DisplayPort™ 2.1
   - HDMI 2.1
   - VGA
   - Serial
   - Fiber NIC 1Gbps
   - Thunderbolt™ 4
   - Dual Type-A SuperSpeed USB 5Gbps signaling rate port
   - Dual Type-C SuperSpeed USB 10Gbps signaling rate port
   - USB-C® SuperSpeed USB 10Gbps signaling rate port (USB-C® option has alt mode DisplayPort™ 1.4 and 15W output)
5. RJ-45 (network) Jack
6. (2) Type A Hi-Speed USB 480 Mbps signaling rate port with wake from S4/S5
7. (2) Type A SuperSpeed USB 5Gbps signaling rate port
8. (1) Type-A Hi-Speed USB 480Mbps
9. Flex Port 2, choice of :
   - Dual Type-A SuperSpeed USB 5Gbps signaling rate port
   - Serial
10. Padlock loop
11. Standard cable lock slot
12. Optional serial port (shown her not installed)
13. Integrated keyboard/mouse wire hoop
14. Power cord connector

Not shown

Optional ports

Optional Parallel port[1]

Optional 4 Serial Port PCIe Card[1]

Bays

(2) 3.5" internal storage drive bay

(2) Slim bay (for ODD and removable SSD)*

*The not shown Bays of (2) Slim bay (for ODD and removable SSD) only for CTO

Features

PRODUCT NAME

HP Z1 Tower G1i Desktop PC

OPERATING SYSTEM

Preinstalled

Windows 11 Pro[1]
Windows 11 Pro Education[1]
Windows 11 Home - HP recommends Windows 11 Pro for business[1]
Windows 11 Home Single Language - HP recommends Windows 11 Pro for business[1]
Windows 11 Pro (Windows 11 Enterprise or Windows 10 Enterprise available with a Volume Licensing Agreement)[1]
FreeDOS

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

CHIPSET

Intel® Q870

Features

PROCESSORS

Intel® Core Ultra Processor
Intel® Core™ Ultra 9-285 Processor with Intel® UHD Graphics xxx (2.5GHz, up to 5.6GHz with Intel® Turbo Boost Max Technology and Intel® Thermal Velocity Boost, 36MB L3 Cache, 24 cores) 65W, Supports Intel® vPro® Technology
Intel® Core™ Ultra 7-265 Processor with Intel® UHD Graphics xxx (2.4GHz, up to 5.3GHz with Intel® Turbo Boost Max Technology, 30MB L3 Cache, 20 cores) 65W, Supports Intel® vPro® Technology
Intel® Core™ Ultra 5-245 Processor with Intel® UHD Graphics xxx (3.5GHz, up to 5.1GHz, 24MB L3 Cache, 14 cores) 65W, Supports Intel® vPro® Technology
Intel® Core™ Ultra 5-235 Processor with Intel® UHD Graphics xxx (3.4GHz, up to 5GHz, 24MB L3 Cache, 14 cores) 65W, Supports Intel® vPro® Technology
Intel® Core™ Ultra 5-225 Processor with Intel® UHD Graphics xxx (3.3GHz, up to 4.9GHz, 20MB L3 Cache, 10 cores) 65W,

1. 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.
2. 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 vPro® requires Windows 10 Pro 64 bit or higher, a vPro supported processor, vPro enabled chipset, vPro enabled wired LAN and/or Wi-Fi 6E WLAN and TPM 2.0. Some functionality requires additional 3rd party software in order to run. Features of vPro® Essentials and Enterprise vary. See http://intel.com/vpro.

Features

GRAPHICS

Integrated Intel® Graphics

Intel® UHD Graphics 4X[e3]
Intel® UHD Graphics 3X[e3]
Intel® UHD Graphics 2X[e3]

Optional Discrete Graphics Solutions

NVIDIA® A400 4GB GDDR6 Graphics card[4]
NVIDIA® A1000 8GB GDDR6 Graphics card[4]
NVIDIA RTX PRO 2000 Blackwell 16 GB 4mDP Graphics Card
Intel® Arc™ A380 6GB GDDR6 Graphics card
AMD Radeon™ RX 6300 2GB GDDR6 Graphics card

Note: Other 3rd Party graphics cards available. Please inquire with your sales specialist or channel partner.

1. Not available with 280W power supply.
2. Support up to 7 displays via native video ports and graphics on Desktop Mini with 35W processors. Support up to 7 displays via native video ports, 1 optional video port flex IO and HP Video Port Extender flex module on Desktop Mini.
3. Xe is Intel LPG Graphics Architecture, one Xe-core represents 16EU.
4. Not available with 180W power supply.
5. Support up to 8 displays via native video ports, a configurable Flex IO port and a discrete graphics on TWR & SFF.

Adapters and Cables

HP DisplayPort™ Cable
HP DisplayPort™ to DVI-D Adapter
HP DisplayPort™ to VGA Adapter
HP USB to Serial Port Adapter
HP USB-C® to HDMI Adapter
HP USB-C® to DisplayPort™ Adapter G2

Features

STORAGE

NOTE: Starting November 1, 2023, HP PCs with Windows require Windows to be installed on SSD.
HDD can only be configured as additional data drives and not as the boot drive.
NOTE: SATA RAID and NVME RAID can be supported simultaneously when customers configure on their own.
SATA RAID can be configured as RAID 0 or 1 and M.2 NVMe RAID supports RAID 0, 1, or 5.
NOTE: M.2 NVMe RAID 5 is not pre-configured at the factory—customers need to set it up manually

3.5 inch SATA Hard Disk Drives (HDD)

1TB* 7200RPM SATA HDD
2TB* 7200RPM SATA HDD

M.2 PCIe NVMe Solid State Drives (SSD)[1]

256GB M.2 2280 PCIe NVMe SSD
512GB M.2 2280 PCIe NVMe SSD
1TB M.2 2280 PCIe NVMe SSD
512GB M.2 2280 PCIe NVMe Three Layer Cell SSD
1TB M.2 2280 PCIe NVMe Three Layer Cell SSD
2TB M.2 2280 PCIe NVMe Three Layer Cell SSD
512GB M.2 2280 PCIe NVMe Self Encrypted OPAL2 Three Layer Cell SSD[2]
256GB M.2 2280 PCIe OPAL2 NVMe SSD

1. 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) of system disk is reserved for the system recovery software.
2. Storage DriveLock does not work with Self Encrypting or Optane based storage.

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

MEMORY

Memory Type

DDR5-4800 (Transfer rates up to 4800 MT/s), Max 128 GB, 4 UDIMM
DDR5-5600 (Transfer rates up to 5600 MT/s), Max 128 GB, 4 UDIMM

***NOTE:** Memory modules support data transfer rates up to 4800 MT/s; system speed up to 4400 MT/s, following Intel's design guideline. Actual data rate is determined by the system configuration.

***NOTE:** System architecture design is 2 DIMMS per channel and the population starts from the furthest memory slot from the processor.

***NOTE:** Symmetric configurations are required for the 2 DIMMs within the same memory channel.

***NOTE:** To achieve optimal memory speed, HP strongly recommends using identical memory modules (e.g., same capacity, same part number and from the same supplier) within the same memory channel

***NOTE:** All memory slots are customer accessible / upgradeable.

Memory Configuration

8GB (1 x 8GB)
16GB (2 x 8GB)
32GB (4 x 8GB)
16GB (1 x 16GB)
32GB (2 x 16GB)
64GB (4 x 16GB)
32GB (1 x 32GB)
64GB (2 x 32GB)
128GB (4 x 32GB)

NETWORKING/COMMUNICATIONS

Ethernet (RJ-45)

Intel® I219-LM 1 Gigabit Network Connection LOM (vPro)
Intel I226-T1 2.5GbE Ethernet Network Adapter

Wireless

Intel Wi-Fi 7 BE200 +Bluetooth® 5.4 Wireless Card non-vPro
Intel Wi-Fi 7 BE200 +Bluetooth® 5.4 Wireless Card vPro
Realtek RTL8852CE 802.11ax 2x2 Wi-Fi 6E + BT5.3 Wireless Card (802.11ax 2x2, supporting gigabit data rate)

NOTE: Wireless access point and Internet service required and sold separately. Availability of public wireless access points limited. Wi-Fi 7 (802.11BE) functionality requires Windows 11 24H2 which would be available starting from end of Aug./2024. a a Wi-Fi 7 router, sold separately. Wi-Fi 7 is backwards compatible with prior 802.11 specs. Available in countries where Wi-Fi 7 is supported.

NOTE: WiFi-6E might be restricted by local regulation and only available in countries where Wi-Fi 6E is supported. HP will enable countries in the future by upgrading BIOS in default as the technology becomes available in more regions.

NOTE: External Antenna is supported on Desktop Mini to strengthen the quality of networking, and only available at the time of purchase.

Features

KEYBOARDS AND POINTING DEVICES

Keyboards

HP 320K v2 USB Keyboard
HP USB Business Slim Wired v2 SmartCard CCID Keyboard
HP 125 v2 Wired Keyboard
HP 125 v2 AntiMicrobial Wired Keyboard (China Only)

Keyboard and Mouse Combo

HP 725 Multi-Device Rechargeable Wireless Keyboard and Mouse Combo
HP 655 Wireless Keyboard and Mouse Combo v2

NOTE: v2 keyboards contains copilot* shortcut key.
*Copilot in Windows requires Windows 11. Some features require an NPU. Timing of feature delivery and availability varies by market and device. Requires Microsoft account to log in. Where Microsoft in Windows is not available, the Copilot key will lead to the Bing search engine. Use of Recall requires customer authentication using Windows Hello Enhanced Sign in Security (ESS) which requires a fingerprint reader or facial recognition camera and may not be supported on all platforms. See http://aka.ms/WindowsAIFeatures.

Mouse

HP 320M Wired Mouse
HP Wired 125 Mouse
HP Wired 128 Laser Mouse
HP Wired 125 Antimicrobial Mouse (China Only)

SECURITY

TPM 2.0 endpoint security controller (Infineon SLB9672/Nuvoton NPCT760HABYX). Common Criteria EAL4+ Certified. FIPS 140-2 Level 2 Certified.
Solenoid Lock & Intrusion Sensor (optional)
Intrusion Sensor for Mini/AiO (integrated in the PCA, can be enabled/disabled through BIOS)
Support for chassis cable lock devices
Support for chassis padlocks devices
SATA port disablement (via BIOS)
Serial, USB enable / disable (via BIOS)
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)

Features

PORTS

I/O Ports – Internal Ports

PCI Express 5.0 x16	1
PCI Express 3.0 x16 (wired as x4)	1
PCI Express 3.0 x1	1
SATA 3.0 (6Gbps) port.	3
M.2 PCIe	(1) M.2 PCIe 3 x1 2230 (for WLAN) (3) M.2 PCIe 4 x4 2280 (for storage)

NOTE: M.2 SSD attached to CPU is PCIe Gen 4

NOTE: PCI slots are full height.

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 (rear)
Type-A SuperSpeed USB 10 Gbps signaling rate port	4 (front)
Type-C® SuperSpeed USB 20Gbps signaling rate port	2 (front)
Video[1]	2 DisplayPort™ 2.1 HBR3 1 HDMI 2.1
Audio	1 Universal Audio Jack with CTIA and OMPT headset support (front); 1 Audio-Line-in/Line out (rear)

(1) Flexible Port 1, choice of <u>one</u> of the following:

Dual SuperSpeed USB Type-A 5 Gbps signaling rate port	1
Dual SuperSpeed USB Type-C 10Gbps signaling rate port with 15W power out	1
Type-C® SuperSpeed USB 10Gbps signaling rate port	1
Thunderbolt™ 4.0	1
Video	1 DisplayPort™ 2.1 <u>or</u> HDMI 2.1 <u>or</u> VGA

Features

Serial	1
Fiber NIC	1x1 Gbps NIC

1. Sold separately or as an optional feature.
2. Occupies a PCIe slot

(1) Flexible Port 2, choice of <u>one</u> of the following:

Dual Type-A SuperSpeed USB 5Gbps signaling rate port	1
Serial	1

Bays

Slim Optical Disc Drive (ODD or removable storage, optional)	2
3.5" Internal Storage Drive	2[1]

1.Must be configured at time of purchase

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 7

Software

Buy Microsoft Office[1]
Edge Customization
HP Connection Optimizer
HP Desktop Support Utilities
HP Documentation
HP Hotkey Support
HP NotificationsHP PC Hardware Diagnostics UEFI
HP PC Hardware Diagnostics WindowsHP Privacy Settings
HP Services Scan[2]
HP Setup Integrated OOBE
HP Smart Support[3]
HP Support Assistant[4]
HSA Fusion for Commercial
HSA Telemetry for Commercial
myHP
Poly Lens

Manageability Features

HP Client Catalog (download))[6]
HP Client Management Script Library (download)[7]
HP Cloud Recovery[8]HP Connect for Microsoft Endpoint Manager[9]
HP Driver Packs (download)
HP Image Assistant (download)[10]
HP Manageability Integration Kit (download)[11]HP Patch Assistant (download)[12]
HP Driver Packs (download)
HP Cloud Recovery[11]
HP Client Catalog[12] (download)

Security Features

HP Wolf Security for Business includes:[13]
HP Sure Admin[14]
HP Sure Click[15]
HP Sure Run[16]
HP Sure Recover[18]
HP Sure Start[19]
HP Tamper Lock[20]
Secured-Core PC Enable

Features

BIOS

Absolute Persistence Module[21]
HP Bios Recovery
HP BIOS Update via Network
HP BIOSphere[22]
HP Secure Erase[23]
HP DriveLock & Automatic DriveLock
TPM

1. Microsoft 365 sold separately and requires Internet access for activation.
2. HP Services Scan automatically collects the telemetry necessary upon initial boot of the product to deliver device-level configuration data and health insights and is available preinstalled on select products, thru HP Factory Configuration Services; or it can be downloaded. For more information about how to enable HP Smart Support or for download, please visit http://www.hp.com/smart-support.
3. HP Smart Support automatically collects the telemetry necessary upon initial boot of the product to deliver device-level configuration data and health insights and is available preinstalled on select products, thru HP Factory Configuration Services; or it can be downloaded. For more information about how to enable HP Smart Support or for download, please visit http://www.hp.com/smart-support.
4. HP Support Assistant is available on Windows. For more information, please visit http://www.support.hp.com/help/hp-support-assistant.
5. MyHP with Multicamera support for Mini Desktop PC will only available on 13th processor and beyond.
6. HP Services Scan automatically collects the telemetry necessary upon initial boot of the product to deliver device-level configuration data and health insights and is available preinstalled on select products, thru HP Factory Configuration Services; or it can be downloaded. For more information about how to enable HP Smart Support or for download, please visit: HP Client Catalog not preinstalled, however available for download at https://www.hp.com/us-en/solutions/client-management-solutions.html.
7. HP Driver Packs not preinstalled, however available for download at http://www.hp.com/go/clientmanagement.
8. HP Cloud Recovery is available for Z by HP, HP Elite and Pro desktops and laptops PCs with Intel® or AMD processors and requires an open, 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.
9. HP Connect for Microsoft Endpoint Manager is available from the Azure Market Place for HP Pro, Elite, Z and Point-of-Sale PCs managed with Microsoft Endpoint Manager. Subscription to Microsoft Endpoint Manager required and sold separately. Network connection required.
10. HP Image Assistant not preinstalled, however available for download at https://ftp.ext.hp.com/pub/caps-softpaq/cmit/HPIA.html.
11. HP Manageability Integration Kit can be downloaded from http://www.hp.com/go/clientmanagement.
12. HP Patch Assistant available on select HP PCs with the HP Manageability Kit that are managed through Microsoft System Center Configuration Manager. HP Manageability Integration Kit can be downloaded from http://www8.hp.com/us/en/ads/clientmanagement/overview.html.
13. HP Wolf Security for Business requires Windows 10 or 11 Pro 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.
14. HP Sure Admin requires HP G8 or newer platforms, Windows 10 or higher, HP BIOS, HP Manageability Kit or KMS Service from http://www.hp.com/go/clientmanagement and HP Sure Admin Local Access Authenticator.
15. HP Sure Click requires Windows 10 Pro or higher or Enterprise. See https://bit.ly/2PrLT6A_SureClick for complete details.
16. HP Sure Run is available on select HP PCs and requires Windows 10 and higher.
17. HP Sure Sense is available on select HP PCs with Windows 10 Pro, Windows 10 Enterprise, Windows 11 Pro, or Windows 11 Enterprise OS.

18. HP Sure Recover is available on select HP PCs and requires Windows 10 or 11 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. HP Sure Recover Gen6 with Embedded Reimaging is an optional feature on select HP PCs which require Windows 10 or 11 must be configured at purchase. You must back up important files, data, photos, videos, etc. before use to avoid loss of data.
19. HP Sure Start is available on select HP PCs and requires Windows 10 and higher.
20. HP Tamper Lock can be Enabled/disabled by customers or IT administrator with administrator authority.
21. Absolute Persistence firmware module is shipped turned off and can only be activated with the purchase a license subscription and full activation of the software agent. License subscriptions can be purchased for terms ranging multiple years. Service is limited, check with Absolute for availability outside the U.S. Certain conditions apply. For full details visit: https://www.absolute.com/about/legal/agreements/absolute/.
22. HP BIOSphere features may vary depending on the platform and configuration.
23. HP Secure Erase implements the methods outlined in the National Institute of Standards and Technology Special.

UNIT ENVIRONMENT AND OPERATING CONDITIONS

ENERGY STAR® certified models available

ENERGY STAR® certified. EPEAT® registered where applicable. Based on US EPEAT® registration according to IEEE 1680.1-2018 EPEAT®. 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 enclosure, and the same operating guidelines listed above will still apply.

Temperature Range	Operating: 50° to 95° F (10° to 35° C)[2] 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)

2. 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.

Features

ENVIRONMENTAL & INDUSTRY

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 • Japan PC Green label*		
Sustainable Impact Specifications	• Product Carbon Footprint • At least 25% ocean bound plastic-PET Bottle in the Fan and 5% ocean bound plastic-PET Bottle in the Speaker[1] • At least 63% total post-consumer recycled plastic[2] • High recycled content plastic.(95%) • High recycled content metal.(20%)[3] • 100% Recycled Rare Earth Elements (REE) in speaker		
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)	5.41 W	5.49 W	5.39 W
Normal Operation (Long idle)	2.18 W	2.19 W	2.14 W
Sleep	2.18 W	2.19 W	2.14 W
Off	0.66 W	0.67 W	0.69 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.			

Features

Heat Dissipation*	**115VAC, 60Hz**	**230VAC, 50Hz**	**100VAC, 50Hz**
Normal Operation (Short idle)	19 BTU/hr	19 BTU/hr	18 BTU/hr
Normal Operation (Long idle)	7 BTU/hr	7 BTU/hr	7 BTU/hr
Sleep	7.5 BTU/hr	7 BTU/hr	7.3 BTU/hr
Off	2.3 BTU/hr	2 BTU/hr	2.4 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	3.0	21
Fixed Disk–Random writes	3.0	22
Optical Drive – Sequential reads	3.0	21

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.
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 (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 93.4% recycle-able when properly disposed of at end of life.

Packaging Materials (vary by country)	**External:**	PAPER/Corrugated	1106 g
		PAPER/Molded Pulp	676 g
		OTHER/Other	36 g
	The plastic packaging material contains at least 30% recycled content.		
	The corrugated paper packaging materials contains at least 59.7% recycled content.		

Features

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)

Features

Material Usage	• 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

Features

Footnotes	1. Percentage of ocean-bound plastic contained in each component varies by product. Ocean Bound plastic is expressed as a percentage of the total weight plastic. Ocean Bound plastic is based on the definition set by the UL2809 standard. 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.

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® Climate+ registered in the United States. See http://www.epeat.net for registration status in your country.* • TCO Certified • China Energy Conservation Program (CECP) • China State Environmental Protection Administration (SEPA) • Taiwan Green Mark • Korea Eco-label • Japan PC Green label • Commission Regulation (EC) No 617/2013 (ErP Lot 3) **NOTE***: Based on US EPEAT® registration according to IEEE 1680.1-2018 EPEAT®. EPEAT® status varies by country. Visit http://www.epeat.net for more information.		
Sustainable Impact Specifications	▪ Ocean-bound plastic in System and CPU Fan, Speaker[1] ▪ 60% post-consumer recycled plastic[2] ▪ Outside Box and corrugated cushions are 100% sustainably sourced and recyclable[3] ▪ Molded Paper Pulp Cushion inside box is 100% sustainably sourced and recyclable[4] ▪ Bulk packaging available[5]		
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)	5.41W	5.49W	5.38W
Normal Operation (Long idle)	2.18W	2.19W	2.14W
Sleep	2.18W	2.19W	2.14W
Off	0.66W	0.67W	0.68W
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.			

Features

Heat Dissipation*	**115VAC, 60Hz**	**230VAC, 50Hz**	**100VAC, 60Hz**
Normal Operation (Short idle)	42.1 18.45 BTU/hr	43.1 18.72 BTU/hr	42.8 18.35 BTU/hr
Normal Operation (Long idle)	39 7.43 BTU/hr	38 7.47 BTU/hr	39 7.30 BTU/hr
Sleep	3.4 7.43 BTU/hr	11.6 7.47 BTU/hr	3.1 7.30 BTU/hr
Off	2.1 2.25 BTU/hr	2.4 BTU 2.28 /hr	2.1 2.32 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	3.0	20.6
Fixed Disk–Random writes	3.0	21.5

Longevity and Upgrading	This product can be upgraded, possibly extending its useful life by several years. Upgradeable features and/or components contained in the product may include: 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 (EPEAT) standard at the Climate+ level, see http://www.epeat.net • Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043. This product is 93.4% recycle-able when properly disposed of at end of life		
Packaging Materials	**External:**	PAPER/Corrugated	1106g
	Internal:	PAPER/Molded Pulp	700g
		PAPER/Bamboo+wood fiber bag	58g
		PLASTIC/Polyethylene low density-LDPE	16g
	The plastic packaging material contains at least 20-30% recycled content.		
	The corrugated paper packaging materials contains at least 35.0% 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.		

Features

	We met our voluntary objective to achieve worldwide compliance with the new EU RoHS requirements for virtually all relevant products by July 2013, and we will continue to extend the scope of the commitment to include further restricted substances as regulations continue to evolve. To obtain a copy of the HP RoHS Compliance Statement, see: HP RoHS position statement.
Material Usage	This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html): • 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: ▪ 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.

Features

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://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842 and http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf
footnotes	1. Percentage of ocean-bound plastic contained in each component varies by product. 2. Recycled plastic content percentage is based on the definition set in the IEEE 1680.1-2018 standard. 3. 100% outer box packaging and corrugated cushions made from sustainably sourced certified and recycled fibers. 4. Fiber cushions made from 100% recycled wood fiber and organic materials. 5. Plastic cushions are made from >90% recycled plastic.

SERVICE AND SUPPORT

On-site Warranty[1]: One-year (1-1-1) limited warranty delivers one year of on-site, next business day[2] service for parts and labor support. Service offers terms up to 5 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.[3]

1. Terms and conditions may vary by country. Certain restrictions and exclusions apply. Other warranty variations may be offered in your region.
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.
3. 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.

CERTIFICATION AND COMPLIANCE

Energy Efficiency Compliance

ENERGY STAR® certified. EPEAT® registered where applicable. EPEAT ® registration varies by country. See http://www.epeat.net for registration status by country. According to IEEE 1680.1-2018.

PROCESSORS

Intel Core Ultra Processors 200S series

All HP EliteDesk G1i Business PC models 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 of the HP Elite series G1i Desktop Business PC.

Intel® Management Engine (ME) v19 - 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 includes the following advanced management functions:

- Support for configuration of Intel ME 19.0 capabilities
- No reset after provisioning
- Support for Intel Enterprise Digital Fence
- The Platform Discovery Utility can now discover these additional Intel products:
    - Public Key Infrastructure
- Profile Editor and Profile Editor Plugin Interface
- Required Permissions for Solutions Framework

GRAPHICS

Intel® HD Graphics (integrated)
Up to four simultaneous displays, 4K60Hz display concurrent with:
— Single external display up to 8K60Hz, supported by joining two pipes over single port.
— Up to 3x4K60Hz External display.

VGA Controller	Integrated
DisplayPort™	Multimode capable; supports HDCP, Display Port Audio), Onboard support HBR2 link rates/option DP support to HBR3 and Multi-Stream Technology for a maximum of 3-displays connected to any output controlled by Intel® Graphics
HDMI (onboard / optional)	Supports HDMI 2.1 features (onboard HDMI support HDMI TMDS 6G; Option HDMI support HDMI 2.1 FRL12) Supports HDCP 2.3 (Support HDCP 1.4/2.3) Supports audio over HDMI
VGA (optional)	VGA output
USB-C® DP Alt Mode (optional)	DisplayPort™ over the optional USB-C® module (Support DP1.4 HBR3)
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	Supports up to 36 BPP (Bit Per Pixel)
Graphics/Video API Support	Decode: HEVC/VP9 8K60 12-bit 420/422/444*, AV1 8K60 10-bit 420, AVC 4K60 8-bit 420 Encode: HEVC/VP9 8K30 10-bit 420/444*, AV1 8K30 10-bit 420 (FF accel, AVC 4K60 8-bit 420 HDR Dolby Vision 420/422 w/ DSC 1.2 DX12 Ultimate
Max. Resolution (VGA Option)	2048 x 1536@60Hz
Max. Resolution (Onboard HDMI)	4096 x 2160@60Hz
Max. Resolution (Option HDMI)	8K60Hz Compressed, 5K120Hz compressed, 4K144Hz compressed
Max. Resolution (On board DP)	HBR3: 5120 x3200 @60hz 24 bpp
Max. Resolution (Option DP)	UHBR20: 8K60Hz compressed, 5K120Hz compressed
Max. Resolution (Option Type C)	DP HBR3: 5120 x3200 @60hz 24 bpp

NVIDIA RTX PRO 2000 Blackwell 16GB 4mDP GRAPHICS

Graphic Memory Type	16GB GDDR7 with ECC
Memory Bandwidth	Up to 288 GB/s
Memory Bus Width	128 bits
Maximum Resolution	3840 × 2160 × 24 bpp at 480Hz1 7680 × 4320 × 24 bpp at 165Hz1
Multi Display Support	4 displays
Rear I/O Connectors	4x mini DisplayPort 2.1b
Cooling (active/passive)	Active
Total power consumption (W)	70W
Form Factor	Half Height, Half Length (HHHL) 6.6", Double-slot NVIDIA Form Factor 6.0 Compliant

NVIDIA® RTX A1000 8GB GRAPHICS

GPU Clocks	Base: 721 Mhz Boost: 1462 Mhz
Memory size / Bus Width	8GB / 128bits
Graphic Memory Type / Clock	8GB GDDR6/6001MHz
Max. Resolution (DP1.4a)	7680x4320 x24 bpp @120Hz/60Hz
Multi Display Support	4 displays
HDCP Compliance	Yes
Rear I/O connectors (bracket)	mDPx4
Cooling (active/passive)	Active
Total power consumption (W)	50W
Form Factor	H: 2.7"(68.58mm) x L: 6.4"(162.56mm), single slot

NVIDIA® RTX A400 4GB Graphics

GPU Clocks	Base: 1417 Mhz Boost: 1762 Mhz
Memory size / Bus Width	4GB / 64 bits
Graphic Memory Type / Clock	4GB GDDR6/6001MHz
Max. Resolution (DP1.4a)	7680x4320 x24 bpp @120Hz/60Hz
Multi Display Support	4 displays
HDCP Compliance	Yes
Rear I/O connectors (bracket)	mDPx4
Cooling (active/passive)	Active
Total power consumption (W)	50W
Form Factor	H: 2.7"(68.58mm) x L: 6.4"(162.56mm), single slot

Intel® Arc™ A380 6GB GDDR6 Graphics card[4]

Engine Clock	2150Mhz
Frame Buffer Size / Width	6GB/96bit
Graphic Memory Type / Clock	GDDR6 ,3 pcs/15.5Gbps
Max. Resolution (HDMI)	4096 x2160@60Hz
Max. Resolution (DP)	7680x4320@60Hz
Multi Display Support	4 displays
HDCP Compliance	Yes
Rear I/O connectors (bracket)	DP x3 + HDMI x1
Cooling (active/passive)	Active
Total power consumption (W)	75W

AMD Radeon™ RX 6300 2GB GDDR6 Graphics card

Engine Clock	Base: 1512 Mhz Boost: 2040 Mhz
Memory Size/Width	2GB/32bit
Graphic Memory Type/Clock	512Mx32 GDDR6 ,1 pcs/16Gbps
Max. Resolution (HDMI)	7680x4320@60Hz
Max. Resolution (DP)	7680x4320@120Hz
Multi Display Support	2 displays
HDCP Compliance	Yes
Rear I/O connectors (bracket)	HDMIx1+ DPx1 (FH)
Cooling (active/passive)	Active
Total power consumption (W)	57W
Form-factor	X:160.2mm/Y:68.9mm/Z: 22.6mm PCB with single slot

STORAGE

NOTE: Starting November 1, 2023, HP PCs with Windows require Windows to be installed on SSD.
HDD can only be configured as additional data drives and not as the boot drive.

1TB 7200RPM 3.5in SATA HDD

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

2TB 7200RPM 3.5in SATA HDD

Capacity	2TB
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 storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36GB (for Windows) is reserved for system recovery software.

256GB M.2 2280 PCIe NVMe SSD

Capacity	256GB
Interface	PCIe NVMe
Minimum Sequential Read	2000 MB/s ±20%
Minimum Sequential Write	900 MB/s ±20%
Logical Blocks	500,118,192
Features	TRIM; L1.2

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

512GB M.2 2280 PCIe NVMe SSD

Capacity	512GB
Interface	PCIe NVMe
Minimum Sequential Read	2200 MB/s ±20%
Minimum Sequential Write	1000 MB/s ±20%
Logical Blocks	1,000,215,216
Features	TRIM; L1.2

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

1TB M.2 2280 PCIe NVMe SSD

Capacity	1TB
Interface	PCIe NVMe
Minimum Sequential Read	2200 MB/s ±20%
Minimum Sequential Write	1600 MB/s ±20%
Logical Blocks	2,000,409,264
Features	TRIM; L1.2

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

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

Capacity	512GB
Interface	PCIE Gen4x4
Minimum Sequential Read	6400 MB/s ±20%
Minimum Sequential Write	3500 MB/s ±20%
Logical Blocks	1,000,215,216
Features	TRIM; L1.2; Pyrite 2.0

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

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

Capacity	1TB
Interface	PCIE Gen4x4
Minimum Sequential Read	6400 MB/s ±20%
Minimum Sequential Write	5000 MB/s ±20%
Logical Blocks	2,000,409,264
Features	TRIM; L1.2; Pyrite 2.0

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

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

Capacity	2TB
Interface	PCIE Gen4x4
Minimum Sequential Read	6400 MB/s ±20%
Minimum Sequential Write	5000 MB/s ±20%
Logical Blocks	4,000,797,360
Features	TRIM; L1.2; Pyrite 2.0

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

256GB M.2 2280 PCIe NVMe Self Encrypted OPAL2 Value SSD

Capacity	256GB
Interface	PCIE NVMe
Minimum Sequential Read	2000 MB/s ±20%
Minimum Sequential Write	900 MB/s ±20%
Logical Blocks	500,118,192
Features	TRIM; L1.2; TCG Opal 2.0

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

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

Capacity	512GB
Interface	PCIE Gen4x4
Minimum Sequential Read	6400 MB/s ±20%
Minimum Sequential Write	3500 MB/s ±20%
Logical Blocks	1,000,215,216
Features	TRIM; L1.2; TCG Opal 2.0

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

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

Technical Specifications – Optical Drives

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® I219-LM 1 Gigabit Network Connection LOM (vPro)	
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 (Hash Mode Only) 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 I226-T1 2.5GbE Ethernet Network Adapter	
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 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 (Hash Mode Only) Jumbo Frame 9K
Power consumption	Cable Disconnection: 25mW 100Mbps Full Run: 450mW 1000Mbp Full Run: 1000mW 2500Mbp Full Run: 4500mW 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

Intel® I226-V 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 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 (Hash Mode Only) Jumbo Frame 9K
Power consumption	Cable Disconnection: 25mW 100Mbps Full Run: 450mW 1000Mbp Full Run: 1000mW 2500Mbp Full Run: 4500mW 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® non-vPro™ support with appropriate Intel® chipset components

Intel BE200 Wi-Fi 7 +Bluetooth® 5.4 Wireless Card M.2 320MHz PCIe World-wide WLAN vPro[1]	
Wireless LAN Standards	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11ac IEEE 802.11ax IEEE 802.11be 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/be ▪ 2.402 – 2.482 GHz 802.11a/n/ac/ax/be ▪ 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 ▪ 5.955 – 6.415 GHz ▪ 6.435 – 6.515 GHz ▪ 6.535 – 6.875 GHz ▪ 6.895 – 7.115 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: max 300Mbps ▪ 802.11ac: 1733Mbps ▪ 802.11ax: max 2.4Gbps ▪ 802.11be: max 5.76Gbps
Modulation	Direct Sequence Spread Spectrum OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM, 4096QAM

Technical Specifications – Networking and Communications

Security[2]	▪ IEEE and WiFi 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 ▪ 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[3]	▪ 802.11b, 1Mbps: +17dBm minimum ▪ 802.11g, 6Mpbs: +16dBm minimum ▪ 802.11a, 6Mbps: +17dBm minimum ▪ 802.11n, MCS7(HT20): +14dBm minimum ▪ 802.11n, MCS7(HT40): +13.5dBm minimu ▪ 802.11ac MCS9(VHT20): 13.5dBm minimum ▪ 802.11ac MCS9(VHT40): +13.5dBm minimum ▪ 802.11ac MCS9(VHT80): +12.5dBm minimum ▪ 802.11ac MCS9(VHT160): +10.5dBm minimum ▪ 802.11ax MCS11(HE20)(6GHz): +11.5dBm minimum ▪ 802.11ax MCS11(HE40)(6GHz): +7.5dBm minimum ▪ 802.11ax MCS11(HE80)(6GHz): +7.5dBm minimum ▪ 802.11ax MCS11(HE160)(6GHz): +7.5dBm minimum ▪ 802.11be MCS13(EHT20)(6GHz): 11.5dBm ▪ 802.11be MCS13(EHT40)(6GHz): 7.5dBm ▪ 802.11be MCS13(EHT80)(6GHz): 7.5dBm ▪ 802.11be MCS13(EHT160)(6GHz): 6.5dBm ▪ 802.11be MCS13(EHT320)(6GHz): 4.5dBm
Power Consumption	▪ Transmit mode 3.1 W ▪ Receive mode 1.8 W ▪ Idle mode (PSP) 180 mW (WLAN Associated) ▪ Idle mode 50 mW (WLAN unassociated) ▪ Connected Standby 10mW ▪ Radio disabled 8 mW

Technical Specifications – Networking and Communications

Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity[4]	▪802.11b, 1Mbps: -93.5dBm maximum ▪802.11b, 11Mbps: -85dBm maximum ▪ 802.11a/g, 6Mbps: -90.5dBm maximum ▪ 802.11a/g, 54Mbps: -72.5dBm maximum ▪ 802.11n, MCS0(HT20): -90dBm maximum ▪ 802.11n, MCS7(HT20): -71.5dBm maximum ▪ 802.11n, MCS0(HT40): -88.5dBm maximum ▪ 802.11n, MCS7(HT40): -68.5dBm maximum ▪ 802.11ac, MCS9(VHT20): -88.5dBm maximum ▪ 802.11ac, MCS9(VHT40): -65.5dBm maximum ▪ 802.11ac, MCS9(VHT80): -60.5dBm maximum ▪ 802.11ac, MCS9(VHT160): -58.5dBm maximum ▪ 802.11ax, MCS11(HE20)(6GHz): -59.5dBm maximum ▪ 802.11ax, MCS11(HE40)(6GHz): -56.5dBm maximum ▪ 802.11ax, MCS11(HE80)(6GHz): -53.5dBm maximum ▪ 802.11ax, MCS11(HE160)(6GHz): -51.5dBm maximum ▪ 802.11be, MCS13(EHT20)(6GHz): -55.5dBm maximum ▪ 802.11be, MCS13(EHT40)(6GHz): -53.5dBm maximum ▪ 802.11be, MCS13(EHT80)(6GHz): -51.5dBm maximum ▪ 802.11be, MCS13(EHT160)(6GHz): -48.5dBm maximum ▪ 802.11be, MCS13(EHT320)(6GHz): -45.5dBm maximum
Antenna type	High efficiency antenna with spatial diversity Two embedded tri-band 2.4/5/6 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 1216: 1.3g
Operating Voltage	3.3v +/- 9%
Temperature	Operating: 14° to 158° F (-10° to 70° C) Non-operating: -40° to 176° F (-40° to 80° C)
Humidity	Operating: 10% to 90% (non-condensing) Non-operating: 5% to 95% (non-condensing)
Altitude	Operating: 0 to 10,000 ft (3,048 m) Non-operating: 0 to 50,000 ft (15,240 m)
LED Activity	LED Amber – Radio OFF; LED OFF – Radio ON

Technical Specifications – Networking and Communications

Subtitle	HP Integrated Module with Bluetooth® 4.0/4.1/4.2/5.0/5.1/5.2/5.3/5.4 Wireless Card Technology
Bluetooth® Specification	4.0/4.1/4.2/5.0/5.1/5.2/5.3/5.4 Wireless Card 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 I Bluetooth device with a maximum transmit power of +15.5 dBm for BR and +13dBm for EDR.
Power Consumption	Peak (Tx): 330 mW Peak (Rx): 230 mW Selective Suspend: 17 mW
Bluetooth® Software Supported Link Topology	1.Microsoft Windows Bluetooth Software 2.Linux/Chrome OS Bluetooth Software.
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Certifications	FCC (47 CFR) Part 15C/E, Section 15.247, 15.249, 15.407 ETSI 300 328, ETSI 301 893, ETSI 303 687
Bluetooth® Profiles Supported	Bluetooth 4.1-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 Bluetooth 4.2 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) Bluetooth 5.2

	ESR9/10 Compliance LE Advertisement Extensions Channel Selection Algo Limited High Duty Cycle Non-Connectable Advertising 2Mbps LE LE Long Range Bluetooth 5.3 Host to Controller Encryption Key Control Enahancements Compliance to the latest Errata Sectipn 12.3 of BT 5.3 specification

1. Wi-Fi 7 requires a Wi-Fi 7 router, sold separately, to function in the 6GHz band. Availability of public wireless access points limited. Wi-Fi 7 is backwards compatible with prior 802.11 specs. And available in countries where Wi-Fi 7 is supported. Wi-Fi 7 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.
2. Check latest software/driver release for updates on supported security features.
3. The FCC has declared as of September 1, 2014 products that utilize passive scanning on channel 12/13 and are capable of transmitting must fully comply with requirements of 15.247 or otherwise disable those channels.
4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).

Intel BE200 Wi-Fi 7 +Bluetooth® 5.4 Wireless Card M.2 320MHz PCIe World-wide WLAN non-vPro[1]	
Wireless LAN Standards	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11ac IEEE 802.11ax IEEE 802.11be 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/be ▪ 2.402 – 2.482 GHz 802.11a/n/ac/ax/be ▪ 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 ▪ 5.955 – 6.415 GHz ▪ 6.435 – 6.515 GHz ▪ 6.535 – 6.875 GHz ▪ 6.895 – 7.115 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: max 300Mbps ▪ 802.11ac: 1733Mbps ▪ 802.11ax: max 2.4Gbps ▪ 802.11be: max 5.76Gbps
Modulation	Direct Sequence Spread Spectrum OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM, 4096QAM

Technical Specifications – Networking and Communications

Security[2]	▪ IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only ▪ AES-CCMP: 128 bitIn 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[3]	▪ 802.11b, 1Mbps: +17dBm minimum ▪ 802.11g, 6Mpbs: +16dBm minimum ▪ 802.11a, 6Mbps: +17dBm minimum ▪ 802.11n, MCS7(HT20): +14dBm minimum ▪ 802.11n, MCS7(HT40): +13.5dBm minimu ▪ 802.11ac MCS9(VHT20): 13.5dBm minimum ▪ 802.11ac MCS9(VHT40): +13.5dBm minimum ▪ 802.11ac MCS9(VHT80): +12.5dBm minimum ▪ 802.11ac MCS9(VHT160): +10.5dBm minimum ▪ 802.11ax MCS11(HE20)(6GHz): +11.5dBm minimum ▪ 802.11ax MCS11(HE40)(6GHz): +7.5dBm minimum ▪ 802.11ax MCS11(HE80)(6GHz): +7.5dBm minimum ▪ 802.11ax MCS11(HE160)(6GHz): +7.5dBm minimum ▪ 802.11be MCS13(EHT20)(6GHz): 11.5dBm ▪ 802.11be MCS13(EHT40)(6GHz): 7.5dBm ▪ 802.11be MCS13(EHT80)(6GHz): 7.5dBm ▪ 802.11be MCS13(EHT160)(6GHz): 6.5dBm ▪ 802.11be MCS13(EHT320)(6GHz): 4.5dBm
Power Consumption	▪ Transmit mode 3.1 W ▪ Receive mode 1.8 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

Technical Specifications – Networking and Communications

Receiver Sensitivity[4]	▪802.11b, 1Mbps: -93.5dBm maximum ▪802.11b, 11Mbps: -85dBm maximum ▪ 802.11a/g, 6Mbps: -90.5dBm maximum ▪ 802.11a/g, 54Mbps: -72.5dBm maximum ▪ 802.11n, MCS0(HT20): -90dBm maximum ▪ 802.11n, MCS7(HT20): -71.5dBm maximum ▪ 802.11n, MCS0(HT40): -88.5dBm maximum ▪ 802.11n, MCS7(HT40): -68.5dBm maximum ▪ 802.11ac, MCS9(VHT20): -88.5dBm maximum ▪ 802.11ac, MCS9(VHT40): -65.5dBm maximum ▪ 802.11ac, MCS9(VHT80): -60.5dBm maximum ▪ 802.11ac, MCS9(VHT160): -58.5dBm maximum ▪ 802.11ax, MCS11(HE20)(6GHz): -59.5dBm maximum ▪ 802.11ax, MCS11(HE40)(6GHz): -56.5dBm maximum ▪ 802.11ax, MCS11(HE80)(6GHz): -53.5dBm maximum ▪ 802.11ax, MCS11(HE160)(6GHz): -51.5dBm maximum ▪ 802.11be, MCS13(EHT20)(6GHz): -55.5dBm maximum ▪ 802.11be, MCS13(EHT40)(6GHz): -53.5dBm maximum ▪ 802.11be, MCS13(EHT80)(6GHz): -51.5dBm maximum ▪ 802.11be, MCS13(EHT160)(6GHz): -48.5dBm maximum ▪ 802.11be, MCS13(EHT320)(6GHz): -45.5dBm maximum
Antenna type	High efficiency antenna with spatial diversity Two embedded tri-band 2.4/5/6 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 1216: 1.3g
Operating Voltage	3.3v +/- 9%
Temperature	Operating: 14° to 158° F (-10° to 70° C) Non-operating: -40° to 176° F (-40° to 80° C)
Humidity	Operating: 10% to 90% (non-condensing) Non-operating: 5% to 95% (non-condensing)
Altitude	Operating: 0 to 10,000 ft (3,048 m) Non-operating: 0 to 50,000 ft (15,240 m)
LED Activity	LED Amber – Radio OFF; LED OFF – Radio ON
HP Integrated Module with Bluetooth® 4.0/4.1/4.2/5.0/5.1/5.2/5.3/5.4 Wireless Card Technology	
Bluetooth® Specification	4.0/4.1/4.2/5.0/5.1/5.2/5.3/5.4 Wireless Card Compliant
Frequency Band	2402 to 2480 MHz

Technical Specifications – Networking and Communications

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 ClassI Bluetooth device with a maximum transmit power of +15.5 dBm for BR and +13dBm for EDR.
Power Consumption	Peak (Tx): 330 mW Peak (Rx): 230 mW Selective Suspend: 17 mW
Bluetooth® Software Supported Link Topology	1. Microsoft Windows Bluetooth Software 2. Linux/Chrome OS Bluetooth Software.
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Certifications	FCC (47 CFR) Part 15C/E, Section 15.247, 15.249, 15.407 ETSI 300 328, ETSI 301 893, ETSI 303 687
Bluetooth® Profiles Supported	Bluetooth 4.1-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 rain Nudging &Interlaced Scan Bluetooth 4.2 ESR08 Compliance E Secure Connection- Basic/Full E 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) Bluetooth 5.2 ESR9/10 Compliance LE Advertisement Extensions Channel Selection Algo Limited High Duty Cycle Non-Connectable Advertising Mbps LE

	LE Long Range Bluetooth 5.3 Host to Controller Encryption Key Control Enahancements Compliance to the latest Errata Section 12.3 of BT 5.3 specification

1. Wi-Fi 7 requires a Wi-Fi 7 router, sold separately, to function in the 6GHz band. Availability of public wireless access points limited. Wi-Fi 7 is backwards compatible with prior 802.11 specs. And available in countries where Wi-Fi 7 is supported. Wi-Fi 7 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.
2. Check latest software/driver release for updates on supported security features.
3. The FCC has declared as of September 1, 2014 products that utilize passive scanning on channel 12/13 and are capable of transmitting must fully comply with requirements of 15.247 or otherwise disable those channels.
4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).

Realtek RTL8852CE 802.11ax 2x2 Wi-Fi 6E + Bluetooth® 5.3 Wireless Card[1] (802.11ax 2x2, supporting gigabit data rate)	
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
Interoperability	Wi-Fi certified
Frequency Band	802.11b/g/n/ax ▪ 2.402 – 2.482 GHz 802.11a/n/ac/ax ▪ 5.15 – 5.25 GHz ▪ 5.25 – 5.35 GHz ▪ 5.47 – 5.725 GHz ▪ 5.825 – 5.850 GHz ▪ 5.955 – 6.415 GHz ▪ 6.435 – 6.515 GHz ▪ 6.535 – 6.875 GHz ▪ 6.895 – 7.115 GHz

Technical Specifications – Networking and Communications

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, (20MHz, 40MHz, ,80MHz & 160MHz) ▪ 802.11ax : MCS0 ~ MCS11, (20MHz, 40MHz, ,80MHz & 160MHz)
Modulation	Direct Sequence Spread Spectrum OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM
Security[2]	▪ 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 (personal) certification ▪ IEEE 802.11i ▪ WAPI ▪ EAP
Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between access points
Output Power[3]	▪ 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 ▪ 802.11ax HE80(6GHz) : +10dBm minimum ▪ 802.11ax HE160(6GHz) : +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

Technical Specifications – Networking and Communications

Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity[4]	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 Two embedded tri-band 2.4/5/6 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
Weight	1. Type 2230 : 2.8g
Operating Voltage	3.3v +/- 9%
Temperature	Operating: 14° to 158° F (-10° to 70° C) Non-operating: -40° to 176° F (-40° to 80° C)
Humidity	Operating: 10% to 60% (non-condensing) Non-operating: 5% to 95% (non-condensing)
Altitude	Operating: 0 to 10,000 ft (3,048 m) Non-operating: 0 to 50,000 ft (15,240 m)
LED Activity	N/A
HP Integrated Module with Bluetooth 4.0/4.1/4.2/5.0/5.1/5.2/5.3 Wireless Card Technology	
Bluetooth Specification	4.0/4.1/4.2/5.0/5.1/5.2/5.3 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)

Technical Specifications – Networking and Communications

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/E, Section 15.247, 15.249, 15.407 ETSI 300 328, ETSI 301 893, ETSI 303 687
Bluetooth Profiles Supported	Bluetooth 4.1-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 Bluetooth 4.2 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) Bluetooth 5.2 ESR9/10 Compliance LE Advertisement Extensions Channel Selection Algo Limited High Duty Cycle Non-Connectable Advertising 2Mbps LE LE Long Range Windows BT profiles support Bluetooth 5.3 Periodic Advertisement interval Encryption key size control enhancements

1. Wi-Fi 6E requires a Wi-Fi 6E router, sold separately, to function in the 6GHz band. Availability of public wireless access points limited. Wi-Fi 6E is backwards compatible with prior 802.11 specs. And available in countries where Wi-Fi 6E is supported. Wi-Fi 6E 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.
2. Check latest software/driver release for updates on supported security features.
3.The FCC has declared as of September 1, 2014 products that utilize passive scanning on channel 12/13 and are capable of transmitting must fully comply with requirements of 15.247 or otherwise disable those channels.
4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).

HP Flex 1GbE Fiber LC Single Port	
Connector	Fiber
Cabling	I GbE over Category OM1 (or better) up to 100m
Controller	Microchip LAN7801
Data Rates Supported	100/1000 Mbps
Compliance	IEE 802.1q priority enconding/tagging (QoS, CoS) IEE 802.1q VLAN tagging IEE 802.3x flow control
Bus Architecture	USB
Power requirement	Requires 3.3V (Integrated regulators for code Vdc)
Boot ROM support	Yes
Network transfer mode	Full-duplex; Half duplex
Network transfer rate	100BASE-X (Half-duplex) 100Mbps 1000BASE-X (Half-duplex) 1000Mbps 1000BASE-X (Full-duplex) 2000Mbps
Operating temperature	32° to 95° F (0° to 35°C)
calvin	1.5 x 1.7 x 0.75 In (3.84 x 4.3 x 1.9 cm)
Operating System Driver Support	Windows 11 64-Bit Windows 10 64-Bit Linux®

I/O DEVICES

HP Business Slim Standalone USB/PS2 Wired Keyboard		
Physical Characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country)
	Dimensions (LxWxH)	171.97 x 68.35 x 8.27 In (436.8± 1.5 x 137.6± 1.0 x 21.0± 1.0 cm)
	Weight	1.32 lb (0.6± 0.08 kg)
Electrical	Operating voltage	4.4-5.25VDC
	Power consumption	50-mA maximum (with 5 VDC power supplied and three LEDs ON)/
	System Interface	USB or PS/2
	ESD	Contact Discharge: 2, 4,6,8KV Air Discharge: 2, 4, 8,10,12.5KV
	EMI - RFI	Conforms to FCC rules for a Class B computing device
Mechanical	Keycaps	Low-profile design
	Switch actuation	60±12.5g nominal peak force with tactile feedback
	Switch life	10 million keystrokes (Life tester)
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
Environmental	Acoustics	43-dBA maximum sound pressure level
	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	Minus 30 degress to 60 degress Celsius
	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	ANSI HFS 100, ISO 9241-4, and TUVGS	

HP USB Business Slim Wired SmartCard CCID Keyboard		
Physical Characteristics	Keys	104, 105, 107, 109 layout (depending upon country)
	Dimensions (LxWxH)	17.34 x 5.68 x 0.78 in (440.6 x 144.5 x 1.98 cm)
	Weight	1.32 lb (598g)
Electrical	Operating voltage	5 VDC, +/-5%
	Power consumption	100mA (All LED on)
	System Interface	USB Type A plug connector
	ESD	Contact Discharge: 8 KV Air Discharge: 12.5 KV
	EMI - RFI	Conforms to FCC rules for a Class B computing device
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
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
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	CE Marking, TUV, EAC, FCC, cULus/CSAus, ICES, RCM, VCCI, KCC, BSMI	
Ergonomic compliance	ISO 9241-4, TUVGS	

Technical Specifications – Input/Output Devices

HP 125 AntiMicrobial Wired Keyboard (China only)		
Physical Characteristics	Keys	104/105/107/109 layout (depending upon country)
	Dimensions (LxWxH)	436 x 138 x20.7 mm
	Weight	471g
Electrical	Operating voltage	5V +- 5%
	Power consumption	50mA
	System Interface	USB Type A plug connector
	ESD	Contact Discharge: 8 KV Air Discharge: 12.5 KV
	EMI - RFI	Conforms to FCC rules for a Class B computing device
Mechanical	Keycaps	Low-profile design
	Switch actuation	55±10g nominal peak force with tactile feedback
	Switch life	10 million keystrokes (Life tester)
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	1.8 m
Environmental	Acoustics	43-dBA maximum sound pressure level
	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-4° to 149° F (-20° to 65° C)
	Operating humidity	10% to 95% (non-condensing at ambient)
	Non-operating humidity	0% to 95% (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, cUL, FCC, CE, TUV GS, VCCI, BSMI, RCM, KCC, USB-IF, WHQL, EN/IEC 60601-1	
Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	

Technical Specifications – Input/Output Devices

HP 655 wireless Keyboard		
Physical Characteristics	Keys	104, 105, 107,109 layouts
	Dimensions (LxWxH)	16.86 x 4.55 x 0.71 in (428.22 x 115.47 x 18.06 mm)
	Weight	0.96 lb (435g)
Electrical	Operating voltage	3 VDC, +/-5%
	Power consumption	20 mA Max (All LED on)
	System Interface	2.4GHz Wireless
	ESD	Contact Discharge: 8 KV Air Discharge: 15 KV
	EMI - RFI	Conforms to FCC rules for a Class B computing device
Mechanical	Keycaps	Plunger, 2.0 mm key travel
	Key actuation	60±10g nominal peak force with tactile feedback
	Key life	10 million keystrokes (Life tester)
	Key structure type	Rubber dome & Membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
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	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	CB, CE, FCC, cULus, ICES, IC, I TRC, TRA, CASA, UA, EAC, CNC, ANATEL, NOM-NYCE SCT, IFETEL, MPTC, RCM, BIS, PosTel, VCCI, TELEC, KC, MCMC, IDA, BSMI, NCC, DWLF&M, TP-BY, MOC	
Ergonomic compliance	TUVGS	

Technical Specifications – Input/Output Devices

<table>
<tr><th colspan="5">HP Wired Desktop 320K Keyboard</th></tr>
<tr><td rowspan="3">Physical Characteristics</td><td>Keys</td><td colspan="3">104, 105, 107,109 layouts</td></tr>
<tr><td>Dimensions(LxWxH)</td><td colspan="3">18.86*4.55*0.66 in (426.2 x 110.9 x 16.7 mm)</td></tr>
<tr><td>Weight</td><td colspan="3">1.00 lb(452g)</td></tr>
<tr><td rowspan="5">Electrical</td><td>Operating voltage</td><td colspan="3">5 VDC, +/-5%</td></tr>
<tr><td>Power consumption</td><td colspan="3">50 mA Max (All LED on)</td></tr>
<tr><td>System Interface</td><td colspan="3">USB Port</td></tr>
<tr><td>ESD</td><td colspan="3">Contact Discharge: 8 KV Air Discharge: 15 KV (Class B)</td></tr>
<tr><td>EMI - RFI</td><td colspan="3">European Standard EN 55022: 2006+A1: 2007, Class B.
FCC/CFR 47: Part 15 Class B</td></tr>
<tr><td>Mechanical</td><td>Keycaps</td><td colspan="3">2.0mm +/-0.2mm at 120gf Key travel</td></tr>
<tr><td rowspan="8">Environmental</td><td>Operating temperature</td><td colspan="3">10° C to 90° C</td></tr>
<tr><td>Non-operating temperature</td><td colspan="3">-30° C to 95° C</td></tr>
<tr><td>Operating humidity</td><td colspan="3">N/A</td></tr>
<tr><td>Non-operating humidity</td><td colspan="3">10% to 90% (non-condensing at ambient)</td></tr>
<tr><td>Operating shock</td><td colspan="3">N/A</td></tr>
<tr><td>Non-operating shock</td><td colspan="3">i. Half-Sine Shock – End-Use Handling, Non-Operational
Sample size: 5pcs.
Condition: Sample power off.
Axis: X, Y, Z axis (all 6 faces) – sample normal mode of operation.
Number of shocks: 1 shock/face.
Pulse duration: < 3 ms
Velocity change: 50lps (inch-per-second)- 65lps desired.

ii. Trapezoidal Shock- Transportation Environment, Non-Operational
Sample size: 5pcs.
Condition: Sample power off.
Orientation: All six faces: Front, Rear, Left, Right, Bottom, and Top.
Configuration: As intended for shipment
Number of shocks: 1 shock/face.
Minimum faired acceleration: 30G's. Test also at 40 and 50G's to find margin.
Velocity change: 266lps (inch-per-second) for product mass (m)
20<m<40lb</td></tr>
<tr><td rowspan="5">Operating vibration</td><td>Frequency (Hz)</td><td>Slope (dB/oct)</td><td>PSD (g^2/Hz)</td></tr>
<tr><td>5-350</td><td>0</td><td>0.0001</td></tr>
<tr><td>350-500</td><td>-6</td><td>-</td></tr>
<tr><td>500</td><td>-</td><td>0.00005</td></tr>
<tr><td colspan="3">(~0.21G_{nms})</td></tr>
<tr><td colspan="4">Total Test time: 10 minutes</td></tr>
</table>

	Non-operating vibration	**Frequency (Hz)**	**Slope (dB/oct)**	**PSD (g^2/Hz)**
		5.100	0	0.015
		100-137	-6	-
		137-350	0	0.008
		350-500	-6	-
		500	-	0.0039
	Drop (out of box)	76cm on carpet, six-drop sequence		
	Drop (in box)	10 times drop including 6 faces, one corner and 3 edges on rigid surface. Drop Height: 91cm		
Approvals	CB, CE, FCC, ICES, EAC, NOM-NYCE SCT, RCM, BIS, VCCI, KC, BSMI			
Ergonomic compliance	TUVGS			

HP 725 Multi-Device Rechargeable Wireless Keyboard		
Physical Characteristics	Keys	US-109 Keys POD-110 Keys JP-114 Keys LA-110 Keys
	Dimensions (LxWxH)	420.47 x 120.7 x 17.66(mm); 16.56 x 4.75 x 0.7(in)
	Weight	1.1lb; 499g
Electrical	Operating voltage	2.5V~3.8V
	Power consumption	2.4G Active=0.833mA Idle=0.065mA Sleep=0.03mA Power off=0.006mA BLE Active=0.414mA Idle=0.048 Sleep=0.03mA Power off=0.006mA
	System Interface	2.4GHz Wireless +Bluetooth 5.3
	ESD	4kV, Contact Discharge 8kV, Air Discharge
	EMI - RFI	-3dB
Mechanical	Key Structure (Switch type and feeling) (Plunger,, Scissor, Mechanical)	Scissor, 2.0mm ± 0.3mm low profile key travel
	Key actuation	Contact Point: 1.1±0.4mm
	Key life	10 million keystrokes (Life tester)
	Key structure type	Scissor
	Key-leveling mechanisms	balance bar
Environmental	Operating temperature	-29°C ~ 60°C
	Non-operating temperature	-20°C ~ 65°C
	Operating humidity	N/A
	Non-operating humidity	0-95%RH
	Operating shock	40G, 2ms, 1 impact on the ± X, ± Y, and + Z axes, with a total of 6 impacts
	Non-operating shock	240G, 2ms, 1 impact on the ± X, ± Y, and + Z axes, with a total of 6 impacts
	Operating vibration	N/A

	Non-operating vibration	Frequency: 5-55-5 (Hz), Amplitude: 2mm, Vibration direction: X, Y, Z, three axes in total, Cycle time: 3 minutes/CYCLE, Number of cycles: 10 times, Test time: 30 minutes/axis, total 90 minutes
	Drop (out of box)	6 faces & 4 corners, 76cm
	Drop (in box)	1 corner, 3 edge, 6 flat
Approvals	CB; FCC; IC; RCM; WPC; NTC; IMDA; BSMI; NCC; SRRC; SIRIM; TRA; EAC; ICASA; UKCA; KCC; TUV; RATEL; IFETEL; BIS; MOICT; iCTqatar; RoHS; Subtel; NKRZI	

HP Wired Desktop 320M Mouse		
Physical Characteristics	Keys	Left/right key
	Dimensions(LxWxH)	4.09 x2.50 x 1.40 in (103.8x 63.4 x 35.5 mm)
	Weight	0.16 lb(72g)
Electrical	Operating voltage	5 VDC, +/-0.25V
	Power consumption	100 mA Max
	System Interface	USB Port
	ESD	Contact Discharge: 8 KV Air Discharge: 15 KV (Class B)
	EMI - RFI	European Standard EN 55022: 2006+A1: 2007, Class B. FCC/CFR 47: Part 15 Class B
Mechanical	Keycaps	0.3mm key travel
	Key actuation	75±20g
	Key life	1million cycles
	Key structure type	Tact Switch
	Key-leveling mechanisms	N/A
Environmental	Operating temperature	10° to 90° C
	Non-operating temperature	-30° C to 95° C
	Operating humidity	N/A
	Non-operating humidity	10% to 90% (non-condensing at ambient)
	Operating shock	N/A

<table>
<tr><td rowspan="8"></td><td>Non-operating shock</td><td colspan="3">i. Half-Sine Shock – End-Use Handling, Non-Operational
Sample size: 5pcs.
Condition: Sample power off.
Axis: X, Y, Z axis (all 6 faces) – sample normal mode of operation.
Number of shocks: 1 shock/face.
Pulse duration: < 3 ms
Velocity change: 50lps (inch-per-second)- 65lps desired.

ii. Trapezoidal Shock- Transportation Environment, Non-Operational
Sample size: 5pcs.
Condition: Sample power off.
Orientation: All six faces: Front, Rear, Left, Right, Bottom, and Top.
Configuration: As intended for shipment
Number of shocks: 1 shock/face.
Minimum faired acceleration: 30G's. Test also at 40 and 50G's to find margin.
Velocity change: 266lps (inch-per-second) for product mass (m)
20<m<40lb</td></tr>
<tr><td rowspan="5">Operating vibration</td><td>Frequency (Hz)</td><td>Slope (dB/oct)</td><td>PSD (g^2/Hz)</td></tr>
<tr><td>5-350</td><td>0</td><td>0.0001</td></tr>
<tr><td>350-500</td><td>-6</td><td>-</td></tr>
<tr><td>500</td><td>-</td><td>0.00005</td></tr>
<tr><td colspan="3">(~0.21G_{nms})
Total Test time: 10 minutes</td></tr>
<tr><td rowspan="6">Non-operating vibration</td><td>Frequency (Hz)</td><td>Slope (dB/oct)</td><td>PSD (g^2/Hz)</td></tr>
<tr><td>5.100</td><td>0</td><td>0.015</td></tr>
<tr><td>100-137</td><td>-6</td><td>-</td></tr>
<tr><td>137-350</td><td>0</td><td>0.008</td></tr>
<tr><td>350-500</td><td>-6</td><td>-</td></tr>
<tr><td>500</td><td>-</td><td>0.0039</td></tr>
<tr><td>Drop (out of box)</td><td colspan="3">76cm on carpet, six-drop sequence</td></tr>
<tr><td>Drop (in box)</td><td colspan="3">N/A</td></tr>
<tr><td>Approvals</td><td colspan="4">CB, CE, FCC, cULus, ICES, EAC, NOM-NYCE SCT, RCM, VCCI, KC, BSMI</td></tr>
<tr><td>Ergonomic compliance</td><td colspan="4">TUVGS</td></tr>
</table>

Technical Specifications – Input/Output Devices

HP USB 125 (Antimicrobial)/128 Laser Mouse (China only)		
Dimensions (HxLxW)	112 x 63 x 36.2 mm (LxWxH)	
Weight	85 g	
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	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
Electrical	Operating voltage	5 VDC, +/-5%
	Power consumption (typical)	100mA
	Resolution	1,200 DPI
	Sensor	Optical/ Laser USB mouse sensor
	Tracking speed	30 inch/sec (max)
	Tracking acceleration	8G(max), 1G=9.8m/s2
Mechanical	Connector	USB
	Cable length	6 ft (1.8 m)
	Color	Jack Black
Regulatory approvals	Compliant	UL, FCC, CE Mark, TUV GS, VCCI, BSMI, RCM, KCC, EAC

AUDIO/MULTIMEDIA

Type	Integrated
HD Stereo Codec	Realtek ALC 3252
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 Rear: Line-out, Line-in*, 3.5mm and support stereo and retasking
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 to 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)

***NOTE:** System default is line-out. Line-in / Line-out can be adjusted through the audio setting

POWER

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)

Internal Power Supply	**500W/280W/400W active PFC** **Efficiency at 115Vac** 80PLUS Platinum certified 90/92/89% efficient at 20/50/100% load **Efficiency at 230Vac** 91/93/90% at 20/50/100% load Which meet 80PLUS Gold
Operating Voltage Range	90Vac~264Vac
Rated Voltage Range	100Vac~240Vac
Rated Line Frequency	50HZ~60HZ
Operating Line Frequency	47HZ~63HZ
Rated Input Current with Energy Efficient* Power Supply	400W Platinum≦5.2A 280W Platinum≦3.3A 500W Platinum≦6A
DC Output	+12V

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

Current Leakage (NFPA 99: 2012)	Less than 500 microamps of leakage current at 264 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 264 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	70 mm variable speed
Power cord length	6.0 ft. (1.83 m)[2]
External Power Adapter	Internal power supply
Dimensions	165 x 95 x 73 mm
Total Cord Length	6.0 ft. (1.83 m)

1. Power cord length will be varied from different type of cords start from 1.8m.
2. The length of India power cord is 2.0m

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 voltage range (100-127VAC and 200-240VAC).

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	115Vac/60HZ
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 (WxDxH)	6.1 x 12.13 x 13.27 in 155 x 308 x 337 mm
System Volume	981.9 cu in 16.1 L
System Weight	13.8 lb 6.25 kg (1 HDD/1 ODD/1 Dim)
Max Supported Weight (desktop orientation)	16.5 lb 7.56 kg (full config)
Packaging (WxDxH)	15.75 x 19.65 x 11.30 in (400 x 499 x 287 mm) **MPP:** 15.75 x 19.65 x 11.30 in (400 x 499 x 287 mm)
Shipping Weight	18.46 lb (8.38 kg) **MPP**: 19.34 lb (8.78kg)
Multipack Packaging	5-units per pack 20 per pallet 1200 x 1000 x 1310 mm (including pallet)
Palletization Profile	6-units per layer 8 layer max 48 per pallet 1200 x 1000 x 2416 mm (including 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
- 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

Technical Specifications – Miscellaneous Features

- 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

Technical Specifications – Miscellaneous Features

Additional Features	Description
Tower Orientation	Product can be oriented as either a desktop (horizontal) or a tower (vertical) for Tower, SFF, and Mini only. SFF/Mini requires optional stand.
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 be able to monitor for changes and allow the user to override them with the backup copy at 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 types 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
NVIDIA RTX A400 4GB Graphics	AV8J3AA
NVIDIA RTX PRO 2000 Blackwell 16 GB 4mDP Graphics	B5CH7AA
GFX NVIDIA RTX A1000 8GB w/Mini Brkt 4mDP	AV8J4AA
AMD Radeon RX 6300 2GB GDDR6 DP+HDMI FH	7Y6P7AA
Intel Arc A380 6GB GDDR6 FH PCIe x16 3DP+HDMI	9Q6G0AA
HP DisplayPort to HDMI True 4k Adapter	2JA63AA
HP HDMI Standard Cable Kit	T6F94AA
HP DisplayPort to VGA Adapter	AS615AA
HP Single Mini Display Port Adapter to Display Port Adapter	2MY05AA
HP DisplayPort Cable Kit	VN567AA
HP USB-C to HDMI 2.0 Adapter	1WC36AA
HP USB-C to USB 3.0 Adapter	N2Z63AA
HP HDMI to VGA Adapter	H4F02AA

Data Storage Drives	Part Number
HP 1TB 7200RPM SATA 3.5in Non-SED HDD	QK555AA

Input Devices	Part Number
HP 128 Laser Wired Mouse	265D9AA

Security Devices	Part Number
HP Business PC Security Lock v3 Kit	3XJ17AA
HP Keyed Cable Lock 10mm	T1A62AA

I/O Devices	Part Number
HP USB 3.1 Gen1 x2 Module FlexIO v2	13L58AA
HP PCIe x1 Parallel Port Card	N1M40AA
HP USB to Serial Port Adapter	J7B60AA
HP Serial Port v3 FlexIO	5B895AA

NOTE: For more detail on HPI/O Devices please refer to the HP FLEXIO Option Cards QuickSpecs. URLs:
http://h20195.www2.hp.com/v2/GetDocument.aspx?docname=c06042607

Communication Devices	Part Number
Intel® Ethernetl226-T1 2.5GbE NIC	9P1U8AA

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Date	Version History	Action	Description of Change
May 8, 2025	From v1 to v2	Changed	ENVIRONMENTAL & INDUSTRY, WEIGHTS & DIMENSIONS, Graphics sections
June 9, 2025	From v2 to v3	Changed	ENVIRONMENTAL & INDUSTRY section
November 17, 2025	From v3 to v4	Changed	Format, STORAGE section
November 20, 2025	From v4 to v5	Changed	PORTS section
May 15, 2026	From v5 to v6	Addition	GFX NVIDIA RTX A1000 8GB w/Mini Brkt 4mDP added to AMO section
June 10, 2026	From v6 to v7	Correction	SATA 3.0 in Internal ports section corrected to 3 from 4
June 12, 2026	From v7 to v8	Correction	PCI Express descriptions corrected in front call outs and ports sections
July 31, 2026	From v8 to v9	Update	AMO section general update
October 25, 2026	From v9 to v10	Addition	NVIDIA RTX PRO 2000 Blackwell 16 GB 4mDP Graphics added