Datasheet | NA

HP ScanJet Pro N4000 snw1 Sheet-feed Scanner

Get fast, two-sided scans in a single pass—recommended for 4000 pages per day.

Fast, affordable, and designed to handle everything from simple color jobs to complex workflows. Quickly and reliably digitize larger projects with scan speeds up to 40 ppm/80 ipm and a 50-page ADF.[1] Recommended for 4,000 pages per day.

Fast scanning. Superb results. Every page.

- Produce scans at up to 40 ppm/80 ipm[1] with two-sided scanning that captures both sides at once.
- Wi-Fi Direct enables scanning from a wireless mobile device without requiring a connection to a network or the internet.
- Capture every page easily—even stacks of mixed media—with HP EveryPage and an ultrasonic sensor.[3]
- Rely on this scanner time after time—recommended for 4000 pages per day.

Optimize workflows with one-touch scanning

- Streamline routine work with one-touch scanning—create one-button, custom settings for recurring scan jobs.
- Scan images directly into applications with included and full-featured TWAIN and ISIS®.
- Easily transfer scans into editable text, searchable PDF files, and more file types, using built-in OCR.
- Quickly share or archive scans directly to popular cloud destinations with HP Scan software.

Capture business documents like a pro

- Tackle tasks quickly and easily - with the simple 2.8" color touchscreen
- Define scan profiles for common document types, and scan to multiple destinations with HP Scan software.
- Capture and organize documents, business cards, and other file types with feature-rich software.
- Produce clear, legible scans—up to 1,200-dpi resolution.

Digitally signed by Olihovschi Dumitru
Date: 2022.09.27 09:02:36 EEST
Reason: MoldSign Signature
Location: Moldova

[1] Scan speed measured at 300 dpi (black-and-white, grayscale, and color). Actual processing speeds may vary depending on scan resolution, network conditions, computer performance, and application software.

Technical specifications

Scan	
Color scanning	Yes
Scan speed[3]	**ADF:** Up to 40 ppm / 80 ipm
Scan type / Technology[3]	Sheetfed / CMOS CIS (Contact Image Sensor)
Scan resolution	**Hardware:** 600 x 600 dpi; **Optical:** Up to 600 dpi
Scan file format	For text & images: PDF, PDF/A, Encrypted PDF, JPEG, PNG, BMP, TIFF, Word, Excel, PowerPoint, Text (.txt), Rich Text (.rtf) and Searchable PDF
Scan input modes	7.1 cm (2.8 inch) Color touch screen on front-panel for HP scan in Win OS, HP Easy Scan/ICA in Mac OS and third parties applications via TWAIN, ISIS and WIA
Scan Size	**ADF:** 8.5 x 122 in Maximum; 2 x 2 in Minimum
Scanner advanced features	Auto exposure, Auto threshold, Auto detect color, Background smooth/removal, Auto detect size, Straighten content, Enhance content, Multi-streaming, Auto feed, Multi-feed detection sensor, Advanced multi-feed detection, Auto orient, Multi-color dropout, Channel color dropout, Edge erase, Delete blank page, Merge pages, Hole fill, PDF permissions, Document separation (Blank page, Barcode, Zonal barcode, Zonal OCR)
Duplex ADF scanning	Yes
ADF capacity	Standard, 50 sheets
Multi feed detection	Yes
Light source (scanning)	LED
Output resolution dpi settings	75; 150; 200; 240; 300; 400; 500; 600; 1200 ppi
Twain version	Windows: 32-bit and 64-bit TWAIN version 2.1; Mac: n/a
Bit depth / Grayscale levels	24-bit (external), 48-bit (internal)/256
Digital sending standard features	Scan to PC, Scan to USB Drive, Scan to Email, Scan to Network Folder, Scan to SharePoint, Scan to Shortcut, Scan to Cloud
Connectivity	
Standard connectivity	Ethernet 10/100 Base-T, USB 3.0, WiFi 802.11 b/g/n, WiFi Direct
Wireless capability	Yes, WiFi 802.11 b/g/n, WiFi Direct
Memory	**Standard:**512 MB
Processor speed	ARM-1176 666 MHz /
Duty cycle (daily)	Recommended daily duty cycle: 4000 pages

Media types supported	Cut Sheet Paper, Printed Paper (Laser and ink), Pre-Punched Paper, Bank Checks, Business Cards, Freight Bills, Carbonless forms, Plastic Carrier sheets for easily damaged documents, Previously stapled media with staple removed, Plastic cards (up to 1.24mm)
What's in the box	**6FW08A** Power cord; Power Adapter; USB Cable; Scanner Engine; Flyers; Install Guide
Product dimensions	**W x d x h:** 11.8 x 6.8 x 6.1 in; **Maximum:** 11.8 x 16.2 x 12.2 in
Product weight	6.2 lb
Warranty features	One-year bench limited warranty whole unit replacement, phone and Web support included. Warranty may vary by country as required by law. Go to hp.com/support to learn about HP world-class service and support options in your region.
Energy star certified	Yes
Energy efficiency compliance	CECP; ENERGY STAR® 3.0 certified; EPEAT® Silver
Control panel	Control panel with a total of four buttons on the right side of the resistive touch panel (sleep/power, home, back, help buttons).
Display description	Resistive, RGB color and 2.8 "touch panel with a resolution of 140 dpi (240 x 320 dots).
Software included	Windows: HP WIA scan driver, HP TWAIN scan driver (32-bit and 64-bit), HP Scan, HP Scanner Tools Utility, I.R.I.S Readiris Pro, I.R.I.S Cardiris, OpenText ISIS
Compatible operating systems	Microsoft® Windows® (10, 8.1, 7, XP: 32-bit and 64-bit, 2008 R2, 2012 R2, 2016, 2019); MacOS (Catalina 10.15, Mojave 10.14, High Sierra 10.13); Linux (Ubuntu, Fedora, Debian, RHEL, Linux Mint, Open Suse, Manjaro); Citrix ready
Minimum system requirements	**PC:** macOS Catalina 10.15,macOS Mojave 10.14, macOS High Sierra 10.13, Microsoft® Windows® 10, 8.1, 7, XP: 32-bit and 64-bit, 2008 R2, 2012 R2, 2016, 2019, 2 GB available hard disk space, CD-ROM/DVD drive or Internet connection, USB port, Microsoft® Internet Explorer; **Mac:** macOS Catalina 10.15,macOS Mojave 10.14, macOS High Sierra 10.13; 1 GB HD; Internet required; USB
Power[1]	**Power supply type:** External power adapter; **Power requirements:** Input Voltage range: 90 - 264 VAC, Rated Frequency: 50 - 60HZ, Worldwide use; **Power consumption:** 5.9 Watts (ready), 24 Watts (scanning), 1.8 Watts (sleep), 0.1 Watts (auto-off), 0.1 Watts (off)
Acoustics	**Acoustic power emissions:** 59 (dB), 5.9 (B)
Operating environment	**Operating temperature range:** 10 to 35°C; **Recommended operating temperature:** 17.5 to 25°C; **Storage temperature range:** -40 to 60°C; **Non-operating humidity range:** ; **Operating humidity range:** 15 to 80% RH; **Recommended humidity operating range:** 30% to 70% relative humidity (RH)
Accessories	C9943B HP ADF Cleaning Cloth Package; 7QH79A HP ScanJet 2000s2/3000s4/4000snw1 Roller Replacement Kit; 8PA50A HP ScanJet 2000s2/3000s4/4000snw1 Sheet Kit; L2756A HP ScanJet 5000 s4/7000 s3 Roller Replacement Kit
HP Service and Support options	UD3E1E - HP 3 year Standard Exchange ScanJet Pro N4000 Service; UD3E2E - HP 3 year Next Business Day Exchange ScanJet Pro N4000 Service; UD3E3E - HP 3 year Next Business Day Onsite Exchange ScanJet Pro N4000 Service; UD3E4E - HP 3 year Return to Depot ScanJet Pro N4000 Service; UD3E5PE - HP 1 year Post Warranty Standard Exchange ScanJet Pro N4000 Service; UD3E6PE – HP 1 year Post Warranty Next Business Day Exchange ScanJet Pro N4000 Service; UD3E7PE - HP 1 year Post Warranty Next Business Day Onsite Exchange ScanJet Pro N4000 Service; UD3E8PE - HP 1 year Post Warranty Return to Depot ScanJet Pro N4000 Service; U9JT1E - HP Install Service wireless/network Personal Scanner & Printer

Learn more at hp.com

[1] Power requirements are based on the country/region where the printer is sold. Do not convert operating voltages. This will damage the printer and void the product warranty. Power consumption values typicallty based on measurement of 115V device. [2] EPEAT® registered where applicable. EPEAT registration varies by country. See http://www.epeat.net for registration status by country. [3] Sheet feed speeds: (All resolutions up to and including 300 ppi). Simplex 40 A-4 pages per minute. Duplex 80 A-4 images per minute

November 2021

Data sheet

HP ScanJet Pro N4600 fnw1

(20G07A)

Network connected, high-speed flatbed Scanner with HP EveryPage technology.

Boost productivity for professional scanning tasks with the fast, reliable, network connected HP ScanJet Pro, designed forscanning up to 6,000 pages daily. Automate workflows with shortcuts and fast, two-sided scanning from the auto document feeder.

Work-team Productivity.

- Scan up to 80 images (40 pages) per minute[1] with a 100-page, two-sided, single-pass auto document feeder.
- Optimize document workflows. Scan directly to e-mail, network folders, or a PC via Ethernet or WiFi connection.
- Don't wait for warm-up—Instant-on Technology lets you begin scanning quickly.[2]
- Place the scanner where the work happens. With a compact design that fits on the desktop.

Easy to use.

- Scan a variety of documents including books, magazines, and ID cards from the ADF or the Legal-size flatbed.
- Connect and scan directly to a storage device using the host USB plug.
- Simplify work processes with pre-configured workflows, and powerful editing tools from HP Scan Pro software.
- Scan directly to document applications using HP's full-featured WIA, ISIS and TWAIN support.

Workteam Reliability.

- Capture every page easily, HP EveryPage technology uses ultrasonic sensing to separate pages in the ADF.
- Designed for the productive workteam with high daily volumes of scanning up to 6,000 pages daily.
- Rely on automated scanning from the 100-page automatic document feeder with single-pass two-sided scanning.
- Get sharp, true-to-life scans of documents, graphics, and photos with up to 1200 dpi resolution.

Strong Security.

- Secure with genuine HP boot code signature validation that prevents booting if the code has been altered.
- Worry-free updates, validate and ensure any firmware updates are code-signed, Only authentic HP code is loaded.

Footnotes

[1] Scan speeds measured at 300 dpi (black and white, grayscale, and color). Actual processing speeds may vary depending on scan resolution, network conditions, computer performance, and application software.
[2] Compared with products that use traditional fusing and cold cathode fluorescent lamp (CCFL) copying.
[3] Wireless performance is dependent on physical environment and distance from access point, and may be limited during active VPN connections.

Accessories and services

Maintenance Kit	**4T8E5A** HP ScanJet A Separation Unit (100,000 pages)
	618J9A HP ScanJet B Roller Unit (100,000 pages)
Service and Support	**U35KDE** HP 3 year Next Business Day Advanced Exchange Service for ScanJet Pro N4600 **U34X1PE** HP 1 year Post Warranty Next Business Day Advanced Exchange Service for ScanJet Pro N4600 **U34X2PE** HP 1 year Post Warranty Onsite Exchange Service for ScanJet Pro N4600

Technical specifications

Control panel	2.8-in (7.11-cm) Touchscreen, Buttons (Power, Back, Home, Help)
Scanner specifications	**Scanner type** ADF; CIS scanning technology; Flatbed; **Scan technology**: ADF; Flatbed; Contact Image Sensor (CIS); **Scan input modes**: Scan front-panel function : Scan to Computer, Scan to E-mail, Scan to Network Folder, Scan to Share Folder, Scan to USB Drive and Everyday Scan. HP Scan in Win OS, HP Easy Scan/ICA in Mac OS and THIRD parties applications via TWAIN.; **Twain version**: Version 2.4; **Colour scanning**: Yes; **Output resolution dpi settings**: 75; 150; 200; 240; 300; 400; 500; 600; 1200 ppi; **Image scaling or enlargement range**: Will not perform any arbitrary scaling
Scan Size	**ADF:** 216 x 5362 mm Maximum; 89 x 148 mm Minimum; **Flatbed:** 216 x 356 mm
Scan speed[2]	Up to 40 ppm/80 ipm (b&w, gray and color, 300 dpi)
Scan resolution	**Optical** Up to 600 dpi (color and mono, ADF); Up to 1200 dpi (color and mono, flatbed); **Hardware**: Up to 600 x 600 dpi (color and mono, ADF); Up to 1200 x 1200 dpi (color and mono, flatbed)
Scan file format	For text and image pages : PDF, JPEG, PNG, BMP, TIF, Text(TXT), Rich Text(RTF), SEARCHABLE PDF, PDF/A, Word(DOC), Word(DOCX), Excel(XLS), Excel(XLSX), CSV
Scanner advanced features	One pass duplex scanning; Multi-feed detection sensor; Configurable Scan shortcuts with HP Scan (included): OCR; Auto exposure; Auto threshold; Auto detect colour; Background smooth/removal; Auto detect size; Straighten content; Enhance content; Auto orient; Multicolour dropout; Edge erase; Blank page options: Delete Blank Page, Blank Page Detection Sensitivity, Zonal Blank Detect; Merge pages; Document separation options: Zonal Text Separation, Barcode Separation, Blank Page Separation (Front/Back/Both/Any side selection), Add Page Separator Manually; Auto Feed; Show Viewer After Scan and Post Scan Operations are: Mark the image for Deletion, Rotate option, Move Left/Right, Create/Delete New Selection, Save as Scan Area, Manual Straighten option, Drag and Crop, Undo Options, image - Basic Zoom Slider, Open in Zoom Window(Zoom, Crop, Rotate) ; Background Clean-up options: Clean-up Background, Remove: make white, Smooth: make consistent, Remove Holes, Multi-Streaming; Single zone Selection for Zonal OCR, Barcode and QR Code; PDF options: PDF Security Settings (Applicable for PDF and Searchable PDF), Password Security & Document Permission Settings, PDF – iHQC compression, File Size/Quality Slider; TIFF Compression Options: for Gray or Color: Uncompressed/LZW/Jpeg-Tiff, for BW: Uncompressed/LZW/Tiff G3/Tiff G4; File Name Options: Base Name, Date, Time, Document Counter, Barcode Value, Zonal Text, File name sequence Settings, If File name already exists Actions - Overwrite/Append Date Time Stamp/Prompt for File Name, Intelligent File Naming; Destinations options: Email (Mail Clients, Save Local Copy Option, Local or NW), Folder, Save Folder path, Show Save as Dialog Box, After Saving the File(s) action, Printer/Fax, Plugins available if not already included: SMTP, SFTP, Box and Evernote, SharePoint, SharePoint365, Google Drive, Dropbox, OneDrive, One Drive for Business and more..; Enable Book Scan (Flatbed); Vertical Streak Removal/Detection; Multi Document Scanning; Enable Desktop Icons creation for Scan Profiles/Shortcuts; Shortcut Management: Create new Scan Shortcut, Delete Shortcut, Rename Shortcut, Shortcut Move Up/Down, Shortcut – Save/Undo, Restore Shortcut Defaults-Factory Settings, Import/Export Shortcut; retrieve shortcuts from Scanner without accessing the software on the PC. Configurable Scan shortcuts as standalone (using only the firmware of the scanner) without using the HP Scan Software: Scan to Computer, E-mail, Network Folder, SharePoint, Scan to USB Drive;
Grayscale levels/Bit depth	256/24-bit (external), 48-bit (internal)
Duty cycle	Recommended daily duty cycle: 6000 pages
Auto document feeder capacity	Standard, 100 sheets (80 g/m²)
Connectivity	**Standard** Ethernet 10/100/1000 Base-T, USB 3.0, WiFi 802.11 b/g/n, WiFi Direct;
Memory	**Standard** 512 MB
Media handling	
Media types	Paper (banner, inkjet, photo, plain), envelopes, labels, cards (greeting, index)
Media size (ADF)	Letter; Legal; Executive; A4; A5; A6; B5; B5 (JIS)
Media weight (ADF)	45 to 120 g/m²
Compatible operating systems	Windows 11; Windows 10; Windows 8; Windows 8.1; Windows 7; Windows Server; macOS 10.14 Mojave; macOS 10.15 Catalina; macOS 11 Big Sur; macOS 12 Monterey; Linux
Minimum system requirements	**PC**: Microsoft® Windows® (11, 10, 8.1, 7 : 32-bit and 64-bit, 2008 R2, 2012 R2, 2016, 2019); 2 GB available hard disk space, Internet connection, Microsoft® Internet Explorer or any browser
Software included	HP Scan Software, HP Scanner Device Driver, HP WIA scan driver, HP TWAIN scan driver, HP Scanner Tools Utility, ISIS driver
Print Server Specifications	
Security management	Power button to on/off
Dimensions and weight	
Product dimensions (W x D x H)	**Minimum**: 536.5 x 325.4 x 133.3 mm; **Maximum**: 536.5 x 442.6 x 387.42 mm
Package dimensions (W x D x H)	645 x 245 x 499 mm
Product weight	6.1 kg
Package weight	7.8 kg
Operating environment	**Temperature**: 17.5 to 25°C **Humidity**: 30 to 70% RH
Storage	**Temperature**: -40 to 60°C
Power	**Requirements**: Input Voltage: 100 to 240 VAC; **Consumption**: 17.4 watts (Active-Scanning), 7.5 watts (Ready), 1.9 watts (Sleep), 0.06 watts (Auto-Off), 0.06 watts (Manual-Off) ; **ENERGY STAR**: Yes
Certifications	IEC62368-1:2018, IEC 60950-1:2005 +A1 and all applicable amendments; CSA/UL 60950-1, 2nd edition (2007); EN 60950-1:2006 +A11 +A1 +A12+A2; EAC safety; Canada cUL CoC; China CCC; European Union CE; Kenya PVOC; Kuwait TER; Nigeria SON; Saudi Arabia SASO; South Africa NRCS; Taiwan BSMI; Ukraine safety approval **Electromagnetic compatibility**: Class B Emissions; CISPR 32:2015 (International); European Union EMC Directive 2004/108/EC, EN 55032:2015 (CE mark); China GB9254-2008 (CCC); Taiwan CNS13438:2006 (BSMI); USA CFR47 Part 15, Subpart B (FCC); ICES-003:2020 Issue 7 (Canada); Australia C-tick (includes New Zealand); KN 22 and Korea KCC; EAC EMC Certificate; Ukraine EMC approval; EN 61000-3-2:2014 (harmonics); EN 61000-3-3:2013 (flicker); Immunity 505035:2017 CECP; SEPA; IT ECO Declaration; EPEAT® Silver registered
What's in the box	**20G07A** HP ScanJet Pro N4600 fnw1 Scanner; Install guide; Supporting flyers; Cushions; USB cable; Power adapter; Power cords
Warranty	One-year limited hardware warranty, phone and Web support included. Warranty may vary by country as required by law. Go to http://www.hp.com/support to learn about HP world-class service and support options in your region.

Technical specifications disclaimers

[1] EPEAT® Silver registered where applicable. EPEAT registration varies by country. See http://www.epeat.net for registration status by country.
[2] Scan speeds of up to 40 ppm measured at 300 dpi (color) from automatic document feeder when scanning to digital file. Actual speeds may vary depending on scan resolution, network conditions, computer performance and application software.

sg-en March 2022

Overview

HP EliteBook 650 15.6 inch G9 Notebook PC

Left

1. Internal Microphones (2)
2. Webcam LED (Optional)
3. Camera Shutter (Only available with webcam)
4. HD TNR and IR Camera (Optional)
5. IR Camera LED (Optional)
6. Clickpad
7. Smartcard Reader (Optional)
8. SuperSpeed USB Type-A 5Gbps signaling rate port (USB 3.2 Gen 1)
9. Ethernet Port (RJ-45) [1]
10. Nano Security Lock Slot (Lock sold separately)

1. RJ-45 port icon may vary.

Overview

Right

1. Power Button Key
2. Power Connector
3. Thunderbolt™ 4 with USB4 Type-C® 40Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4)[1]
4. SuperSpeed USB Type-A 5Gbps signaling rate port (Powered port) (USB 3.2 Gen 1)
5. SuperSpeed USB Type-A 5Gbps signaling rate port (USB 3.2 Gen 1)
6. HDMI 2.0b Port (Cable not included)
7. Audio Combo Jack
8. External SIM Card Slot (Optional)
9. Touch Fingerprint Sensor (Select Models)

1. SuperSpeed USB 20Gbps is not available with Thunderbolt™ 4

Overview

At A Glance

- Preinstalled with Windows 11 versions or FreeDOS
- Choice of 12th generation Intel® Core™ i7, i5 and i3 processors
- NVIDIA® GeForce® MX570 discrete graphics with 2 GB GDDR6 video memory
- NVIDIA® GeForce® MX570A discrete graphics with 2 GB GDDR6 video memory
- Fast and upgradeable dual channel DDR4 SODIMM memory up to 64 GB
- Choice of 39.6 cm (15.6") diagonal HD, Ultra Wide Viewing Angle FHD, Touch or Non-Touch screen option
- Features redesigned quiet and responsive HP Keyboard with the HP Programmable key and backlit options
- Choice of solid state drives up to 1 TB
- Multi-layered security with HP SureStart Gen7[1], HP Privacy Camera, HP Sure View Gen4[2], HP Wolf Security (Includes HP Sure Sense[3] and HP Sure Click[4]), HP Secure Erase[5], HP Client Security Manager Gen7 (Includes Sure Run Gen5[6], Sure Recover Gen5[7]), Touch Fingerprint reader[8], and Tamper Lock[9]
- Supports wireless options for connectivity on the go including gigabit-speed Wi-Fi® 6e and CAT9 4G/LTE WWAN
- Supports fast charging (50% in 30 minutes) with no impact on battery recharge cycles[10]
- Designed to support HP docking options
- Passed MIL-STD 810H tests[11]
- Battery Life up to 13 hours with the optional 51.3Whr battery
- Optimize your video calls with an HD camera and Temporal Noise Reduction that adjusts to the lighting in your environment.
- Audio G2G

1. HP Sure Start Gen7 is available on select HP PCs.
2. HP Sure View integrated privacy screen is an optional feature that must be configured at purchase and is designed to function in landscape orientation.
3. HP Sure Sense is available on select HP PCs and is not available with Windows11Home.
4. HP Sure Click requires Windows 11. See https://bit.ly/2PrLT6A_SureClick for complete details.
5. For the methods outlined in the National Institute of Standards and Technology Special Publication 800-88 "Clear" sanitation method. HP Secure Erase does not support platforms with Intel® Optane™.
6. HP Sure Run Gen4 is available on select Windows based HP Pro, Elite and Workstation PCs with select Intel® or AMD processors.
7. HP Sure Recover Gen5 is available on select HP PCs and requires Windows 10 and higher and an open network connection. You must back up important files, data, photos, videos, etc. before using HP Sure Recover to avoid loss of data. Network based recovery using Wi-Fi is only available on PCs with Intel Wi-Fi Module.
8. Sold separately or as an optional feature
9. HP Tamper Lock must be enabled by the customer or your administrator.
10. HP notebooks up to 50% within 30 minutes when the system is off or in standby mode. Power adapter with a minimum capacity of 65 watts is required. After charging has reached 50% capacity, charging will return to normal. Charging time may vary +/-10% due to System tolerance.
11. MIL STD 810H testing is not intended to demonstrate fitness for U.S. Department of Defense contract requirements or for military use. Test results are not a guarantee of future performance under these test conditions. Accidental damage requires an optional HP Accidental Damage Protection Care Pack.

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

Technical Specifications

PRODUCT NAME

HP EliteBook 650 15.6"? G9 Notebook 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 available with a Volume Licensing Agreement) [1]
Windows 10 Pro (available through downgrade rights from Windows 11 Pro) [1,2]
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 10 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.
2. This system is preinstalled with Windows 10 Pro software and also comes with a license for Windows 11 Pro software and provision for recovery software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.

PROCESSORS

Processor [3,4,5,6,7]	Cores	Number of P-cores	Number of E-cores	Threads	L3 Cache	Max Turbo Frequency		Base Frequency		Intel SIPP/ vPro® Enterprise	Intel vPro® Essentials
						P-cores	E-cores	P-cores	E-cores		
Intel® Core™ i7-1270P	12	4	8	16	18MB	4.8 GHz	3.5 GHz	2.2 GHz	1.6 GHz	X	
Intel® Core™ i5-1250P	12	4	8	16	12MB	4.4 GHz	3.3 GHz	1.7 GHz	1.2 GHz	X	
Intel® Core™ i7-1265U	10	2	8	12	12MB	4.8 GHz	3.6 GHz	1.8 GHz	1.3 GHz	X	
Intel® Core™ i7-1255U	10	2	8	12	12MB	4.7 GHz	3.5 GHz	1.7 GHz	1.2 GHz		X
Intel® Core™ i5-1245U	10	2	8	12	12MB	4.4 GHz	3.3 GHz	1.2 GHz	1.2 GHz	X	
Intel® Core™ i5-1235U	10	2	8	12	12MB	4.4 GHz	3.3 GHz	1.3 GHz	0.9 GHz		X
Intel® Core™ i3-1215U	6	2	4	8	10MB	4.4 GHz	3.3 GHz	1.2 GHz	0.9 GHz		

3. Multicore is designed to improve performance of certain software products. Not all customers or software applications will necessarily benefit from use of this technology. Performance and clock frequency will vary depending on application workload and your hardware and software configurations. Intel's numbering, branding and/or naming is not a measurement of higher performance.
4. Processor speed denotes maximum performance mode; processors will run at lower speeds in battery optimization mode.

Technical Specifications

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

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

7. 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

CHIPSET

Chipset is integrated with processor

GRAPHICS

Integrated

Intel® Iris® Xe Graphics (Core i5 and Core i7) [8]
Intel® UHD Graphics (Core i3)

Discrete

NVIDIA GeForce ®MX570 Controller
NVIDIA GeForce ®MX570A Controller

Supports

Support HD decode, DX12, HDMI 2.1b [9]

8. Intel® Iris® Xe Graphics capabilities require system to be configured with Intel® Core™ i5 or i7 processors and dual channel memory. Intel® Iris® Xe Graphics with Intel® Core™ i5 or 7 processors and single channel memory will only function as UHD graphics
9. HD content required to view HD images.

DISPLAY

Non-Touch

39.6 cm (15.6") diagonal FHD (1920x1080) UWVA eDP, anti-glare, LED, low power, narrow bezel bent, 400 nits, 100% for HD + IR camera for WWAN [9,11]
39.6 cm (15.6") diagonal FHD (1920x1080) UWVA eDP, anti-glare, WLED, low power, narrow bezel bent, 400 nits, 100% for HD camera [9,11]
39.6 cm (15.6") diagonal FHD (1920x1080) UWVA eDP, anti-glare, LED, narrow bezel bent, 250 nits, 45% for HD + IR camera for WWAN [9,11]
39.6 cm (15.6") diagonal FHD (1920x1080) UWVA eDP, anti-glare, LED, narrow bezel bent, 250 nits, 45% for HD + IR camera [9,11]
39.6 cm (15.6") diagonal FHD (1920x1080) UWVA eDP, anti-glare, WLED, narrow bezel bent, 250 nits, 45% for HD camera for WWAN [9,11]
39.6 cm (15.6") diagonal FHD (1920x1080) UWVA eDP, anti-glare, WLED, narrow bezel bent, 250 nits, 45% for HD camera [9,11]
39.6 cm (15.6") diagonal FHD (1920x1080) UWVA eDP 1.2 w/o PSR, anti-glare, WLED, narrow bezel bent, 250 nits, 45% [9,11]
39.6 cm (15.6") diagonal HD (1920x1080) SVA, eDP 1.2 w/o PSR, anti-glare, WLED, narrow bezel bent, 250 nits, 45% [9,11]
39.6 cm (15.6") diagonal HD (1920x1080) SVA, eDP, anti-glare, WLED, narrow bezel bent, 250 nits, 45% for HD camera [9,11]

Touch

39.6 cm (15.6") diagonal FHD UWVA eDP anti-glare narrow bezel bent touch-on-panel screen, 250 nits, 45% NTSC for HD + IR camera and WWAN (1920 x 1080) [9,10,11,12]
39.6 cm (15.6") diagonal FHD UWVA eDP anti-glare narrow bezel bent touch-on-panel screen, 250 nits, 45% NTSC for HD camera (1920 x 1080) [9,10,11,12]

Technical Specifications

Display Size
15.6" diagonal
39.6 cm (15.6") diagonal

9. HD content required to view HD images.
10. Sold separately or as an optional feature.
11. Resolutions are dependent upon monitor capability, and resolution and color depth settings.
12. Actual brightness will be lower with touchscreen.

Docking (Sold Separately)

Docking station model #1	HP USB-C Dock G5
Docking station model #2	HP USB-C/A Universal Dock G2
Docking station model #3	HP Thunderbolt Dock G2

For additional aftermarket options and docking specs please see page 41.

STORAGE AND DRIVES

Primary M.2 Storage
1 TB PCIe® Gen4x4 NVMe™ M.2 TLC Solid State Drive [13]
512 GB PCIe® Gen4x4 NVMe™ M.2 TLC Self Encrypted OPAL2 Solid State Drive [13]
512 GB PCIe® Gen4x4 NVMe™ M.2 TLC Solid State Drive [13]
512 GB PCIe® NVMe™ M.2 SSD [13]
256 GB PCIe® Gen4x4 NVMe™ M.2 TLC Self Encrypted OPAL2 Solid State Drive [13]
256 GB PCIe® Gen4x4 NVMe™ M.2 TLC single-sided Solid State Drive [13]
256 GB PCIe® NVMe™ M.2 SSD [13]

Secondary M.2 Storage (Optional)
128 GB PCIe® NVMe™ M.2 Value Solid State Drive [13,14]
256 GB PCIe® NVMe™ M.2 Value Solid State Drive [13,14]

13. For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 30 GB (for Windows 10 and 11) is reserved for system recovery software
14. Second storage is only available with non-WWAN base Unit AND Primary M.2 storage

MEMORY

Technical Specifications

Maximum Memory
64 GB DDR4-3200 SDRAM [15]

Memory
64 GB DDR4-3200 SDRAM (2x32GB) [15]
32 GB DDR4-3200 SDRAM (2x16GB) [15]
32 GB DDR4-3200 SDRAM (1x32GB) [15]
16 GB DDR4-3200 SDRAM (2x8GB) [15]
16 GB DDR4-3200 SDRAM (1x16GB) [15]
8 GB DDR4-3200 SDRAM (1x8GB) [15]

Memory Slots
2 SODIMM
Both slots are customer accessible / upgradeable
DDR4 PC4 SODIMMS (Alder Lake runs at 3200)
Supports Dual Channel Memory

15. Due to the non-industry standard nature of some third-party memory modules, we recommend HP branded memory to ensure compatibility. If you mix memory speeds, the system will perform at the lower memory speed.

NETWORKING/COMMUNICATIONS

WLAN
Intel® AX211 Wi-Fi 6E and Bluetooth® 5.2 M.2 2230 160MHz CNVi World-Wide WLAN [16]
Intel® AX211 Wi-Fi 6E and Bluetooth® 5.2 M.2 2230 vPro 160MHz CNVi World-Wide WLAN [16]

WWAN
Intel® XMM™ 7560 R+ LTE-Advanced Pro [17]

NFC
NXP NPC300 Near Field Communication Module (NFC Mirage WNC XRAV-1)

Miracast
Native Miracast Support

Ethernet
Intel® I219-LM 1 Gigabit Network Connection LOM (vPro) [18]
Intel® I219v 1 Gigabit Network Connection LOM (non-vPro) [18]

Wake on WLAN
Support on S3 AC mode only

16. 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.
17. WWAN module is an optional feature, requires factory configuration and requires separately purchased service contract. Check with service provider for coverage and availability in your area. Connection speeds will vary due to location, environment, network conditions, and other factors. 4G LTE not available on all products, in all regions.
18. The term "10/100/1000" or "Gigabit" Ethernet indicates compatibility with IEEE standard 802.3ab for Gigabit Ethernet, and does not connote actual operating speed of 1 Gb/s. For high-speed transmission, connection to a Gigabit Ethernet server and network infrastructure is required.

Technical Specifications

AUDIO/MULTIMEDIA

Audio
2 Integrated stereo speakers
Integrated microphone (Dual Array)

Speaker Power
2W/4ohm Per speaker

Camera
720p HD camera with Temporal Noise Reduction [9]
720p HD camera+IR Camera with Temporal Noise Reduction [9,10]

9. HD content required to view HD images.
10. Sold separately or as an optional feature.

KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS

Keyboard
HP Premium Keyboard, spill resistant with numeric keypad and optional backlit function [19]

Pointing Device
Clickpad with multi-touch gesture support

Function Keys
F1 - Display Switching
F2 - Blank
F3 - Brightness Down
F4 - Brightness Up
F5 - Audio Mute
F6 - Volume Down
F7 - Volume Up
F8 - Mic Mute
F9 - Blank or Backlit Toggle
F10 - Insert
F11 - Wireless
F12 - Programmable key

Hidden Function Keys
Fn+R - Break
Fn+S - Sys Rq
Fn+C - Scroll Lock

19. Backlit keyboard is an optional feature.

SOFTWARE AND SECURITY

Preinstalled Software
Software
HP Quick Touch
HP Quick Drop [20]
myHP
HP Smart Support [21]

Technical Specifications

HP Connection Optimizer
HP Power Manager
HP Hotkey Support
HP Support Assistant [22]
HP Notifications
HP Privacy Settings
Buy Microsoft Office (Sold separately)

Manageability Features
HP Manageability Integration Kit Gen4 (download) [23]
HP Driver Packs (download)
HP Client Catalog (download)
HP Client Management Script Library (download)
HP Image Assistant (download)

NOTE: To enhance brightness, level go to the Intel® Graphics Command Center app, click on System and turn off the Display Power Savings function.

Security Management
HP Wolf Security for Business[24] includes:
HP Sure Click [25]
HP Sure Sense [26]
HP Sure Run Gen5 [27]
HP Sure Recover Gen5 [28]
HP Sure Start Gen7 [29]
HP Tamper Lock
HP Sure Admin [30]
HP Client Security Manager Gen7 [31]
TPM 2.0 Embedded Security Chip (Common Criteria EAL4+ Certified) (FIPS 140-2 Level 2 Certified)

BIOS
HP BIOSphere Gen6 [32]
HP Secure Erase [33]
Absolute Persistence Module [34]
HP DriveLock & Automatic DriveLock
BIOS Update via Network
HP Wake on WLAN
HP Fingerprint Sensor [35]
Secured-Core PC Enable [36]

Security
TPM
Model: Infineon SLB9672VU2.0
Version: 15.21
Revision: TPM 2.0
FIPS 140-2 Compliant: Yes

Smartcard Reader
Model number: Alcor AU9560
FIPS 201 Compliant: Yes

IPv6 Support
Yes

FirstNet Certified
No

Is the BIOS on this notebook ISO/IEC 19678:2015 (formerly NIST 800-147) compliant?: Yes

Technical Specifications

UEFI version: 2.7
Class: 3

20. HP Quick Drop requires Internet access and Windows 10 or higher PC preinstalled with HP QuickDrop app and either an Android device (phone or tablet) running Android 7 or higher with the Android HP QuickDrop app, and /or an iOS device (phone or tablet) running iOS 12 or higher with the iOS HP QuickDrop app.
21. 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.
22. HP Support Assistant requires Windows and Internet Access.
23. HP Manageability Integration Kit can be downloaded from http://www.hp.com/go/clientmanagement.
24. HP Wolf Security for Business requires Windows 10 or higher, includes various HP security features and is available on HP Pro, Elite, RPOS and Workstation products. See product details for included security features and OS requirement.
25. HP Sure Click requires Windows 10 Pro or higher or Enterprise. See https://bit.ly/2PrLT6A_SureClick for complete details.
26. HP Sure Sense is available on select HP PCs with Windows 10 Pro, Windows 10 Enterprise, Windows 11 Pro, or Windows 11 Enterprise OS
27. HP Sure Run Gen5 is available on select HP PCs and requires Windows 10 and higher.
28. HP Sure Recover Gen5 is available on select HP PCs and requires Windows 10 and higher and an open network connection. You must back up important files, data, photos, videos, etc. before using HP Sure Recover to avoid loss of data. Network based recovery using Wi-Fi is only available on PCs with Intel Wi-Fi Module.
29. HP Sure Start Gen7 is available on select HP PCs and requires Windows 10 and higher.
30. HP Sure Admin requires Windows 10 or higher, HP BIOS, HP Manageability Integration Kit from http://www.hp.com/go/clientmanagement and HP Sure Admin Local Access Authenticator smartphone app from the Android or Apple store.
31. HP Client Security Manager Gen7 requires Windows and is available on the select HP Elite and Pro PCs.
32. HP BIOSphere Gen6 features may vary depending on the platform and configuration.
33. For the methods outlined in the National Institute of Standards and Technology Special Publication 800-88 "Clear" sanitation method. HP Secure Erase does not support platforms with Intel® Optane™.
34. Absolute 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/.
35. Fingerprint Reader is an optional feature that must be configured at purchase.
36. Requires an Intel® vPro®, AMD Ryzen™ Pro processor or Qualcomm® processor with SD850 or higher and requires 8 GB or more system memory. Secured-core PC is enabled from the factory.

POWER

Technical Specifications

Power Supply
HP Smart 65 W External AC power adapter [37]
HP Smart 65 W EM External AC power adapter [37]
HP Smart 65 W USB Type-C™ adapter [37]
HP Smart 45 W External AC power adapter [37]
HP Smart 45 W USB Type-C™ adapter [37]

Battery
HP Long Life 3-cell, 42.75 Wh Polymer [38,39]
HP Long Life 3-cell, 51.3 Wh Polymer [38,39]
Compliant with UL 1642 Standard

Power Cord
3-wire plug - 1m [37]
2-wire plug - 1m [37]

Battery life
Up to 13 hours with 51whr battery (HP Long Life 3-Cell, 51 Whr Polymer, UMA graphic, Intel U15, 200 nits display, 2*4G memory, 25 GB SSD) [40]
Up to 12 hours and 15 minutes with 51whr battery (HP Long Life 3-Cell, 51 Whr Polymer, UMA graphic, Intel P28, 200 nits display, 2*4G memory, 256 GB SSD) [40]
Up to 11 hours with 42whr battery (HP Long Life 3-Cell, 42 Whr Polymer, UMA graphic, Intel U15, 200 nits display, 2*4G memory, 25 GB SSD)[40]

Battery Weight
HP Long Life 3-cell - 42.72 Wh Polymer
.40 lb
181.83 g

HP Long Life 3-cell - 51.3 Wh Polymer
.45 lb
203.56 g

37. Availability may vary by country.
38. Battery is internal and not replaceable by customer. Serviceable by warranty.
39. Actual battery Watt-hours (Wh) will vary from design capacity. Battery capacity will naturally decrease with shelf life, time, usage, environment, temperature, system configuration, loaded apps, features, power management settings and other factors.
40. Windows 10 MM18 battery life will vary depending on various factors including product model, configuration, loaded applications, features, use, wireless functionality, and power management settings. The maximum capacity of the battery will naturally decrease with time and usage. See http://www.bapco.com for additional details.

WEIGHTS & DIMENSIONs

Product Weight
Starting at 3.83 lb [41]
Starting at 1.74 kg [41]

Product Dimensions (W x D x H)
14.15 x 9.20 x 0.78 in
35.94 x 23.39 x 1.99 cm

41. Weight will vary by configuration. Does not include power adapter.

PORTS/SLOTS

Technical Specifications

1 Thunderbolt™ 4 with USB4™ Type-C® 40 Gbps signaling rate (USB Power Delivery, DisplayPort™ 2.1b)[42]
3 SuperSpeed USB Type-A 5Gbps signaling rate Port includes 1 Powered port (USB 3.2 Gen 1)
1 AC power
1 HDMI 2.0b [43]
1 Headphone/microphone combo jack
1 Nano SIM slot for WWAN (optional)
1 RJ-45 [44]

Expansion Slots
Smart Card Reader (optional)

42. SuperSpeed USB 20Gbps is not available with Thunderbolt™ 4
43. HDMI cable sold separately.
44. RJ-45 port icon may vary.

SERVICE AND SUPPORT

HP Services offers 1-year or 3-year limited warranties and 90 day software limited warranty options depending on country. Batteries have a default one year limited warranty except for Long Life batteries which will have same 1-year or 3-year limited warranty as the platform. Refer to http://www.hp.com/support/batterywarranty/ for additional battery information. On-site service and extended coverage is also available. HP Care Pack Services are optional extended service contracts that go beyond the standard limited warranties. To choose the right level of service for your HP product, use the HP Care Pack Services Lookup Tool at: http://www.hp.com/go/cpc. [45]

45. HP Care Packs are sold separately. 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 http://www.hp.com/go/cpc. HP services are governed by the applicable HP terms and conditions of service provided or indicated t Customer at the time of purchase. Customer may have additional statutory rights according to applicable local laws, and such right 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
Energy Efficiency Compliance:	EPEAT® registered[46]
Environmental Specifications:	Low halogen [47]
Environmental Specifications:	TCO 9.0 Certification

46. 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.
47. External power supplies, power cords, cables and peripherals are not Low Halogen. Service parts obtained after purchase may not be Low Halogen.

SYSTEM UNIT

Technical Specifications

Stand-Alone Power Requirements (AC Power)	
Nominal Operating Voltage	19V
Average Operating Power	U15 UMA 3.72W/U15 DSC 4.56W/U28 3.80W
Integrated graphics	Yes
Discrete Graphics	Yes, GN20-S5
Max Operating Power	Discrete < 65W UMA U15 < 45W, UMA U28 < 65W
Temperature	
Operating	32° to 95° F (0° to 35° C) (No sustained direct exposure to sunlight) (System performance may be reduced above 32°C (89.6°F))
Non-operating	-4° to 140° F (-20° to 60° C)
Relative Humidity	
Operating	10% to 90% (non-condensing)
Non-operating	5% to 95% (38.7° C (101.6° F) maximum wet bulb tempera-ture; non-condensing)
Shock	
Operating	40 G, 2 ms, half-sine
Non-operating	200 G, 2 ms, half-sine
Random Vibration	
Operating	1.043 grams
Non-operating	3.5 grams
Altitude (unpressurized)	
Operating	10,000 ft (3,048 m)
Non-operating	40,000 ft (12,192 m)
Planned Industry Standard Certifications	
Regulatory Model Number	HSN-Q33C-5
UL	Yes
CSA	Yes
FCC Compliance	Yes
ENERGY STAR®	Yes[48]
EPEAT®	EPEAT® Gold in the United States[49]
ICES	Yes
Australia /	Yes
NZ A-Tick Compliance	Yes
CCC	Yes
Japan VCCI Compliance	Yes
KC	Yes
BSMI	Yes
CE Marking Compliance	Yes
BNCI or BELUS	Yes
CIT	Yes
EAC	Yes
Saudi Arabian Compliance (ICCP)	Yes
SABS	Yes
UKRSERTCOMPUTER	Yes

48. Configurations of the HP EliteBook 650 G9 that are ENERGY STAR® qualified are identified as HP EliteBook 650 G9 ENERGY STAR on HP websites and on http://www.energystar.gov.
49. 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.

DISPLAYS

Note: All specifications represent the typical specifications provided by hp's component manufacturers; actual performance may vary either higher or lower.
1. Actual brightness will be lower with touchscreen or HP Sure View.

Technical Specifications

Panel LCD 15.6 inch FHD (1920 x 1080) Anti-Glare WLED UWVA 45percent cg 250nits eDP 1.2 w/o PSR bent Touch on Panel NWBZ	**Outline Dimensions (W x H)**	350.960 x 205.740 mm (max)
	Active Area	344.160 x 193.590 mm (typ.)
	Weight	380 g (max)
	Diagonal Size	15.6 inch
	Thickness	3.2mm/ 5.2mm (PCB) (max)
	Interface	eDP 1.2
	Surface Treatment	Anti-Glare On-cell
	Touch Enabled	Yes[1]
	Contrast Ratio	600:1 (typ.)
	Refresh Rate	60 Hz
	Brightness	250 nits[1]
	Pixel Resolution - Format	1920 x 1080 (FHD)
	Backlight	LED
	Pixel Resolution	RGB Stripe
	Color Gamut Coverage	NTSC 45%
	Color Depth	6 bits
	Viewing Angle	UWVA 85/85/85/85
	Low Blue Light	No
	Power Consumption (W, EBL@ 150nits max/ 200nits max)	2.54 (Max) / 3.12 (Max)

15.6 inch FHD (1920 x 1080) Anti-Glare WLED UWVA sRGB 100percent cg 400nits eDP 1.4+PSR2 bent LP NWBZ	**Outline Dimensions (W x H)**	349.460 x 204.790 mm (max)
	Active Area	344.160 x 193.590 mm (typ.)
	Weight	325 g (max)
	Diagonal Size	15.6 inch
	Thickness	2.6mm / 4.6mm (PCB) (max)
	Interface	eDP 1.4
	Surface Treatment	Anti-Glare
	Touch Enabled	No
	Contrast Ratio	1200:1 (typ.)
	Refresh Rate	60 Hz
	Brightness	400 nits
	Pixel Resolution - Format	1920 x 1080 (FHD)
	Backlight	LED
	Pixel Resolution	RGB Stripe
	Color Gamut Coverage	sRGB 100% (NTSC 72%)
	Color Depth	8 bits
	Viewing Angle	UWVA 85/85/85/85
	Low Blue Light	No
	Power Consumption (W, EBL@ 150nits max/ 200nits max)	1.13(Max)/1.37(Max)

Technical Specifications

15.6 inch FHD (1920 x 1080) Anti-Glare WLED UWVA 45percent cg 250nits eDP 1.2 w/o PSR bent NWBZ	**Outline Dimensions (W x H)**	350.960 x 205.540mm (max)
	Active Area	344.160 x 193.590 mm (typ.)
	Weight	370 g (max)
	Diagonal Size	15.6 inch
	Thickness	3.0 mm/ 5.0 mm (w/PCB) (max)
	Interface	eDP 1.2 (2 lane)
	Surface Treatment	Anti-Glare
	Touch Enabled	No
	Contrast Ratio	600:1 (typ.)
	Refresh Rate	60 Hz
	Brightness	250 nits
	Pixel Resolution - Format	1920 x 1080 (FHD)
	Backlight	LED
	Pixel Resolution	RGB Stripe
	Color Gamut Coverage	NTSC 45%
	Color Depth	6 bits (Hi FRC supportive w/ condition to enable)
	Viewing Angle	UWVA 85/85/85/85
	Low Blue Light	No
	Power Consumption (W, EBL@ 150nits max/ 200nits max)	2.62 (Max) / 3.27 (Max)

15.6-in HD (1366 x 768) Anti-Glare WLED SVA 45percent cg 250nits eDP 1.2 w/o PSR NWBZ bent	**Outline Dimensions (W x H)**	350.960 x 205.540 mm (max)
	Active Area	344.230 x 193.540 mm (typ.)
	Weight	370 g (max)
	Diagonal Size	15.6 inch
	Thickness	3.2 mm / 5.0 mm (w/PCB) (max)
	Interface	eDP 1.2 (1 lane)
	Surface Treatment	Anti-Glare
	Touch Enabled	No
	Contrast Ratio	300:1 (typ.)
	Refresh Rate	60 Hz
	Brightness	250 nits
	Pixel Resolution - Format	1366 x 768 (HD)
	Backlight	LED
	Pixel Resolution	RGB Stripe
	Color Gamut Coverage	NTSC 45%
	Color Depth	6 bits
	Viewing Angle	SVA 45/45/15/35
	Low Blue Light	No
	Power Consumption (W, EBL@ 150nits max/ 200nits max)	2.49 (Max) / 2.78 (Max)

STORAGE AND DRIVES

For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 30 GB (for Windows 10 and 11) is reserved for system recovery software

Technical Specifications

SSD 128GB 2230 PCIe NVMe Value	**Form Factor**	M.2 2230
	Capacity	128GB
	NAND Type	Value
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.01 lb (5 g)
	Interface	PCIe NVMe Gen3
	Maximum Sequential Read	Up to 2100 MB/s
	Maximum Sequential Write	Up to 1200 MB/s
	Logical Blocks	250,069,680
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	Pyrite; TRIM; L1.2
SSD 256GB 2230 PCIe NVMe Value	**Form Factor**	M.2 2230
	Capacity	256 GB
	NAND Type	Value
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen3
	Maximum Sequential Read	up to 2500 MB/s
	Maximum Sequential Write	up to 1300 MB/s
	Logical Blocks	500,118,192
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	Pyrite; TRIM; L1.2
SSD 256GB 2280 PCIe NVMe Value	**Form Factor**	M.2 2280
	Capacity	256GB
	NAND Type	Value
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen3
	Maximum Sequential Read	Up to 2900 MB/s
	Maximum Sequential Write	Up to 1400 MB/s
	Logical Blocks	500,118,192
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	ATA Security; TRIM; L1.2

Technical Specifications

SSD 256GB 2280 PCIe-4x4 NVMe Three Layer Cell	**Form Factor**	M.2 2280
	Capacity	256 GB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen4
	Maximum Sequential Read	Up to 6,400 MB/s
	Maximum Sequential Write	Up to 2,700 MB/s
	Logical Blocks	500,118,192
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	Pyrite 2.0; TRIM; L1.2
256GB PCIe-4x4 2280 NVME Self Encrypted OPAL2 Three Layer Cell Solid State Drive	**Form Factor**	M.2 2280
	Capacity	256GB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen4
	Maximum Sequential Read	6400
	Maximum Sequential Write	2700
	Logical Blocks	500,118,192
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	ATA Security (Option); TCG Opal 2.0; TRIM; L1.2
SSD 512GB 2280 PCIe NVMe Value	**Form Factor**	M.2 2280
	Capacity	512GB
	NAND Type	Value
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen3
	Maximum Sequential Read	Up to 3500 MB/s
	Maximum Sequential Write	up to 3000 MB/s
	Logical Blocks	1,000,215,216
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	TRIM; L1.2

Technical Specifications

SSD 512GB 2280 PCIe-4x4 NVMe Three Layer Cell	**Form Factor**	M.2 2280
	Capacity	512GB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen4
	Maximum Sequential Read	Up to 6,600 MB/s
	Maximum Sequential Write	Up to 5,100 MB/s
	Logical Blocks	1,000,215,216
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	Pyrite 2.0; TRIM; L1.2
512GB PCIe-4x4 2280 NVME Self Encrypted OPAL2 Three Layer Cell Solid State Drive	**Form Factor**	M.2 2280
	Capacity	512GB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen4
	Maximum Sequential Read	Up to 6,600 MB/s
	Maximum Sequential Write	Up to 5,100 MB/s
	Logical Blocks	1,000,215,216
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	ATA Security (Option); TCG Opal 2.0; TRIM; L1.2
SSD 1TB 2280 PCIe-4x4 NVMe Three Layer Cell	**Form Factor**	M.2 2280
	Capacity	1TB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen4
	Maximum Sequential Read	Up to 7,100 MB/s
	Maximum Sequential Write	Up to 5,200 MB/s
	Logical Blocks	2,000,409,264
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	Pyrite 2.0; TRIM; L1.2

NETWORKING/COMMUNICATIONS

Intel® AX211 Wi-Fi 6E + Bluetooth® 5.2 M.2 160MHz CNVi WW 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 802.11d IEEE 802.11e IEEE 802.11h IEEE 802.11i

	IEEE 802.11k IEEE 802.11r IEEE 802.11v
Interoperability	Wi-Fi certified
Frequency Band	• 802.11b/g/n/ax 2.402 - 2.482 GHz • 802.11a/n/ac/ax 4.9 - 4.95 GHz (Japan) 5.15 - 5.25 GHz 5.25 - 5.35 GHz 5.47 - 5.725 GHz 5.825 - 5.850 GHz 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
Modulation	Direct Sequence Spread Spectrum OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM
Security[3]	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	Ad-hoc (Peer to Peer)
Models	Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between access points
Output Power[2]	802.11b : +17dBm minimum 802.11g : +16dBm minimum 802.11a : +17dBm minimum 802.11n HT20(2.4GHz) : +14dBm minimum 802.11n HT40(2.4GHz) : +13dBm minimum 802.11n HT20(5GHz) : +14dBm minimum 802.11n HT40(5GHz) : +13dBm minimum 802.11ac VHT80(5GHz) : +10dBm minimum 802.11ac VHT160(5GHz) : +10dBm minimum 802.11ax HE40(2.4GHz) : +12dBm minimum 802.11ax HE80(5GHz) : +10dBm minimum 802.11ax HE160(5GHz) : +10dBm minimum
Power Consumption	Transmit mode2.0 W Receive mode1.6 W Idle mode (PSP)180 mW(WLAN Associated) Idle mode50 mW(WLAN unassociated) Connected Standby 10mW Radio disabled8 mW
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, mounted in the display enclosure Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications
	Form Factor	PCI-Express M.2 MiniCard
	Dimensions	1. Type 2230: 2.3 x 22.0 x 30.0 mm 2. Type 1216: 1.67 x 12.0 x 16.0 mm
	Weight	1. Type 2230: 2.8g 2. Type 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 Wireless Technology		
	Bluetooth Specification	4.0/4.1/4.2/5.0/5.1/5.2 Compliant
	Frequency Band	2402 to 2480 MHz
	Number of Available Channels	Legacy: 0~79 (1 MHz/CH) BLE: 0~39 (2 MHz/CH)
	Data Rates and Throughput	Legacy: 3 Mbps data rate; throughput up to 2.17 Mbps BLE: 1 Mbps data rate; throughput up to 0.2 Mbps Legacy : Synchronous Connection Oriented links up to 3, 64 kbps, voice channels Legacy: Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)
	Transmit Power	The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 9.5 dBm for BR and EDR.

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. 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.
3. Check latest software/driver release for updates on supported security features.
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).

Technical Specifications

Intel® AX211 Wi-Fi 6E + Bluetooth® 5.2 M.2 160MHz CNVi WW 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 802.11d IEEE 802.11e IEEE 802.11h IEEE 802.11i IEEE 802.11k IEEE 802.11r IEEE 802.11v
	Interoperability	Wi-Fi certified
	Frequency Band	• 802.11b/g/n/ax 2.402 - 2.482 GHz • 802.11a/n/ac/ax 4.9 - 4.95 GHz (Japan) 5.15 - 5.25 GHz 5.25 - 5.35 GHz 5.47 - 5.725 GHz 5.825 - 5.850 GHz 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
	Modulation	Direct Sequence Spread Spectrum OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM
	Security[3]	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	Ad-hoc (Peer to Peer)
	Models	Infrastructure (Access Point Required)
	Roaming	IEEE 802.11 compliant roaming between access points
	Output Power[2]	802.11b : +17dBm minimum 802.11g : +16dBm minimum 802.11a : +17dBm minimum 802.11n HT20(2.4GHz) : +14dBm minimum 802.11n HT40(2.4GHz) : +13dBm minimum 802.11n HT20(5GHz) : +14dBm minimum 802.11n HT40(5GHz) : +13dBm minimum 802.11ac VHT80(5GHz) : +10dBm minimum 802.11ac VHT160(5GHz) : +10dBm minimum 802.11ax HE40(2.4GHz) : +12dBm minimum 802.11ax HE80(5GHz) : +10dBm minimum 802.11ax HE160(5GHz) : +10dBm minimum

Technical Specifications

Power Consumption	Transmit mode2.0 W Receive mode1.6 W Idle mode (PSP)180 mW(WLAN Associated) Idle mode50 mW(WLAN unassociated) Connected Standby 10mW Radio disabled8 mW	
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, mounted in the display enclosure Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications	
Form Factor	PCI-Express M.2 MiniCard	
Dimensions	1. Type 2230: 2.3 x 22.0 x 30.0 mm 2. Type 1216: 1.67 x 12.0 x 16.0 mm	
Weight	1. Type 2230: 2.8g 2. Type 1216: 1.3g	
Operating Voltage	3.3v +/- 9%	
Temperature	**Operating** **Non-operating**	14° to 158° F (-10° to 70° C) -40° to 176° F (-40° to 80° C)
Humidity	**Operating** **Non-operating**	10% to 90% (non-condensing) 5% to 95% (non-condensing)
Altitude	**Operating** **Non-operating**	0 to 10,000 ft (3,048 m) 0 to 50,000 ft (15,240 m)
LED Activity	LED Amber - Radio OFF; LED Off - Radio ON	

HP Integrated Module with Bluetooth 4.0/4.1/4.2/5.0/5.1/5.2 Wireless Technology

Bluetooth Specification	4.0/4.1/4.2/5.0/5.1/5.2 Compliant
Frequency Band	2402 to 2480 MHz
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Transmit Power	The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 9.5 dBm for BR and EDR.

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Technical Specifications

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. 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.
3. Check latest software/driver release for updates on supported security features.
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® XMM™ 7560 R+ LTE-Advanced Pro[1]	**Technology/Operating bands**	FDD LTE: 2100 (Band 1), 1900 (Band 2), 1800 (Band 3), 1700/2100 (Band 4), 850 (Band 5), 2600 (Band 7), 900 (Band 8), 700 (Band 12 lower), 700 (Band 13 upper), 700 (Band 14 upper), 700 (Band 17 lower), 850 (Band 18 lower), 850 (Band 19 upper), 800 (Band 20), 1900 (Band 25), 850 (Band 26), 700 (Band 28), 700 (Band 29 RX only), 2300 (Band 30), 1700/2100 (Band 66), 600 (band 71). TDD LTE: 2100 (Band 34), 2600 (Band 38), 1900 (Band 39), 2400 (Band 40), 2500 (Band 41), 3500 (Band 42), 3700 (Band 43), 3700 (band 48), 5200 (Band 46 RX only) MHz; HSPA+: 2100 (Band 1), 1900 (Band 2), 1700/2100 (Band 4), 850 (Band 5), 900 (Band 8) MHz
	Wireless protocol standards	3GPP Release 12 LTE Specification DL-CAT.16, DL 100MHz BW throughput up to 978Mbps; UL-CAT.13 40MHz throughput up to 150Mbps WCDMA R99, 3GPP Release 5, 6, 7 and 8 UMTS Specification
	GPS	Standalone GPS/Beidou/Glonass, A-GPS (MS-A, MS-B)
	GPS bands	1575.42 MHz ± 1.023 MHz, GLONASS 1596-1607MHz, Beidou 1561.098 MHz
	Maximum data rates	LTE: 978 Mbps (Download), 150 Mbps (Upload) DC-HSPA+: 42 Mbps (Download), 5.76 Mbps (Upload) HSPA+: 21Mbps (Download), 5.76 Mbps (Upload)
	Maximum output power	LTE: 23 dBm in all band except B41 LTE B41 HPUE = 26dBm HSPA+: 23.5 dBm
	Maximum power consumption	LTE: 1,200 mA (peak); 900 mA (average) HSPA+: 1,100 mA (peak); 800 mA (average)
	Form Factor	M.2, 3042-S3 Key B
	Weight	6 g
	Dimensions (Length x Width x Thickness)	42 x 30 x 2.3 mm
	eSIM	Support

1. Mobile Broadband is an optional feature. Connection requires wireless data service contract, network support, and is not available in all areas. Contact service provider to determine the coverage area and availability. Connection speeds will vary due to location, environment, network conditions, and other factors. 4G LTE not available on all products or in all countries.

Technical Specifications

NXP NPC300 Near Field Communication Module	**Dimensions (L x W x H)**	Module 17 mm by 10 mm by 2.0 mm
	Chipset	NPC300
	System interface	I2C
	NFC RF standards	ISO/IEC 14443 A ISO/IEC 14443 B ISO/IEC 15693 ISO/IEC 18092 ECMA-340 NFCIP-1 Target and Initiator ECMA-320 NFCIP-2
	NFC Forum Support	Tag Type 1, Type 2, Type3 and Type 4, NFCIP-1 and NFCIP-2
	Reader (PCD-VCD) Mode(1)	ISO/IEC 14443 A ISO/IEC 14443 B ISO/IEC 15693 MIFARE 1K MIFARE 4K MIFARE DESFire FeliCa Jewel and Topaz cards
	Card Emulation (PICC-VICC) Mode(1)	ISO/IEC 14443 A ISO/IEC 14443 B and B' MIFARE FeliCa
	Frequency	13.56 MHz
	NFC Modes Supported	Reader/Writer, Peer-to-Peer
	Raw RF Data Rates	106, 212, 424, 848 kbps
	Operating temperature	0°C to 70°C
	Storage temperature	-20°C to 125°C
	Humidity	10-90% operating 5-95% non-operating
	Supply Operating voltage	2.97 to 5.5 Volts
	I/O Voltage	1.8V or 3.3V
Power Consumption (Booster enable, VBAT= 3.3V, VCC_BOOST = 5V)		
	Mode	Power Consumption, Typical
	Polling	7.3 mA
	Detected Test Tag Type 1	32.9 mA
	Detected Test Tag Type 2	70.7 mA
	Detected Test Tag Type 3	79.2 mA
	Detected Test Tag Type 4	64.9 mA
	Antenna	Antenna connector, 0.5mm pitch, 7 connector FPC. Antenna matching is external to module.

Technical Specifications

Intel® I219-LM 1 Gigabit Network Connection LOM (vPro)	**Ethernet Features**	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
	Power Management	ACPI compliant - multiple power modes Situation-sensitive features reduce power consumption Advanced link down power saving for reducing link down power consumption
	Performance Features	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
	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
	Interface	PCI (Intel proprietary) + SMBus
	NIC Device Driver Name	Intel(R) Ethernet Connection (13) I219-LM
Intel® I219v 1 Gigabit Network Connection LOM (non-vPro)	**Ethernet Features**	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. Auto-Negotiation (Automatic Speed Selection) Full Duplex Operation at all Speeds, Half Duplex operation at 10, 100 & 1000 Mbit/s
	Power Management	ACPI compliant - multiple power modes Situation-sensitive features reduce power consumption Advanced link down power saving for reducing link down power consumption
	Performance Features	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
	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
	Interface	PCI(Intel proprietary) + SMBus
	NIC Device Driver Name	Intel(R) Ethernet Connection I219-V

Technical Specifications

POWER

AC Adapter 45 Watt nPFC Standard USB type C Straight 1.8m	**Dimensions**	94.0 mm x 40.0 mm x 26.5 mm
	Weight	192.5g +/-10%
	Input	100~240 VAC
	Input Efficiency	Average Efficiency of 25%, 50%, 75%, 100% load condition with 115Vac/230Vac Spec: 5V: 81.5% 9V: 86.7% 12V: 87.41% 15V: 87.8%
	Input frequency range	47 to 63 Hz
	Input AC current	Max. 1.4 A at 90 Vac
	Output	
	Output power	5V/15W 9V/27W 12V/36W 15V/45W
	DC output	5V/9V/12V/15V
	Hold-up time	5ms at 115 Vac input
	Output current limit	<5.0A
	Connector	USB Type-C
	Environmental Design	
	Operating temperature	32° to 95° F (0° to 35° C)
	Non-operating (storage) temperature	-4° to 185° F (-20° to 85° C)
	Altitude	0 to 16,400 ft (0 to 5000m)
	Humidity	20% to 95%
	Storage Humidity	10% to 95%
	EMI and Safety Certifications	Eg. *CE Mark - full compliance with LVD and EMC directives *Worldwide safety standards - IEC60950, EN60950, UL60950, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE. *MTBF - over 200,000 hours at 25°C ambient condition.

AC Adapter 45 Watt Smart nPFC Standard Barrel 4.5mm Right Angle 1.8m	**Dimensions**	95 x 45 x 26.5 mm
	Weight	unit: 200g +/- 10g
	Input	100~240 VAC
	Input Efficiency	87.74 % at 115 Vac and 88.4 % at 230Vac
	Input frequency range	47 ~ 63 Hz
	Input AC current	Max. 1.4 A at 90 Vac
	Output	
	Output power	45W
	DC output	19.5V
	Hold-up time	5ms at 115 Vac input
	Output current limit	<8.0A
	Connector	4.5mm Barrel Type
	Environmental Design	
	Operating temperature	32° to 95° F (0° to 35° C)
	Non-operating (storage) temperature	-4° to 185° F (-20° to 85° C)
	Altitude	0 to 16,400 ft (0 to 5000m)

Technical Specifications

	Humidity	20% to 95%
	Storage Humidity	10% to 95%
	EMI and Safety Certifications	Eg: *CE Mark - full compliance with LVD and EMC directives * Worldwide safety standards - IEC60950-1 and/or IEC62368-1, EN60950-1 and/or EN62368-1, UL60950-1 and/or UL62368-1, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC, NOM-001 NYCE. * MTBF - over 200,000 hours at 25°C ambient condition.
AC Adapter 65 Watt nPFC Standard USB type C Straight 1.8m	**Dimensions**	90.0 x 51 x 28.5mm
	Weight	unit: 250g +/- 10g
	Input	100~240 VAC
	Input Efficiency	Average Efficiency of 25%, 50%, 75%, 100% load condition with 115Vac/230Vac Spec: 5V: 81.5% 9V: 86.7% 12V: 88% 15V: 88% 20V: 89%
	Input frequency range	47 ~ 63Hz
	Input AC current	1.6 A at 90 VAC and maximum load
	Output	
	Output power	5V/15W 9V/27W 12V/60W 15V/60W 20V/65W
	DC output	5V/9V/12V/15V/20V
	Hold-up time	5ms at 115 Vac input
	Output current limit	<8.0A
	Connector	USB Type-C
	Environmental Design	
	Operating temperature	32° to 95° F (0° to 35° C)
	Non-operating (storage) temperature	-4° to 185° F (-20° to 85° C)
	Altitude	0 to 16,400 ft (0 to 5000m)
	Humidity	20% to 95%
	Storage Humidity	10% to 95%
	EMI and Safety Certifications	Eg: *CE Mark - full compliance with LVD and EMC directives * Worldwide safety standards - IEC60950-1 and/or IEC62368-1, EN60950-1 and/or EN62368-1, UL60950-1 and/or UL62368-1 , Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC, NOM-001 NYCE. * MTBF - over 200,000 hours at 25°C ambient condition.

Technical Specifications

AC Adapter 65 Watt Smart nPFC EM Barrel 4.5mm New EM	**Dimensions**	102 x 55 x 30mm
	Weight	unit: 250g +/- 10g
	Input	100~240 VAC
	Input Efficiency	88.0 % at 115 Vac and 89.0 % at 230Vac
	Input frequency range	47 ~ 63 Hz
	Input AC current	Max. 1.7 A at 90 Vac
	Output	
	Output power	65W
	DC output	19.5V
	Hold-up time	5ms at 115 Vac input
	Output current limit	<11.0A
	Connector	4.5mm Barrel Type
	Environmental Design	
	Operating temperature	32°F to 95°F (0°to 35°C)
	Non-operating (storage) temperature	-4°F to 185°F (-20°to 85°C)
	Altitude	0 to 16,400 ft (0 to 5000m)
	Humidity	20% to 95%
	Storage Humidity	10% to 95%
	EMI and Safety Certifications	Eg: *CE Mark - full compliance with LVD and EMC directives * Worldwide safety standards - IEC60950-1 and/or IEC62368-1, EN60950-1 and/or EN62368-1, UL60950-1 and/or UL62368-1 , Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC, NOM-001 NYCE. * MTBF - over 200,000 hours at 25°C ambient condition.

AC Adapter 65 Watt Smart nPFC Standard Barrel 4.5mm Right Angle 1.8m	**Dimensions**	90 x 51 x 28.5mm
	Weight	230g +/-10%
	Input	100~240 VAC
	Input Efficiency	88.0 % at 115 Vac and 89.0 % at 230 Vac
	Input frequency range	47 ~ 63 Hz
	Input AC current	Max. 1.7 A at 90 Vac
	Output	
	Output power	65W
	DC output	19.5V
	Hold-up time	5 ms at 115 Vac input
	Output current limit	<11.0A
	Connector	4.5mm Barrel Type
	Environmental Design	
	Operating temperature	32°F to 95°F (0°to 35°C)
	Non-operating (storage) temperature	-4°F to 185°F (-20°to 85°C)
	Altitude	0 to 16,400 ft (0 to 5000m)
	Humidity	20% to 95%
	Storage Humidity	10% to 95%
	EMI and Safety Certifications	Eg: *CE Mark - full compliance with LVD and EMC directives * Worldwide safety standards - IEC60950-1 and/or IEC62368-1, EN60950-1 and/or EN62368-1, UL60950-1 and/or UL62368-1, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55032 Class B, FCC

Class B, CISPR32 Class B, CCC, NOM-001 NYCE.
* MTBF - over 200,000 hours at 25°C ambient condition.

RH 42Whr[1] Long Life Polymer Fast Charge[2] 3 cell Battery	**Dimensions (H x W x L)**	6.2 x 76.25 x 249.50 mm (0.244 x 3.002 x 9.823 inch)
	Weight	0.18 kg (0.397 lb)
	Cells/Type	3cell Lithium-Ion Polymer cell / 545974
	Energy	
	Voltage	11.4V
	Amp-hour capacity	3.752Ah
	Watt-hour capacity	42.75Wh
	Temperature	
	Operating (Charging)	32? to 113? F (0? to 45? C)
	Operating (Discharging)	14? to 122? F (-10? to 60? C)
	Fuel Gauge LED	NA
	Warranty	Follow Product Spec.
	Optional Travel Battery Available	No

1. Actual battery Watt-hours (Wh) will vary from design capacity. Battery capacity will naturally decrease with shelf life, time, usage, environment, temperature, system configuration, loaded apps, features, power management settings and other factors.
2. Recharges your battery up to 50% within 30 minutes when the system is off or in standby mode. Power adapter with a minimum capacity of 65 watts is required. After charging has reached 50% capacity, charging will return to normal. Charging time may vary +/-10% due to System tolerance.

RH 51Whr[1] Long Life Polymer Fast Charge[2] 3 cell Battery	**Dimensions (H x W x L)**	6.50 x 67.80 x 254.00 mm (0.256 x 2.669 x 10 inch)
	Weight	0.2025 kg (0.446 lb)
	Cells/Type	3cell Lithium-Ion Polymer cell / 566075
	Energy	
	Voltage	11.58V
	Amp-hour capacity	4.431Ah
	Watt-hour capacity	51.3Wh
	Temperature	
	Operating (Charging)	32? to 113? F (0? to 45? C)
	Operating (Discharging)	14? to 122? F (-10? to 60? C)
	Fuel Gauge LED	NA
	Warranty	Follow Product Spec.
	Optional Travel Battery Available	No

1. Actual battery Watt-hours (Wh) will vary from design capacity. Battery capacity will naturally decrease with shelf life, time, usage, environment, temperature, system configuration, loaded apps, features, power management settings and other factors.
2. Recharges your battery up to 50% within 30 minutes when the system is off or in standby mode. Power adapter with a minimum capacity of 65 watts is required. After charging has reached 50% capacity, charging will return to normal. Charging time may vary +/-10% due to System tolerance

Audio

Technical Specifications

HD Stereo Codec	ALC3247-CG
Audio I/O Ports	Headset: CTIA only and Headphone-out
Internal Speaker Amplifier	ALC 3247 has Embedded Class-D 2W Stereo Amplifier
Multi-streaming Capable	Playback multi-streaming can be enabled in the audio control panel to allow independent audio. Following MSFT Behavior
Sampling	DAC:44.1k/48kHz ADC:48kHz
Wavetable Syntheses	NA
Analog Audio	Support 3.5mm Headset: CTIA only and Headphone-out
# of Channels on Line-Out	NA
Internal Speaker	Yes

Fingerprint reader

Sensor vendor	Elan efsa80ST
Sensor type	Capacitive
DPI resolution	508 dpi
Scan area	80*80 pixels
False Rejection Rate	<3%
False Acceptance Rate	1/100K
Mobile Voltage Operation	2.7V to 3.6V
Operating Temperature	-4 - 175°F (-20° ~ +80°C)
Current Consumption Image	50mA peak
Low Latency Wait For Finger	900uA
Capture Rate	30 frame/sec
ESD Resistance	+15KV
Detection Matrix	80*80 pixels/ 508 dpi / 4*4mm sensor area

ENVRIONMENTAL DATA

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[7] 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	• Ocean-bound plastic in Speaker • 10% post-consumer recycled plastic • Low halogen • Outside Box and corrugated cushions are 100% sustainably sourced and recyclable • Molded Paper Pulp Cushion inside box is 100% sustainably sourced and recyclable • Bulk packaging available

Technical Specifications

System Configuration	The configuration used for the Energy Consumption and Declared Noise Emissions data for the Notebook model is based on a "Typically Configured Notebook"?.		
Energy Consumption (in accordance with US ENERGY STAR® test method)	**115VAC, 60Hz**	**230VAC, 50Hz**	**100VAC, 50Hz**
Normal Operation (Sort idle)	4.28 W	4.36 W	4.37 W
Normal Operation (Long idle)	1.25 W	1.37 W	1.25 W
Sleep	1.25 W	1.37 W	1.25 W
Off	0.3 W	0.35 W	0.31 W
	Note: Energy efficiency data listed is for an ENERGY STAR® compliant product if offered within the model family. HP computers marked with the ENERGY STAR® Logo are compliant with the applicable U.S. Environmental Protection Agency (EPA) ENERGY STAR® specifications for computers. If a model family does not offer ENERGY STAR® compliant configurations, then energy efficiency data listed is for a typically configured PC featuring a hard disk drive, a high efficiency power supply, and a Microsoft Windows® operating system.		
Heat Dissipation*	**115VAC, 60Hz**	**230VAC, 50Hz**	**100VAC, 50Hz**
Normal Operation (Short idle)	14.6 BTU/hr	14.9 BTU/hr	14.9 BTU/hr
Normal Operation (Long idle)	4.3 BTU/hr	4.7 BTU/hr	4.3 BTU/hr
Sleep	4.3 BTU/hr	4.7 BTU/hr	4.3 BTU/hr
Off	1 BTU/hr	1.2 BTU/hr	1.1 BTU/hr
	*NOTE: Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.		
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)	Sound Power (L_{WAd}, bels)	Sound Pressure (L_{pAm}, decibels)	
Typically Configured - Idle	2.6	13.7	
Fixed Disk - Random writes	2.8	21.2	
Optical Drive - Sequential reads	3.8	32.6	
Longevity and Upgrading	This product can be upgraded, possibly extending its useful life by several years. Upgradeable features and/or components contained in the		
	Spare parts are available throughout the warranty period and or for up to "5"? years after the end of production.		
Additional Information	• This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC. • This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive - 2002/96/EC. • This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986). • This product is in compliance with the IEEE 1680 (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 93.3% recycle-able when properly disposed of at end of life.		

Technical Specifications

Packaging Materials	**External:**	PAPER/Corrugated	295 g
		PAPER/Molded Pulp	192 g
	Internal:	PLASTIC/Polyethylene low density - LDPE	10 g
	The plastic packaging material contains at least 0.0% recycled content.		
	The corrugated paper packaging materials contains at least 60.6% recycled content.		

RoHS Compliance

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

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

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

To obtain a copy of the HP RoHS Compliance Statement, see **Error! Hyperlink reference not valid.** 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:

- 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.

Technical Specifications

	• Maximize the use of post-consumer recycled content materials in packaging materials. • Use readily recyclable packaging materials such as paper and corrugated materials. • Reduce size and weight of packages to improve transportation fuel efficiency. • Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.
End-of-life Management and Recycling	HP offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/go/reuse-recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner. The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the 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.
HP, Inc. Corporate Environmental Information	For more information about HP's commitment to the environment: Global Citizenship Report http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html Eco-label certifications http://www8.hp.com/us/en/hp-information/environment/ecolabels.html ISO 14001 certificates: http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842 and http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf
footnotes	• Percentage of ocean-bound plastic contained in each component varies by product • Recycled plastic content percentage is based on the definition set in the IEEE 1680.1-2018 standard. • External power supplies, WWAN modules, power cords, cables and peripherals excluded. • 100% outer box packaging and corrugated cushions made from sustainably sourced certified and recycled fibers. • Fiber cushions made from 100% recycled wood fiber and organic materials.

COUNTRY OF ORIGIN

China

Options and Accessories (sold separately and availability may vary by country)

DOCKING (Sold Separately)

Docking station model #1	HP USB-C Dock G5
Total number of supported displays (incl.the notebook display)	3
Max.resolutions supported	Dual 5K@ 30Hz + 1 4K UHD (multi-function mode) 5120x2880
Dock Connectors	1xHDMI, 2xDP
Technical limitations	Highest resolution with dual displays is two 8K@ 60Hz host in High Resolution mode. Three maximum displays supported are two 5K@ 30 Hz on DP ports plus one 4K UHD@ 30 Hz on HDMI in Multi-function mode The highest resolution for a non-Thunderbolt host in Multi-function mode is a single 5K dual cable (using both DP ports) + (1) 4K on HDMI port.
Docking station model #2	HP USB-C/A Universal Dock G2
Total number of supported displays (incl.the notebook display)	3
Max.resolutions supported	Triple 4K UHD@ 60Hz 3840x2160
Dock Connectors	1xHDMI, 2xDP
Technical limitations	The best resolution for dual or triple displays is 4K UHD@ 60Hz. For use with the USB-A adapter that comes in the box the maximum number of displays supported is (2) 4k x 60 Hz on the Type-A Gen 1 connection from the host
Docking station model #3	HP Thunderbolt Dock G2
Total number of supported displays (incl.the notebook display)	4
Max.resolutions supported	Dual 4K @30Hz or dual 4K UHD @ 60Hz is supported Dual 8K@ 60Hz for TB hosts or USB-C hosts DP 1.4 with DSC in high res mode
Dock Connectors	2xDP, 1xVGA, 1xTB, 1xUSB-C alt-mode
Technical limitations	Thunderbolt Hosts: Maximum of (4) displays with maximum resolution of 5K@ 30Hz running Thunderbolt host. Maximum resolution possible is dual 8K displays @ 60Hz running Thunderbolt host or running a non-Thunderbolt host in high resolution mode @30Hz Non-Thunderbolt hosts: The highest resolution for dual displays running a non-Thunderbolt host in multi-function mode is (1) 5K dual cable (using both DP ports) +(1) 4K on USB-C DP port Non-Thunderbolt hosts support (3) displays with a maximum resolution of (2) 5K single cable + (1) 4K UHD @ 60 Hz in high resolution mode. In multi-function mode the maximum resolution for (3) displays is (2) 5K single cable @ 30Hz + (1) 4K UHD @ 30Hz.

Category	Description	Part Number
Audio/Video	HP Wired USB-A Stereo Headset	428K6AA
	HP Wired 3.5mm Stereo Headset	428K7AA
Cases	HP Business Slim 17.3 Top Load	2UW02AA
	HP Executive 15.6 Backpack	6KD07AA
	HP Executive 15.6 Top Load	6KD06AA
	HP Executive 17.3 Backpack	6KD05AA

Options and Accessories (sold separately and availability may vary by country)

	HP Executive 17.3 Top Load	6KD08AA
	HP Executive Leather 15.6 Top Load	6KD09AA
	HP Prelude G2 15.6 Backpack	1E7D6AA
	HP Prelude G2 15.6 Top Load	1E7D7AA
	HP Prelude Pro Recycled 15.6 Backpack	1X644AA
	HP Prelude Pro Recycled 15.6 Top Load	1X645AA
	HP Renew Business 17.3 Laptop Backpack	3E2U5AA
	HP Renew Business 17.3 Laptop Bag	3E2U6AA
	HP Renew Business 15.6 Laptop Bag	3E5F8AA
Docking	HP Thunderbolt 120W G2 Dock	2UK37AA
	HP Thunderbolt 120W G2 Dock w/Audio	3YE87AA
	HP Thunderbolt 120W G4 Dock	4J0A2AA
	HP Thunderbolt 230W G2 Dock w/Combo Cable	3TR87AA
	HP Thunderbolt 280W G4 Dock w/Combo Cable	4J0G4AA
	HP USB-C/A 120W G2 Universal Dock	5TW13AA
	HP USB-C 120W G5 Dock	26D32AA
Hub	HP USB-C Mini Dock	1PM64AA
	HP Universal USB-C Multiport Hub	50H55AA
	HP USB-C Travel Dock G2	7PJ38AA
	HP USB-C to USB-A Hub	Z6A00AA
Adapter	HP HDMI to DVI Adapter	F5A28AA
	HP HDMI to VGA Adapter	H4F02AA
	HP USB-C to DisplayPort Adapter	N9K78AA
	HP USB-C to HDMI 2.0 Adapter	N7P47AA
	HP USB-C to USB 3.0 Adapter	1WC36AA
	HP USB-C to VGA Adapter	N9K76AA
Keyboard/Combo	HP 975 USB+BT Dual-Mode Wireless Keyboard	3Z726AA
	HP 455 Programmable Wireless Keyboard	4R177AA
	HP 125 WD USB Keyboard	266C9AA
	HP 320K WD USB Keyboard	9SR37AA
	HP 655 Wireless Keyboard and Mouse Combo	4R009AA
	HP 225 Wired Mouse and Keyboard Combo	286J4AA
	HP 235 Wireless Mouse and Keyboard Combo	1Y4D0AA
	HP Slim Wireless Keyboard and Mouse	T6L04AA
	HP Wired Desktop 320MK Mouse and Keyboard	9SR36AA
	HP Wireless Rechargeable 950MK Mouse and Keyboard	3M165AA
Mouse	HP USB Premium Wireless Mouse	1JR31AA
	HP 435 Multi-Device Wireless Mouse	3B4Q5AA
	HP 125 USB-A Wired Mouse	265A9AA
	HP 128 USB Laser Wired Mouse	265D9AA
	HP 320M USB-A Wired Mouse	9VA80AA
	HP Creator USB-A+Bluetooth 935 Wireless Mouse Black	1D0K8AA
	HP USB-A+Bluetooth Multi-Device 635 Wireless Mouse Black	1D0K2AA
	HP USB-A+Bluetooth Travel Bluetooth Mouse	6SP30AA
Power	HP 65W USB-C Auto Chevy AC Power Adapter	5TQ76AA

Options and Accessories (sold separately and availability may vary by country)

	HP 45W 4.5 mm Smart AC Power Adapter	H6Y88AA
	HP 45W USB-C G2 Zeus AC Power Adapter	1HE07AA
	HP 45W USB-C LC Dali AC Power Adapter	1MZ01AA
	HP 65W 4.5 mm LC Smart non-EM India Only AC Power Adapter	3FF84AA#ACJ
	HP 65W 4.5 mm Smart AC Power Adapter	H6Y89AA
	HP 65W 4.5 mm wDongle 7.4 mm Slim AC Power Adapter	H6Y82AA
	HP 65W USB-C Hades AC Power Adapter	1HE08AA
	HP 65W USB-C LC AC Power Adapter	1P3K6AA
Commodity	HP USB DVD-Writer EXT ODD	F2B56AA
	HP Nano Keyed Cable Lock	1AJ39AA
	HP Nano Master Keyed Cable Lock	1AJ40AA
	HP SureKey Standard/Nano/Wedge Cable Lock	6UW42AA

Summary of Changes

Date of change:	Version History:	Updated	Description of change:
April 11, 2022	V1 to V2	Added	Environmental Data and Reference for USB ports
May 13, 2022	V2 to V3	Updated	Battery life
June 6, 2022	V3 to V4	Added	RJ-45 disclaimer in overview and ports section; Manageability disclaimer
June 22, 2022	V4 to V5	Updated	Discrete in Graphics section
July 20, 2022	V5 to V6	Added	Input value in Power section

Overview

HP Elite x360 1040 14 inch G9 2-in-1 Notebook PC

Left

1. Internal Microphones (2)
2. Ambient Light Sensor (Optional)
3. Webcam
4. Camera Shutter
5 IR Camera (Optional)
6. IR Camera LEDs (Optional)
7. Glass Clickpad
8. Smartcard Reader (Optional)
9. LED Indicator
10. Thunderbolt™ 4 with USB4 Type-C® 40Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4)[1]
11. Thunderbolt™ 4 with USB4 Type-C® 40Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4)[1]
12. SuperSpeed USB Type-A 5Gbps signaling rate (USB 3.2 Gen 1)
13. HDMI 2.0b Port (Cable not included)

1. SuperSpeed USB 20Gbps is not available with Thunderbolt™ 4.

Overview

Right

1. Power Button Key
2. Audio Combo Jack
3. SuperSpeed USB Type-A 5Gbps signaling rate (Charging) (USB 3.2 Gen 1)
4. Nano Security Lock Slot (Lock sold separately)
5. SIM Card Slot (Optional)
6. Touch Fingerprint Sensor (Select models)

Overview

At a Glance

- Preinstalled with Windows 11 versions or FreeDOS
- A new x360 ultraslim design with precision-crafted magnesium chassis for a premium look and feel
- 12th Generation Intel® Core™ i5, i7 U series, up to ten-core
- New 16:10 ratio screen reduces the need to scroll by showing more vertical content than 16:9
- New 5MP camera with HP Auto Frame allows you around a little without losing viewers' attention during video calls
- New DDR5 memory (up to 16GB) and PCI Gen4 SSDs provide fast access to your work.
- Choice of displays:

  35.6 cm (14"?) diagonal BV WUXGA (1920x1200) LED-backlit, 250 nits, 45% NTSC, touchscreen

  35.6 cm (14"?) diagonal AG WUXGA (1920x1200) LED-backlit, 400 nits, 100% sRGB, touchscreen with HP Eye Ease

  35.6 cm (14"?) diagonal BV WUXGA (1920x1200) LED-backlit, 400 nits, 100% sRGB, touchscreen with HP Eye Ease

  35.6 cm (14"?) diagonal AG WUXGA (1920x1200) LED-backlit, 1000 nits, 100% sRGB, HP Sure View Reflect, touchscreen with HP Eye Ease

  35.6 cm (14") diagonal BV WUXGA (1920x1200) LED-backlit, 1000 nits, 100% sRGB, HP Sure View Reflect, touchscreen with HP Eye Ease
- An optional HP Rechargeable Active Pen 3 with Magnetic Attach and 4096 Levels of pressure
- Choose from 38Wh or 51Wh battery options
- HP Wolf Security for Business creates a hardware-enforced, always-on, resilient defense.
- Larger Clickpad surface for easier, more intuitive input
- Connectivity with optional Intel® 5000 5G/WWAN available world-wide, and Thunderbolt™ Docking (Dock sold separately)
- Undergoes MIL-STD 810H tests
- Supports fast charging (50% in 30 minutes) with no impact on battery recharge cycles
- Designed to support all HP docking options including the HP Universal Dock G5

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

Technical Specifications

PRODUCT NAME

HP Elite x360 1040 14 inch G9 2-in-1 Notebook PC

OPERATING SYSTEMS

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 available with a Volume Licensing Agreement) [1]
Windows 10 Pro (available through downgrade rights from Windows 11 Pro) [1,2]
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.
2. This system is preinstalled with Windows 10 Pro software and also comes with a license for Windows 11 Pro software and provision for recovery software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.

PROCESSORS

Processor 3,4,5,6,7	Cores	Number of P-cores	Number of E-cores	Threads	L3 Cache	Max Turbo Frequency		Base Frequency		Intel SIPP/vPro® Enterprise
						P-cores	E-cores	P-cores	E-cores	
Intel® Core™ i7-1265U	10	2	8	12	12MB	4.8 GHz	3.6 GHz	1.8 GHz	1.3 GHz	X
Intel® Core™ i7-1255U	10	2	8	12	12MB	4.7 GHz	3.5 GHz	1.7 GHz	1.2 GHz	
Intel® Core™ i5-1245U	10	2	8	12	12MB	4.4 GHz	3.3 GHz	1.2 GHz	1.2 GHz	X
Intel® Core™ i5-1235U	10	2	8	12	12MB	4.4 GHz	3.3 GHz	1.3 GHz	0.9 GHz	

3. Multicore is designed to improve performance of certain software products. Not all customers or software applications will necessarily benefit from use of this technology. Performance and clock frequency will vary depending on application workload and your hardware and software configurations. Intel's numbering, branding and/or naming is not a measurement of higher performance.
4. Processor speed denotes maximum performance mode; processors will run at lower speeds in battery optimization mode.
5. Intel® Turbo Boost performance varies depending on hardware, software and overall system configuration. See www.intel.com/technology/turboboost for more information.
6. In accordance with Microsoft's support policy, HP does not support the Windows 8 or Windows 7 operating system on product configured with Intel and AMD 7th generation and forward processors or provide any Windows 8 or Windows 7 drivers on http://www.support.hp.com.
7. Intel vPro® requires Windows 10 Pro 64 bit or higher, a vPro supported processor, vPro enabled chipset, vPro enabled wired LA 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

CHIPSET

Chipset is integrated with processor

GRAPHICS

Integrated
Intel® Iris® X? Graphics [8]

Supports
Support HD decode, DX12, HDMI 2.0b, HDCP 2.3 [9]

8. Intel® Iris® X? Graphics capabilities require system to be configured with Intel® Core™ i5 or i7 processors and dual channel memory. Intel® Iris® X? Graphics with Intel® Core™ i5 or 7 processors and single channel memory will only function as UHD graphics
9. HDMI cable sold separately

DISPLAY

Touch
35.56 cm (14") diagonal WUXGA Bent touch screen, BrightView UWVA, eDP, 250 nits, 45% NTSC, time of flight sensor, with 5MP+IR camera (1920 x 1200) [10,11,13]
35.56 cm (14") diagonal WUXGA Bent touch screen, BrightView UWVA, eDP, 250 nits, 45% NTSC, time of flight sensor, with 5MP+IR camera for WWAN (1920 x 1200) [10,11,13]
35.56 cm (14") diagonal WUXGA Bent touch screen, Low Blue Light, anti-glare UWVA eDP1.4+PSR, 400 nits, 100% sRGB, Low Power, Ambient Light Sensor+Ambient Color Sensor, time of flight sensor, with 5MP+IR Camera (1920 x 1200) with HP Eye Ease [10,11,13]
35.56 cm (14") diagonal WUXGA Bent touch screen, Low Blue Light, anti-glare UWVA eDP1.4+PSR, 400 nits, 100% sRGB, Low Power, Ambient Light Sensor+Ambient Color Sensor, time of flight sensor, with 5MP+IR Camera for WWAN (1920 x 1200) with HP Eye Ease [10,11,13]
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35.56 cm (14") diagonal WUXGA Bent touch screen, Low Blue Light, anti-glare UWVA eDP1.3+PSR, 1000 nits, 100% sRGB with HP Sure View Reflect integrated privacy screen, Ambient Light Sensor+Ambient Color Sensor, time of flight sensor, with 5MP+IR camera (1920 x 1200) with HP Eye Ease [10,11,12,13]
35.56 cm (14") diagonal WUXGA Bent touch screen, Low Blue Light, anti-glare UWVA eDP1.3+PSR, 1000 nits, 100% sRGB with HP Sure View Reflect integrated privacy screen, Ambient Light Sensor+Ambient Color Sensor, time of flight sensor, with 5MP+IR camera for WWAN (1920 x 1200) with HP Eye Ease [10,11,12,13]
35.56 cm (14") diagonal WUXGA Bent touch screen, Low Blue Light, BrightView UWVA eDP1.3+PSR, 1000 nits, 100% sRGB with HP Sure View Reflect integrated privacy screen, Ambient Light Sensor+Ambient Color Sensor, time of flight sensor, with 5MP+IR camera (1920 x 1200) with HP Eye Ease [10,11,12,13]
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DisplayPort™ 1.2
HDMI 2.0 Support resolution up to 4K @60 Hz [8]
Displays support
Supports dual display through the dock

Display Size (diagonal)
14"
35.56 cm (14")

9. HDMI cable sold separately

10. HD content required to view HD images.

11. Resolutions are dependent upon monitor capability, and resolution and color depth settings.

12. HP Sure View Reflect integrated privacy screen is an optional feature that must be configured at purchase and is designed to function in landscape orientation.

13. Actual brightness will be lower with touchscreen or HP Sure View.

DOCKING (Sold Separately)

Docking station model #1	HP Thunderbolt Dock G2
Docking station model #2	HP USB-C Dock G5
Docking station model #3	HP USB-C/A Universal Dock G2

For additional aftermarket options and docking specs please see page 40.

STORAGE AND DRIVES

Primary M.2 Storage
2 TB PCIe® Gen4x4 NVMe™ M.2 SSD TLC [14]
1 TB PCIe® Gen4x4 NVMe™ M.2 SSD TLC [14]
512 GB PCIe® Gen4x4 NVMe™ M.2 SSD TLC [14]
512 GB PCIe® Gen4x4 NVMe™ SED TLC OPAL2 [14]
512 GB PCIe® NVMe™ Value M.2 SSD [14]
256 GB PCIe® Gen4x4 NVMe™ M.2 SSD TLC [14]
256 GB PCIe® Gen4x4 NVMe™ SED TLC OPAL2 [14]
256 GB PCIe® NVMe™ Value M.2 SSD [14]

14. For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 30 GB (for Windows 10 and 11) is reserved for system recovery software.

MEMORY

Maximum Memory
16 GB DDR5-4800 [15]

Memory
16 GB DDR5-4800 [15]
8 GB DDR5-4800 [15]

Memory Slots
Memory soldered down
DDR5 SODIMMS, system runs at 4800
Supports Dual Channel Memory

15. Due to the non-industry standard nature of some third-party memory modules, we recommend HP branded memory to ensure compatibility. If you mix memory speeds, the system will perform at the lower memory speed.

NETWORKING/COMMUNICATIONS

WLAN
Intel® AX211 Wi-Fi6E +BT5.2 M.2 160MHz CNVi World-Wide WLAN vPro [16,17,18]
Intel® AX211 Wi-Fi6E +BT5.2 M.2 160MHz CNVi World-Wide WLAN non-vPro [16,18]
WWAN
Intel® 5000 5G Solution WWAN [19,20]
Intel® XMM 7560 R+ LTE-Advanced Pro WWAN (Cat 16) [19]

NFC
Near Field Communications Controller [21]
HP Module with NXP NFC Controller NPC300 I2C NCI

Miracast
Native Miracast Support [22]

16. 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.
17. 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.
18. For full Intel® vPro™ functionality, Windows, a vPro supported processor, vPro enabled chipset, vPro enabled WLAN card and discrete TPM 2.0 are required. See https://www.intel.com/content/www/us/en/architecture-and-technology/vpro/vpro-platform-general.html
19. WWAN module is an optional feature, requires factory configuration and requires separately purchased service contract. Check with service provider for coverage and availability in your area. Connection speeds will vary due to location, environment, network conditions, and other factors. 4G LTE not available on all products, in all regions.
20. Intel 5G module is optional and must be configured at the factory. Module designed for 5G NR NSA (non-standalone) networks as carriers deploy Evolved-Universal Terrestrial Radio Access New Radio Dual Connectivity (ENDC) with both 100Mhz of 5G NR and LTE channel bandwidth, using 256QAM 4x4 as defined by 3GPP. Module requires activation and separately purchased service contract. Check with service provider for coverage and availability in your area. Data connection, upload and download speeds will vary due to network, location, environment, network conditions, and other factors. Backwards compatible to 4G LTE and 3G HSPA technologies. 5G module planned to be available in select platforms and select countries, where carrier supported.
21. Sold separately or as an optional feature.
22. Miracast is a wireless technology your PC can use to project your screen to TVs, projectors, and streaming.

AUDIO/MULTIMEDIA

Technical Specifications

Audio
Audio by Bang & Olufsen
2 Integrated stereo speakers
Discrete Amplifiers
Integrated dual array microphone

Speaker Power
2W/4ohm Per speaker

Camera
5 MP camera [21]
5 MP+IR camera [21]

Sensors
ALS (ambient light sensor)
Magnetometer
Hall Sensor
Gyro
Accelerometer
HP Tamper Lock [23]

21. Sold separately or as an optional feature.
23. HP Tamper Lock must be enabled by the customer or your administrator.

KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS

Keyboard
HP Premium Keyboard, spill resistant, Backlit keyboard and DuraKeys

Pointing Device
Clickpad with multi-touch gesture support, taps enabled as default
Microsoft Precision Touchpad Default Gestures Support

Function Keys
ESC: system information
F1 - Display Switching
F2 - Blank or Privacy
F3 - Brightness Down
F4 - Brightness Up
F5 - Audio Mute
F6 - Volume Down
F7 - Volume Up
F8 - Mic Mute
F9 - Blank or Backlit Toggle
F10 - Insert
F11 - Airplane Mode
F12 - HP Command Center
home
end
Power Button (with LED)
Delete

Technical Specifications

Hidden Function Keys
Fn+R - Break
Fn+S - Sys Rq
Fn+C - Scroll Lock

SOFTWARE AND SECURITY

Software
HP Quick Touch
HP Quick Drop [24]
HP Easy Clean [25]
HP PC Hardware Diagnostics Windows
myHP
HP Smart Support [26]
HP Connection Optimizer
HP Hotkey Support
HP Support Assistant [27]
HP Notifications
HP Privacy Settings
HP Power Manager
Buy Microsoft Office (Sold separately)

Manageability Features
HP Image Assistant Gen5 (download)
HP Manageability Integration Kit (download) [28]
HP Client Management Script Library (download)
HP Driver Packs (download)
HP Cloud Recovery [29]
HP Client Catalog (download)

Security Management
HP Wolf Security of Business [30] includes:
HP Sure Click [31]
HP Sure Sense [32]
HP Sure Run Gen5 [33]
HP Sure Recover Gen5 [34]
HP Sure Start Gen7 [35]
HP Tamper Lock
HP Sure Admin [36]
HP Client Security Manager Gen7 [37]

BIOS
HP BIOSphere Gen6 [38]
HP Secure Erase [39]
Absolute Persistence Module [40]
HP DriveLock & Automatic DriveLock
BIOS Update via Network
HP Wake on WLAN
HP Fingerprint Sensor [41]
Secured-Core PC Enable [42]
TPM 2.0 Embedded Security Chip (Common Criteria EAL4+ Certified) (FIPS 140-2 Level 2 Certified)

Security
TPM
Model: Infineon SLB9672VU2.0
Version: 15.21
Revision: TPM 2.0
FIPS 140-2 Compliant: Yes

Smartcard Reader
Model number: Alcor AU9560
FIPS 201 Compliant: Yes

Technical Specifications

IPv6 Support
Yes

FirstNet Certified
Yes

Is the BIOS on this notebook ISO/IEC 19678:2015 (formerly NIST 800-147) compliant?: Yes
UEFI version: 2.7
Class: Class 3

24. HP Quick Drop requires Internet access and Windows 10 or higher PC preinstalled with HP QuickDrop app and either an Android device (phone or tablet) running Android 7 or higher with the Android HP QuickDrop app, and /or an iOS device (phone or tablet) running iOS 12 or higher with the iOS HP QuickDrop app.
25. HP Easy Clean requires Windows 10 RS3 and higher and will disable the keyboard, touchscreen, and clickpad only. Ports are not disabled. See user guide for cleaning instructions.
26. 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.
27. HP Support Assistance requires Windows and Internet Access.
28. HP Manageability Integration Kit can be downloaded from http://www8.hp.com/us/en/ads/clientmanagement/overview.html.
29. 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, wired network connection. Note: You must back up important files, data, photos, videos, etc. before use to avoid loss of data. Detail please refer to: https://support.hp.com/us-en/document/c05115630.
30. HP Wolf Security for Business requires Windows 10 or higher, includes various HP security features and is available on HP Pro, Elite, RPOS and Workstation products. See product details for included security features and OS requirement.
31. HP Sure Click requires Windows 10 Pro or higher or Enterprise. See https://bit.ly/2PrLT6A_SureClick for complete details.
32. HP Sure Sense is available on select HP PCs with Windows 10 Pro, Windows 10 Enterprise, Windows 11 Pro, or Windows 11 Enterprise OS.
33. HP Sure Run Gen5 is available on select HP PCs and requires Windows 10 and higher.
34. HP Sure Recover Gen5 with Embedded Reimaging is an optional feature which requires Windows 10 and higher must be configured at purchase. You must back up important files, data, photos, videos, etc. before use to avoid loss of data. Network based recovery using Wi-Fi is only available on PCs with Intel Wi-Fi Module.
35. HP Sure Start Gen7 is available on select HP PCs and requires Windows 10 and higher.
36. HP Sure Admin requires Windows 10 or higher, HP BIOS, HP Manageability Integration Kit from http://www.hp.com/go/clientmanagement and HP Sure Admin Local Access Authenticator smartphone app from the Android or Apple store.
37. HP Client Security Manager Gen7 requires Windows and is available on the select HP Elite and Pro PCs.
38. HP BIOSphere Gen6 features may vary depending on the platform and configuration.
39. HP Secure Erase for the methods outlined in the National Institute of Standards and Technology Special Publication 800-88 "Clear" sanitation method. HP Secure Erase does not support platforms with Intel® Optane™.
40. Absolute 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/.
41. HP Fingerprint sensor is an optional feature that must be configured at purchase.
42. Secured-Core PC Enable requires an Intel® vPro® , AMD Ryzen™ Pro processor or Qualcomm® processor with SD850 or higher and requires 8 GB or more system memory. Secured-core PC is enabled from the factory.

POWER

Technical Specifications

Power Supply
HP Smart 65 W USB Type-C adapter [43]
HP Smart 65 W Slim USB Type-C adapter [43]
HP Smart 45 W USB Type-C adapter [43]

Battery
HP Long Life 3-cell, 38 Wh Polymer [44,45]
HP Long Life 3-cell, 51 Wh Polymer [44,45]
Compliant with UL 1642 Standard

Power Cord
3-wire plug - 1m
2-wire plug - 1m

Battery Life
Up to 13 hours 45 minutes (51 Whr battery) [46]
Up to 10 hours (38 Whr battery) [46]

43 Availability may vary by country.
44. Battery is internal and not replaceable by customer. Serviceable by warranty.
45. Actual battery Watt-hours (Wh) will vary from design capacity. Battery capacity will naturally decrease with shelf life, time, usage, environment, temperature, system configuration, loaded apps, features, power management settings and other factors.
46. MM18 battery life will vary depending on various factors including product model, configuration, loaded applications, features, use, wireless functionality, and power management settings. The maximum capacity of the battery will naturally decrease with time and usage. See www.bapco.com for additional details.

WEIGHTS & DIMENSIONS

Product Weight- 38 Wh [47]
Starting at 2.98 lb
Starting at 1.35 kg

Product Dimensions (W x D x H)
12.42 x 8.89 x 0.75 in
31.56 x 22.565 x 1.92 cm

47. Weight will vary by configuration. Does not include power adapter.

PORTS/SLOTS

2 Thunderbolt™ 4 with USB4 Type-C® 40Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4) [48]
2 Super Speed USB Type-A 5Gbps signaling rate (1 charging) (USB 3.2 Gen 1)
1 HDMI 2.0 [9]
1 Headphone/microphone combo jack
1 Nano Security Lock Slot (Lock sold separately)
1 Smartcard reader (Optional)
1 nano SIM card slot

9. HDMI cable sold separately
48. SuperSpeed USB 20Gbps is not available with Thunderbolt™ 4.

SERVICE AND SUPPORT

1-year warranty and 90 day software limited warranty options depending on country. Batteries have a default one year limited warranty except for HP Long Life batteries which will follow the one or three year warranty of the platform. Refer to http://www.hp.com/support/batterywarranty/ for additional battery information. On-site service and extended coverage is also available. HP Care Pack Services are optional extended service contracts that go beyond the standard limited warranties. To choose the right level of service for your HP product, use the HP Care Pack Services Lookup Tool at: http://www.hp.com/go/cpc.[49]

49. HP Care Packs are sold separately. 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 http://www.hp.com/go/cpc. HP services are governed by the applicable HP terms and conditions of service provided or indicated t Customer at the time of purchase. Customer may have additional statutory rights according to applicable local laws, and such right are not in any way affected by the HP terms and conditions of service or the HP Limited Warranty provided with your HP Product.

SYSTEM UNIT

Stand-Alone Power Requirements (AC Power)	Type-C Adapter
Nominal Operating Voltage	AC 20V
Average Operating Power	
Integrated graphics	Yes
Discrete Graphics	N/A
Max Operating Power	UMA<65W
Temperature	
Operating	32° to 95° F (0° to 35° C)
Non-operating	41° to 95° F (5° to 35° C) (writing optical)
Relative Humidity	
Operating	10% to 90%, non-condensing
Non-operating	5% to 95%, 101.6° F (38.7° C) maximum wet bulb temperature
Shock	
Operating	40 G, 2 ms, half-sine
Non-operating	200 G, 2 ms, half-sine
Random Vibration	
Operating	0.75 grams
Non-operating	1.50 grams
Altitude (unpressurized)	
Operating	-50 to 10,000 ft (-15.24 to 3,048 m)
Non-operating	-50 to 40,000 ft (-15.24 to 12,192 m)
Planned Industry Standard Certifications	
Regulatory Model Number	HSN-I45C
UL	Yes
CSA	Yes
FCC Compliance	Yes
ENERGY STAR®	Certified [50]
EPEAT®	EPEAT® Gold in the United States [51]
ICES	Yes
Australia /	Yes
NZ A-Tick Compliance	Yes
CCC	Yes
Japan VCCI Compliance	Yes

Technical Specifications

KC	Yes
BSMI	Yes
CE Marking Compliance	Yes
BNCI or BELUS	Yes
CIT	Yes
GOST	Yes
Saudi Arabian Compliance (ICCP)	Yes
SABS	Yes

50. Configurations of the HP Elite x360 1040 14 inch G9 2-in-1 Notebook PC that are ENERGY STAR® qualified are identified as HP Elite x360 1040 14 inch G9 2-in-1 Notebook PC ENERGY STAR on HP websites and on http://www.energystar.gov.
51. 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.

DISPLAYS

Note: All specifications represent the typical specifications provided by HP's component manufacturers; actual performance may vary either higher or lower.

1. Actual brightness will be lower with touchscreen or HP Sure View.

14.0 in WUXGA (1920 x 1200) Anti-Glare UWVA LED NTSC NB2X 250 eDP 1.2 w/o PSR 45 bent LCD Panel	**Outline Dimensions (W x H x D)**	307.590 x 199.550 (max)
	Active Area	301.590 X 188.500 (typ)
	Weight	300 (max)
	Diagonal Size	14
	Thickness	3.0 / 5.0 (max)
	Interface	eDP 1.2
	Surface Treatment	Anti-Glare
	Touch Enabled	Yes[1]
	Contrast Ratio	1000:1(typ)
	Refresh Rate	60 Hz
	Brightness	250 nits [1]
	Pixel Resolution - Format	1920 x 1200 (WUXGA)
	Backlight	WLED
	P.P.I.	162
	Pixel Resolution - configuration	RGB
	Color Gamut Coverage	NTSC 45%
	Color Depth	8 bits
	Viewing Angle	UWVA 89/89/89/89
	Low Blue Light	No
	Power Consumption (W, EBL@ 150nits max/ 200nits max)	2.20 (max) / 2.70 (max)

Technical Specifications

14.0 in WUXGA (1920 x 1200) Anti-Glare UWVA WLED+LBL sRGB NB2X 400 eDP 1.4+PSR2 Low-Power 100 bent LCD Panel	**Outline Dimensions (W x H x D)**	307.590 x 199.550 (max)
	Active Area	301.590 X 188.500 (typ)
	Weight	210 (max)
	Diagonal Size	14
	Thickness	2.0 / 3.8 (max)
	Interface	eDP 1.4
	Surface Treatment	Anti-Glare
	Touch Enabled	Yes [1]
	Contrast Ratio	1000:1(typ)
	Refresh Rate	60 Hz
	Brightness	400 nits [1]
	Pixel Resolution - Format	1920 x 1200 (WUXGA)
	Backlight	WLED
	P.P.I.	162
	Pixel Resolution - configuration	RGB
	Color Gamut Coverage	sRGB 100%
	Color Depth	8 bits
	Viewing Angle	UWVA 89/89/89/89
	Low Blue Light	Yes
	Power Consumption (W, EBL@ 150nits max/ 200nits max)	1.29 (max) / 1.66 (max)

14.0 in WUXGA (1920 x 1200) Anti-Glare UWVA WLED+LBL sRGB NB2Y 1000 eDP 1.3+PSR 100 PrivacyG4 Plus bent LCD Panel	**Outline Dimensions (W x H x D)**	307.600 x 199.550 (typ)
	Active Area	301.680 x 188.500 (typ)
	Weight	238 (max)
	Diagonal Size	14
	Thickness	2.2 / 3.9 (max)
	Interface	eDP 1.3
	Surface Treatment	Anti-Glare
	Touch Enabled	Yes[1]
	Contrast Ratio	1500:1(typ)
	Refresh Rate	60 Hz
	Brightness	1000 nits[1]
	Pixel Resolution - Format	1920 x 1200 (WUXGA)
	Backlight	WLED
	P.P.I	162
	Pixel Resolution - configuration	RGB
	Color Garmut Coverage	sRGB 100%
	Color Depth	8 bits
	Viewing Angle	UWVA 85/85/85/85
	Low Blue Light	Yes
	Power Consumption (W, EBL@ 150nits max/ 200nits max)	N/A

Technical Specifications

STORAGE AND DRIVES

For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 30 GB (for Windows 10 and 11) is reserved for system recovery software.

SSD 256GB 2280 PCIe-4x4 NVMe Three Layer Cell	**Form Factor**	M.2 2280
	Capacity	256GB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen4X4
	Maximum Sequential Read	4000 MB/s ±20%
	Maximum Sequential Write	2000 MB/s ±20%
	Logical Blocks	500,118,192
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	Pyrite 2.0; TRIM; L1.2

SSD 512GB 2280 PCIe-4x4 NVMe Three Layer Cell	**Form Factor**	M.2 2280
	Capacity	512GB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen4X4
	Maximum Sequential Read	6400 MB/s ±20%
	Maximum Sequential Write	3500 MB/s ±20%
	Logical Blocks	1,000,215,215
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	Pyrite 2.0; TRIM; L1.2

SSD 1TB 2280 PCIe-4x4 NVMe Three Layer Cell	**Form Factor**	M.2 2280
	Capacity	1TB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen4X4
	Maximum Sequential Read	6400 MB/s ±20%
	Maximum Sequential Write	5000 MB/s ±20%
	Logical Blocks	2,000,409,264
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	Pyrite 2.0; TRIM; L1.2

Technical Specifications

SSD 2TB 2280 PCIe-4x4 NVMe Three Layer Cell	**Form Factor**	M.2 2280
	Capacity	2TB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen4X4
	Maximum Sequential Read	6400 MB/s ±20%
	Maximum Sequential Write	5000 MB/s ±20%
	Logical Blocks	4,000,797,360
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	Pyrite 2.0; TRIM; L1.2
256GB PCIe-4x4 2280 NVME Self Encrypted OPAL2 Three Layer Cell Solid State Drive	**Form Factor**	M.2 2280
	Capacity	256GB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen4X4
	Maximum Sequential Read	4000 MB/s ±20%
	Maximum Sequential Write	2000 MB/s ±20%
	Logical Blocks	500,118,192
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	TCG Opal 2.0; TRIM; L1.2
512GB PCIe-4x4 2280 NVME Self Encrypted OPAL2 Three Layer Cell Solid State Drive	**Form Factor**	M.2 2280
	Capacity	512GB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen4X4
	Maximum Sequential Read	6400 MB/s ±20%
	Maximum Sequential Write	3500 MB/s ±20%
	Logical Blocks	1,000,215,215
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	TCG Opal 2.0; TRIM; L1.2

Technical Specifications

SSD 256GB 2280 PCIe NVMe Value	**Form Factor**	M.2 2280
	Capacity	256 GB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen3X4
	Maximum Sequential Read	1500 MB/s ±20%
	Maximum Sequential Write	750 MB/s ±20%
	Logical Blocks	500,118,192
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	Pyrite 2.0; TRIM; L1.2

SSD 512GB 2280 PCIe NVMe Value	**Form Factor**	M.2 2280
	Capacity	512 GB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen3X4
	Maximum Sequential Read	1500 MB/s ±20%
	Maximum Sequential Write	750 MB/s ±20%
	Logical Blocks	1,000,215,215
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	Pyrite 2.0; TRIM; L1.2

NETWORKING/COMMUNICATIONS

Intel® AX211 Wi-Fi 6E + Bluetooth® 5.2 M.2 160MHz CNVi World-Wide WLAN vPro[1,5]	**Wireless LAN Standards**	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11ac IEEE 802.11ax IEEE 802.11d IEEE 802.11e IEEE 802.11h IEEE 802.11i IEEE 802.11k IEEE 802.11r IEEE 802.11v
	Interoperability	Wi-Fi certified
	Frequency Band	• 802.11b/g/n/ax 2.402 - 2.482 GHz • 802.11a/n/ac/ax 4.9 - 4.95 GHz (Japan) 5.15 - 5.25 GHz

	5.25 - 5.35 GHz 5.47 - 5.725 GHz 5.825 - 5.850 GHz 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
Modulation	Direct Sequence Spread Spectrum OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM
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	Ad-hoc (Peer to Peer)
Models	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
Power Consumption	Transmit mode 2.0 W Receive mode 1.6 W Idle mode (PSP) 180 mW (WLAN Associated) Idle mode 50 mW (WLAN unassociated) Connected Standby 10mW Radio disabled 8 mW
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity[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

Technical Specifications

Antenna type	High efficiency antenna with spatial diversity, mounted in the display enclosure Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications	
Form Factor	PCI-Express M.2 MiniCard	
Dimensions	1. Type 2230 : 2.3 x 22.0 x 30.0 mm	
Weight	1. Type 2230 : 2.8g	
Operating Voltage	3.3v +/- 9%	
Temperature	**Operating** **Non-operating**	14° to 158° F (-10° to 70° C) -40° to 176° F (-40° to 80° C)
Humidity	**Operating** **Non-operating**	10% to 90% (non-condensing) 5% to 95% (non-condensing)
Altitude	**Operating** **Non-operating**	0 to 10,000 ft (3,048 m) 0 to 50,000 ft (15,240 m)
LED Activity	LED Amber - Radio OFF; LED OFF - Radio ON	

HP Integrated Module with Bluetooth 4.0/4.1/4.2/5.0/5.1/5.2 Wireless Technology

Bluetooth Specification	4.0/4.1/4.2/5.0/5.1/5.2 Compliant
Frequency Band	2402 to 2480 MHz
Number of Available Channels	Legacy : 0~79 (1 MHz/CH) BLE : 0~39 (2 MHz/CH)
Data Rates and Throughput	Legacy : 3 Mbps data rate; throughput up to 2.17 Mbps BLE : 1 Mbps data rate; throughput up to 0.2 Mbps Legacy : Synchronous Connection Oriented links up to 3, 64 kbps, voice channels Legacy : Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)
Transmit Power	The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 9.5 dBm for BR and EDR.
Power Consumption	Peak (Tx): 330 mW Peak (Rx): 230 mW Selective Suspend: 17 mW
Bluetooth Software Supported	Microsoft Windows Bluetooth Software
Link Topology	
Power Management	Microsoft Windows ACPI, and USB Bus Support
Certifications	FCC (47 CFR) Part 15C, Section 15.247 & 15.249
Power Management Certifications	ETS 300 328, ETS 300 826 Low Voltage Directive IEC950 UL, CSA, and CE Mark
Bluetooth Profiles Supported	BT4.1-ESR 5/6/7 Compliance LE Link Layer Ping LE Dual Mode LE Link Layer LE Low Duty Cycle Directed Advertising LE L2CAP Connection Oriented Channels Train Nudging & Interlaced Scan BT4.2 ESR08 Compliance LE Secure Connection- Basic/Full LE Privacy 1.2 -Link Layer Privacy LE Privacy 1.2 -Extended Scanner Filter Policies LE Data Packet Length Extension FAX Profile (FAX) Basic Imaging Profile (BIP)2 Headset Profile (HSP)

		Hands Free Profile (HFP) Advanced Audio Distribution Profile (A2DP) BT5.2 ESR9/10 Compliance LE Advertisement Extensions Channel Selection Algo Limited High Duty Cycle Non-Connectable Advertising 2Mbps LE LE Long Range

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.
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).
5. 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.

Intel® AX211 Wi-Fi 6E + Bluetooth® 5.2 M.2 160MHz CNVi World-Wide WLAN non-vPro®[1,5]	**Wireless LAN Standards**	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11ac IEEE 802.11ax IEEE 802.11d IEEE 802.11e IEEE 802.11h IEEE 802.11i IEEE 802.11k IEEE 802.11r IEEE 802.11v
	Interoperability	Wi-Fi certified
	Frequency Band	• 802.11b/g/n/ax 2.402 - 2.482 GHz • 802.11a/n/ac/ax 4.9 - 4.95 GHz (Japan) 5.15 - 5.25 GHz 5.25 - 5.35 GHz 5.47 - 5.725 GHz 5.825 - 5.850 GHz 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
	Modulation	Direct Sequence Spread Spectrum OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM
	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	Ad-hoc (Peer to Peer)
Models	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
Power Consumption	Transmit mode 2.0 W Receive mode 1.6 W Idle mode (PSP) 180 mW (WLAN Associated) Idle mode 50 mW (WLAN unassociated) Connected Standby 10mW Radio disabled 8 mW
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity[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, mounted in the display enclosure Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications
Form Factor	PCI-Express M.2 MiniCard
Dimensions	1. Type 2230 : 2.3 x 22.0 x 30.0 mm 2. Type 1216: 1.67 x 12.0 x 16.0 mm
Weight	1. Type 2230 : 2.8g 2. Type 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)

Technical Specifications

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 Wireless Technology

Bluetooth Specification	4.0/4.1/4.2/5.0/5.1/5.2 Compliant
Frequency Band	2402 to 2480 MHz
Number of Available Channels	Legacy: 0~79 (1 MHz/CH) BLE: 0~39 (2 MHz/CH)
Signaling Data Rate	Legacy: 3 Mbps data rate; throughput up to 2.17 Mbps BLE: 1 Mbps data rate; throughput up to 0.2 Mbps Legacy: Synchronous Connection Oriented links up to 3, 64 kbps, voice channels Legacy: Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)
Transmit Power	The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 9.5 dBm for BR and EDR.
Power Consumption	Peak (Tx): 330 mW Peak (Rx): 230 mW Selective Suspend: 17 mW
Bluetooth Software Supported Link Topology	Microsoft Windows Bluetooth Software
Power Management	Microsoft Windows ACPI, and USB Bus Support
Certifications	FCC (47 CFR) Part 15C, Section 15.247 & 15.249
Power Management Certifications	ETS 300 328, ETS 300 826 Low Voltage Directive IEC950 UL, CSA, and CE Mark
Bluetooth Software Supported	BT4.1-ESR 5/6/7 Compliance LE Link Layer Ping LE Dual Mode LE Link Layer LE Low Duty Cycle Directed Advertising LE L2CAP Connection Oriented Channels Train Nudging & Interlaced Scan BT4.2 ESR08 Compliance LE Secure Connection- Basic/Full LE Privacy 1.2 -Link Layer Privacy LE Privacy 1.2 -Extended Scanner Filter Policies LE Data Packet Length Extension FAX Profile (FAX) Basic Imaging Profile (BIP)2 Headset Profile (HSP) Hands Free Profile (HFP) Advanced Audio Distribution Profile (A2DP) BT5.2 ESR9/10 Compliance LE Advertisement Extensions Channel Selection Algo Limited High Duty Cycle Non-Connectable Advertising 2Mbps LE LE Long Range

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.
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).
5. 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.

Intel(R) 5G Solution 5000[1]	**Technology/Operating bands**	WCDMA/HSPA+ operating bands: Band 1: 1920 to 1980 MHz (UL), 2110 to 2170 MHz (DL) Band 2: 1850 to 1910 MHz (UL), 1930 to 1990 MHz (DL) Band 4: 1710 to 1755 MHz (UL), 2110 to 2155 MHz (DL) Band 5: 824 to 849 MHz (UL), 869 to 894 MHz (DL) Band 8: 880 to 915 MHz (UL), 925 to 960 MHz (DL) LTE FDD/TDD operating bands: Band 1: 1920 to 1980 MHz (UL), 2110 to 2170 MHz (DL) Band 2: 1850 to 1910 MHz (UL), 1930 to 1990 MHz (DL) Band 3: 1710 to 1785 MHz (UL), 1805 to 1880 MHz (DL) Band 4: 1710 to 1755 MHz (UL), 2110 to 2155 MHz (DL) Band 5: 824 to 849 MHz (UL), 869 to 894 MHz (DL) Band 7: 2500 to 2570 MHz (UL), 2620 to 2690 MHz (DL) Band 8: 880 to 915 MHz (UL), 925 to 960 MHz (DL) Band 12: 699 to 716 MHz (UL), 729 to 746 MHz (DL) Band 13: 777 to 787 MHz (UL), 746 to 756 MHz (DL) Band 14: 788 to 798 MHz (UL), 758 to 768 MHz (DL) Band 17: 704 to 716 MHz (UL), 734 to 746 MHz (DL) Band 18: 815 to 830 MHz (UL), 860 to 875 MHz (DL) Band 19: 830 to 845 MHz (UL), 875 to 890 MHz (DL) Band 20: 832 to 862 MHz (UL), 791 to 821 MHz (DL) Band 25: 1850 to 1915 MHz (UL), 1930 to 1995 MHz (DL) Band 26: 814 to 849 MHz (UL), 859 to 894 MHz (DL) Band 28: 703 to 748 MHz (UL), 758 to 803 MHz (DL) Band 29: 717 to 728 MHz (DL) Band 30: 2305 to 2315 MHz (UL) 2350 to 2360 MHz (DL) Band 32: 1452 to 1496 MHz (DL) Band 34: 2010 to 2025 MHz (UL/DL) Band 38: 2570 to 2620 MHz (UL/DL) Band 39: 1880 to 1920 MHz (UL/DL) Band 40: 2300 to 2400 MHz (UL/DL) Band 41: 2496 to 2690 MHz (UL/DL) Band 42: 3400 to 3600 MHZ (UL/DL) Band 43: 3400 to 3800 MHZ (UL/DL) Band 46: 5150 to 5925 MHZ (DL) Band 48: 3550 to 3700 MHZ (UL/DL) Band 66: 1710 to 1800 MHz (UL), 2110 to 2200 MHz (DL) Band 71: 663 to 698 MHz (UL), 617 to 652 MHz (DL) 5GNR Sub 6GHZ n1: 1920 to 1980 MHz (UL), 2110 to 2170 MHz (DL) n2: 1850 to 1910 MHz (UL), 1930 to 1990 MHz (DL) n3: 1710 to 1785 MHz (UL), 1805 to 1880 MHz (DL) n5: 824 to 849 MHz (UL), 869 to 894 MHz (DL) n7: 2500 to 2570 MHz (UL), 2620 to 2690 MHz (DL) n8: 880 to 915 MHz (UL), 925 to 960 MHz (DL) n20: 832 to 862 MHz (UL), 791 to 821 MHz (DL) n25: 1850 to 1915 MHz (UL), 1930 to 1995 MHz (DL) n28: 703 to 748 MHz (UL), 758 to 803 MHz (DL) n38: 2570 to 2620 MHz (UL/DL) n40: 2300 to 2400 MHz (UL/DL) n41: 2496 to 2690 MHz (UL/DL) n48: 3550 to 3700 MHZ (UL/DL) n66: 1710 to 1800 MHz (UL), 2110 to 2200 MHz (DL) n71: 663 to 698 MHz (UL), 617 to 652 MHz (DL) n77: 3300 to 4200 MHz (UL/DL) n78: 3300 to 3800 MHz (UL/DL)

Technical Specifications

	n79: 4400 to 5000 MHz (UL/DL)
Wireless protocol standards	5GNR Air Interface 3GPP Rel15 5G NR sub-6 LTE Rel14 20 layers and 2 Gbps downlink (DL) throughput - 4 ? 4 MIMO across 5x CA 200 Mbps/uplink (UL) throughput - 40 MHz ULCA and 256 QAM WCDMA R99, 3GPP Release 5, 6, 7 and 8 UMTS Specification
GPS	Standalone, A-GPS (MS-A, MS-B)
GPS bands	GPS: L1 (1575.42MHz) GLONASS: L1 (1602MHz) BeidouB1(1561.098MHz) Galileo E1 (1575.42) QZSS(1575.42 MHz)
Maximum data rates	SA 5G/NR sub-6 Peak: DL4.67Gbps/ UL 1.25Gbps 5G NSA sub 6G : DL: 3.8 Gbps/UL 700Mbps LTE: ue-CategoryDL 19, (DL : 1.6 Gbps) ue-CategoryUL 13 , (UL: 150Mbps) DC-HSPA+: 42 Mbps (Download), 11.5 Mbps (Upload)
Maximum output power	LTE: 23 dBm in all band except B41 LTE B41 HPUE = 26dBm NR: 23 dBm in all band except n41, n77, n78 and n79 LTE n41, n77, n78 and n79 HPUE = 26dBm HSPA+: 23.5 dBm
Maximum power consumption	5G Sub 6 : 2500 mA LTE: 1,300 mA (peak); 1100 mA (average) HSPA+: 1,100 mA (peak); 800 mA (average)
Form Factor	M.2, 3042-S3 Key B
Weight	8 g
Dimensions (Length x Width x Thickness)	52 mm ? 30 mm ? 2.6 mm

1. Intel 5G module is optional and must be configured at the factory. Module designed for 5G NR NSA (non-standalone) networks as carriers deploy Evolved-Universal Terrestrial Radio Access New Radio Dual Connectivity (ENDC) with both 100Mhz of 5G NR and LTE channel bandwidth, using 256QAM 4x4 as defined by 3GPP. Module requires activation and separately purchased service contract. Check with service provider for coverage and availability in your area. Data connection, upload and download speeds will vary due to network, location, environment, network conditions, and other factors. Backwards compatible to 4G LTE and 3G HSPA technologies. 5G module planned to be available in select platforms and select countries, where carrier supported.

Technical Specifications

Intel® XMM™ 7560 R+ LTE-Advanced Pro[1]	**Technology/Operating bands**	FDD LTE: 2100 (Band 1), 1900 (Band 2), 1800 (Band 3), 1700/2100 (Band 4), 850 (Band 5), 2600 (Band 7), 900 (Band 8), 700 (Band 12 lower), 700 (Band 13 upper), 700 (Band 14 upper), 700 (Band 17 lower), 850 (Band 18 lower), 850 (Band 19 upper), 800 (Band 20), 1900 (Band 25), 850 (Band 26), 700 (Band 28), 700 (Band 29 RX only), 2300 (Band 30), 1700/2100 (Band 66), 600 (band 71). TDD LTE: 2100 (Band 34), 2600 (Band 38), 1900 (Band 39), 2400 (Band 40), 2500 (Band 41), 3500 (Band 42), 3700 (Band 43), 3700 (band 48), 5200 (Band 46 RX only) MHz; HSPA+: 2100 (Band 1), 1900 (Band 2), 1700/2100 (Band 4), 850 (Band 5), 900 (Band 8) MHz
	Wireless protocol standards	3GPP Release 12 LTE Specification DL-CAT.16, DL 100MHz BW throughput up to 978Mbps; UL-CAT.13 40MHz throughput up to 150Mbps WCDMA R99, 3GPP Release 5, 6, 7 and 8 UMTS Specification
	GPS	Standalone GPS/Beidou/Glonass, A-GPS (MS-A, MS-B)
	GPS bands	1575.42 MHz ± 1.023 MHz, GLONASS 1596-1607MHz, Beidou 1561.098 MHz
	Maximum data rates	LTE: 978 Mbps (Download), 150 Mbps (Upload) DC-HSPA+: 42 Mbps (Download), 5.76 Mbps (Upload) HSPA+: 21Mbps (Download), 5.76 Mbps (Upload)
	Maximum output power	LTE: 23 dBm in all band except B41 LTE B41 HPUE = 26dBm HSPA+: 23.5 dBm
	Maximum power consumption	LTE: 1,200 mA (peak); 900 mA (average) HSPA+: 1,100 mA (peak); 800 mA (average)
	Form Factor	M.2, 3042-S3 Key B
	Weight	6 g
	Dimensions (Length x Width x Thickness)	42 x 30 x 2.3 mm
	eSIM	Support

1. Mobile Broadband is an optional feature. Connection requires wireless data service contract, network support, and is not available in all areas. Contact service provider to determine the coverage area and availability. Connection speeds will vary due to location, environment, network conditions, and other factors. 4G LTE not available on all products or in all countries.

Technical Specifications

Near Field Communications Controller (optional)	**Dimensions (L x W x H)**	Module 25 mm by 10 mm by 2.0 mm
	Chipset	NPC100
	System interface	I2C
	NFC RF standards	ISO/IEC 14443 A ISO/IEC 14443 B ISO/IEC 15693 ISO/IEC 18092 ECMA-340 NFCIP-1 Target and Initiator ECMA-320 NFCIP-2
	NFC Forum Support	Tag Type 1, Type 2, Type3 and Type 4, NFCIP-1 and NFCIP-2
	Reader (PCD-VCD) Mode (1)	ISO/IEC 14443 A ISO/IEC 14443 B ISO/IEC 15693 MIFARE 1K MIFARE 4K MIFARE DESFire FeliCa Jewel and Topaz cards
	Card Emulation (PICC-VICC) Mode (1)	ISO/IEC 14443 A ISO/IEC 14443 B and B' MIFARE FeliCa
	Frequency	13.56 MHz
	NFC Modes Supported	Reader/Writer, Peer-to-Peer
	Raw RF Data Rates	106, 212, 424, 848 kbps
	Operating temperature	0°C to 70°C
	Storage temperature	-20°C to 125°C
	Humidity	10-90% operating 5-95% non-operating
	Supply Operating voltage	4.35 to 5.25 Volts
	I/O Voltage	1.8V or 3.3V
	Power Consumption (Booster enable, VBAT= 3.3V, VCC_BOOST = 5V)	
	Mode	Power Consumption, Typical
	Polling	7.3 mA
	Detected Test Tag Type 1	Total 283.8 mA Net Module 236.8 mA
	Detected Test Tag Type 2	Total 288.8 mA Net Module 241.8 mA
	Detected Test Tag Type 3	Total 287.7 mA Net Module 240.7 mA
	Detected Test Tag Type 4	Total 282.3 mA Net Module 235.3 mA
	Antenna	Antenna connector, 0.5mm pitch, 7 connector FPC. Antenna matching is external to module.

POWER

1. Actual battery Watt-hours (Wh) will vary from design capacity. Battery capacity will naturally decrease with shelf life, time, usage, environment, temperature, system configuration, loaded apps, features, power management settings and other factors

Technical Specifications

AC Adapter 45 Watt nPFC Standard USB type C Straight 1.8m	**Dimensions (H x W x D)**	94.0mm x 40.0mm x 26.5mm	
	Weight	192.5g +/-10%	
	Input	**Input Efficiency**	Average Efficiency of 25%, 50%, 75%, 100% load condition with 115Vac/230Vac Spec: 5V: 81.5% 9V: 86.7% 12V: 87.41% 15V: 87.8%
		Input frequency range	47 ~ 63Hz
		Input AC current	Max. 1.4 A at 90 Vac
	Output	**Output power**	5V/15W 9V/27W 12V/36W 15V/45W
		DC output	5V/9V/12V/15V
		Hold-up time	5ms at 115 Vac input
		Output current limit	<5.0A
	Connector	C6	
	Environmental Design	**Operating temperature**	32°Fto 95°F (0° to 35°C)
		Non-operating (storage) temperature	-4^{O}F to 185^{O}F (-20^{O} to 85^{O}C)
		Altitude	0 to 16,400 ft (0 to 5000m)
		Humidity	20% to 95%
		Storage Humidity	10% to 95%
	EMI and Safety Certifications	Eg: *CE Mark - full compliance with LVD and EMC directives * Worldwide safety standards - IEC60950-1 and/or IEC62368-1, EN60950-1 and/or EN62368-1, UL60950-1 and/or UL62368-1 , Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC, NOM-001 NYCE. * MTBF - over 200,000 hours at 25°C ambient condition.	

AC Adapter 65 Watt nPFC Slim USB type C Straight 1.8m	**Dimensions (H x W x D)**	88 x 53.5 x 21mm	
	Weight	unit: 220g +/- 10g	
	Input	**Input Efficiency**	81.5% min at 115 Vac/ 230Vac @ 5V/3A 86.7% min at 115 Vac/ 230Vac @ 9V/3A 88% min at 115 Vac/ 230Vac @ 12V/5A 89% min at 115 Vac/ 230Vac @ 15V/4.33A 89% min at 115 Vac/ 230Vac @ 20V/3.25A
		Input frequency range	47 ~ 63 Hz
		Input AC current	1.6 A at 90 VAC and maximum load
	Output	**Output power**	65W
		DC output	5V/9V/12V/15V/20V
		Hold-up time	5ms at 115 Vac input
		Output current limit	<8.0A
	Connector	C6	
	Environmental Design	**Operating temperature**	32°Fto 95°F (0° to 35°C)

		Non-operating (storage) temperature	-4ºF to 185ºF (-20º to 85ºC)
		Altitude	0 to 16,400 ft (0 to 5000m)
		Humidity	5% to 95%
		Storage Humidity	5% to 95%
	EMI and Safety Certifications	Eg: *CE Mark - full compliance with LVD and EMC directives * Worldwide safety standards - IEC60950-1 and/or IEC62368-1, EN60950-1 and/or EN62368-1, UL60950-1 and/or UL62368-1 , Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC, NOM-001 NYCE. * MTBF - over 200,000 hours at 25°C ambient condition.	

AC Adapter 65 Watt nPFC Standard USB type C Straight 1.8m	**Dimensions (H x W x D)**	90.0mm x 51.0mm x 28.5mm	
	Weight	250g +/-10%	
	Input	**Input Efficiency**	Average Efficiency of 25%, 50%, 75%, 100% load condition with 115Vac/230Vac Spec: 5V : 81.5% 9V : 86.7% 12V : 88% 15V : 88% 20V : 89%
		Input frequency range	47 ~ 63Hz
		Input AC current	Max. 1.6 A at 90 Vac
	Output	**Output power**	5V/15W 9V/27W 12V/60W 15V/60W 20V/65W
		DC output	5V/9V/12V/15V/20V
		Hold-up time	5ms at 115 Vac input
		Output current limit	<8.0A
	Connector	C6	
	Environmental Design	**Operating temperature**	32°Fto 95°F (0° to 35°C)
		Non-operating (storage) temperature	-4ºF to 185ºF (-20º to 85ºC)
		Altitude	0 to 16,400 ft (0 to 5000m)
		Humidity	20% to 95%
		Storage Humidity	10% to 95%
	EMI and Safety Certifications	Eg: *CE Mark - full compliance with LVD and EMC directives * Worldwide safety standards - IEC60950-1 and/or IEC62368-1, EN60950-1 and/or EN62368-1, UL60950-1 and/or UL62368-1 , Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC, NOM-001 NYCE. * MTBF - over 200,000 hours at 25°C ambient condition.	

Technical Specifications

HP 3-cell Long Life Li-Ion (38Wh) [1]	**Dimensions (H x W x D)**	251.8 x 66.1 x 6.82mm (9.91 x 2.6 x 0.27 inch)	
	Weight	0.184kg +/- 10g(0.406lb)	
	Cells/Type	3cell Lithium-Ion Polymer cell / 564975	
	Energy	**Voltage**	11.58V
		Amp-hour capacity	3.283Ah
		Watt-hour capacity[1]	38Wh
	Temperature	**Operating (Charging)**	32° to 113° F (0° to 45° C)
		Operating (Discharging)	14° to 140° F (-10° to 60° C)
		Fuel Gauge LED	NA
		Warranty	Follow product spec
		Optional Travel Battery Available	No

HP 3-cell Long Life Li-Ion (51 Wh) [1]	**Dimensions (H x W x D)**	251.8 x 70.3 x 6.82mm (9.91 x 2.77 x 0.27 inch)	
	Weight	0.229kg +/- 10g (0.505 lb)	
	Cells/Type	3cell Lithium-Ion Polymer cell / 566075	
	Energy	**Voltage**	11.58V
		Amp-hour capacity	4.431Ah
		Watt-hour capacity[1]	51.3Wh
	Temperature	**Operating (Charging)**	32° to 113° F (0° to 45° C)
		Operating (Discharging)	14° to 140° F (-10° to 60° C)
		Fuel Gauge LED	NA
		Warranty	Follow product spec
		Optional Travel Battery Available	No

AUDIO

HD Stereo Codec	Realtek ALC3315
Audio I/O Ports	Headset: CTIA only and Headphone-out
Internal Speaker Amplifier	Cirrus Logic High-Efficiency Boosted Class D Amplifier
Multi-streaming Capable	Playback multi-streaming can be enabled in the audio control panel to allow independent audio. Following MSFT Behaviour
Sampling	DAC: 44.1k/48kHz ADC: 48kHz
Wavetable Syntheses	
Analog Audio	Support 3.5mm Headset: CTIA only and Headphone-out
# of Channels on Line-Out	
Internal Speaker	Yes

FINGERPRINT READER

Technical Specifications

Sensor vendor	Synaptics FS7604
Sensor type	Capacitive
DPI resolution	363DPI
Scan area	7.4x6mm sensor area
False Rejection Rate	<1%
False Acceptance Rate	1:50K FAR
Mobile Voltage Operation	3.0V to 3.6V
Operating Temperature	0~60°C
Current Consumption Image	100mA Max
Low Latency Wait For Finger	260 uA
Capture Rate	<30msec per image
ESD Resistance	IEC 61000-4-2 4B (+/-15KV)
Detection Matrix	363 dpi / 7.4x6mm sensor area

ENVIRONMENTAL DATA

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	• Ocean-bound plastic in Speaker • 45% post-consumer recycled plastic • Low halogen • Outside Box and corrugated cushions are 100% sustainably sourced and recyclable • Molded Paper Pulp Cushion inside box is 100% sustainably sourced and recyclable • Bulk packaging available		
System Configuration	The configuration used for the Energy Consumption and Declared Noise Emissions data for the Notebook model is based on a "Typically Configured Notebook"?.		
Energy Consumption (in accordance with US ENERGY STAR® test method)	**115VAC, 60Hz**	**230VAC, 50Hz**	**100VAC, 50Hz**
Normal Operation (Sort idle)	4.83 W	5.13 W	4.97 W
Normal Operation (Long idle)	1.11 W	1.2 W	1.33 W
Sleep	1.11 W	1.2 W	1.33 W
Off	0.43 W	0.47 W	0.43 W
	Note: Energy efficiency data listed is for an ENERGY STAR® compliant product if offered within the model family. HP computers marked with the ENERGY STAR® Logo are compliant with the applicable U.S. Environmental Protection Agency (EPA) ENERGY STAR® specifications for computers. If a model		

	family does not offer ENERGY STAR® compliant configurations, then energy efficiency data listed is for a typically configured PC featuring a hard disk drive, a high efficiency power supply, and a Microsoft Windows® operating system.		
Heat Dissipation*	**115VAC, 60Hz**	**230VAC, 50Hz**	**100VAC, 50Hz**
Normal Operation (Short idle)	16.5 BTU/hr	17.5 BTU/hr	17 BTU/hr
Normal Operation (Long idle)	3.8 BTU/hr	4.1 BTU/hr	4.5 BTU/hr
Sleep	3.8 BTU/hr	4.1 BTU/hr	4.5 BTU/hr
Off	1.5 BTU/hr	1.6 BTU/hr	1.5 BTU/hr
	*NOTE: Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.		
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)	Sound Power (L_{WAd}, bels)	Sound Pressure (L_{pAm}, decibels)	
Typically Configured - Idle	2.6	14.3	
Fixed Disk - Random writes	3.2	27.0	
Optical Drive - Sequential reads	4.0	32.0	
Longevity and Upgrading	This product can be upgraded, possibly extending its useful life by several years. Upgradeable features and/or components contained in the		
	Spare parts are available throughout the warranty period and or for up to "5"? years after the end of production.		
Additional Information	• This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC. • This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive - 2002/96/EC. • This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986). • This product is in compliance with the IEEE 1680 (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	**External:**	PAPER/Corrugated	269 g
		PAPER/Paper	3 g
		PAPER/Molded Pulp	108 g
	Internal:	PLASTIC/Polyethylene low density - LDPE	13 g
	The plastic packaging material contains at least 0.0% recycled content.		
	The corrugated paper packaging materials contains at least 59.1% recycled content.		
RoHS Compliance	HP Inc. complies fully with materials regulations. We were among the first companies to extend the restrictions in the European Union (EU) Restriction of Hazardous Substances (RoHS) Directive to our products worldwide through the HP GSE. HP has contributed to the development of related legislation in Europe, as well as China, India, and Vietnam. We believe the RoHS directive and similar laws play an important role in promoting industry-wide elimination of substances of concern. We have supported the inclusion of additional substances-including PVC, BFRs, and certain phthalates-in future RoHS legislation that pertains to electrical and electronics products. We met our voluntary objective to achieve worldwide compliance with the new EU RoHS		

	requirements for virtually all relevant products by July 2013, and we will continue to extend the scope of the commitment to include further restricted substances as regulations continue to evolve. To obtain a copy of the HP RoHS Compliance Statement, see HP RoHS position statement.
Material Usage	This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at http://www.hp.com/hpinfo/globalcitizenship/environment/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: • Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials. • Eliminate the use of ozone-depleting substances (ODS) in packaging materials. • Design packaging materials for ease of disassembly. • Maximize the use of post-consumer recycled content materials in packaging materials. • Use readily recyclable packaging materials such as paper and corrugated materials. • Reduce size and weight of packages to improve transportation fuel efficiency. • Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.
End-of-life Management and Recycling	HP offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/go/reuse-recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner. The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the 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.

HP, Inc. Corporate Environmental Information	For more information about HP's commitment to the environment: Global Citizenship Report http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html Eco-label certifications http://www8.hp.com/us/en/hp-information/environment/ecolabels.html ISO 14001 certificates: http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842 and http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf
footnotes	• Percentage of ocean-bound plastic contained in each component varies by product • Recycled plastic content percentage is based on the definition set in the IEEE 1680.1-2018 standard. • External power supplies, WWAN modules, power cords, cables and peripherals excluded. • 100% outer box packaging and corrugated cushions made from sustainably sourced certified and recycled fibers. • Fiber cushions made from 100% recycled wood fiber and organic materials.

COUNTRY OF ORIGIN

China

Options and Accessories (Sold separately and availability may vary by country)

DOCKING (Sold Separately)

Docking station model #1	HP Thunderbolt Dock G2
Total number of supported displays (incl.the notebook display)	4
Max.resolutions supported	Dual 4K @30Hz or dual 4K UHD @ 60Hz is supported Single 8K@ 30Hz (multiple tiles) for Thunderbolt hosts Non-TBT hosts DP 1.4 in high res mode (1) 8K video single cable@30Hz [10]
Dock Connectors	2xDP, 1xVGA, 1xTB, 1xUSB-C alt-mode
Technical limitations	Thunderbolt Hosts: Maximum of (4) displays with maximum resolution of 5K@ 30Hz running Thunderbolt host. Max resolution possible is dual 8K displays @ 60Hz running Thunderbolt host or running a non-Thunderbolt host in High Resolution mode @30Hz Non-Thunderbolt hosts: The highest resolution for dual displays running a non-Thunderbolt host in multi-function mode is (1) 5K dual cable (using both DP ports) +(1) 4K on USB-C DP port Non-Thunderbolt hosts support (3) displays with a max resolution of: (2) 5K single cable + (1) 4K UHD @ 60 Hz in high resolution mode. In multi-function mode the maximum resolution for (3) displays is (2) 5K single cable @ 30Hz + (1) 4K UHD @ 30Hz.
Docking station model #2	HP USB-C Dock G5
Total number of supported displays (incl.the notebook display)	3
Max.resolutions supported	Dual 5K@ 30Hz + (1) 4K UHD (multi-function mode) [10]
Dock Connectors	1xHDMI, 2xDP
Technical limitations	Highest resolution with dual displays is two 8K@ 60Hz host in High Resolution mode. Three maximum displays supported are two 5K@ 30 Hz on DP ports plus one 4K UHD@ 30 Hz on HDMI in multi-function mode The highest resolution for a non-Thunderbolt host in Multi-function mode is a single 5K dual cable (using both DP ports) + (1) 4K on HDMI port.
Docking station model #3	HP USB-C/A Universal Dock G2
Total number of supported displays (incl.the notebook display)	3
Max.resolutions supported	Triple 4K UHD@ 60Hz [10]
Dock Connectors	1xHDMI, 2xDP
Technical limitations	The best resolution for dual or triple displays is 4K UHD@ 60Hz. For use with the USB-A adapter that comes in the box the maximum number of displays supported is (2) 4k x 60 Hz on the Type-A Gen 1 connection from the host

Type	Description	Part Number
Audio/Video	HP Wired USB-A Stereo Headset	428K6AA
	HP Wired 3.5mm Stereo Headset	428K7AA
Cases	HP Executive 15.6 Backpack	6KD07AA
	HP Executive 15.6 Top Load	6KD06AA
	HP Executive Slim 14.1 Top Load	6KD04AA
	HP Prelude G2 15.6 Backpack	1E7D6AA
	HP Prelude G2 15.6 Top Load	1E7D7AA
	HP Prelude Pro Recycled 15.6 Backpack	1X644AA
	HP Prelude Pro Recycled 15.6 Top Load	1X645AA

Options and Accessories (Sold separately and availability may vary by country)

	HP Renew 14 Laptop Sleeve	2E6U9AA,2E6V0AA
	HP Renew Business 14.1 Laptop Bag	3E5F9AA
	HP Renew Business 14.1 Laptop Sleeve	3E2U7AA
	HP Renew Business 17.3 Laptop Backpack	3E2U5AA
	HP Renew Business 17.3 Laptop Bag	3E2U6AA
	HP Renew Business 15.6 Laptop Bag	3E5F8AA
Docking	HP Thunderbolt 120W G2 Dock	2UK37AA
	HP Thunderbolt 120W G2 Dock w/Audio	3YE87AA
	HP Thunderbolt 230W G2 Dock w/Combo Cable	3TR87AA
	HP USB-C 120W G5 Dock	5TW10AA
	HP USB-C/A 120W G2 Universal Dock	5TW13AA
Digital Pen	HP Active RECHBL G3 Moonracer 2.0 Pen	6SG43AA
Hub	HP USB-C Mini Dock	1PM64AA
	HP Universal USB-C Multiport Hub	50H55AA
	HP USB-C Travel Dock G2	7PJ38AA
	HP USB-C to USB-A Hub	Z6A00AA
Adapter	HP HDMI to DVI Adapter	F5A28AA
	HP HDMI to VGA Adapter	H4F02AA
	HP USB to Gigabit RJ45 Adapter	N7P47AA
	HP USB-C to DisplayPort Adapter	N9K78AA
	HP USB-C to HDMI 2.0 Adapter	1WC36AA
	HP USB-C to RJ45 Adapter	V7W66AA
	HP USB-C to USB 3.0 Adapter	N2Z63AA
	HP USB-C to VGA Adapter	N9K76AA
	HP USB-C to RJ45 Adapter G2	4Z527AA
	HP USB 3.0 to Gigabit RJ45 Adapter G2	4Z7Z7AA
Keyboard/Combo	HP 975 USB+BT Dual-Mode Wireless Keyboard	3Z726AA
	HP 455 Programmable Wireless Keyboard	4R177AA
	HP 125 WD USB Keyboard	266C9AA
	HP 320K WD USB Keyboard	9SR37AA
	HP 655 Wireless Keyboard and Mouse Combo	4R009AA
	HP 225 Wired Mouse and Keyboard Combo	286J4AA
	HP 235 Wireless Mouse and Keyboard Combo	1Y4D0AA
	HP Slim Wireless Keyboard and Mouse	T6L04AA
	HP Wired Desktop 320MK Mouse and Keyboard	9SR36AA
	HP Wireless Rechargeable 950MK Mouse and Keyboard	3M165AA
Mouse	HP USB Premium Wireless Mouse	1JR31AA
	HP 435 Multi-Device Wireless Mouse	3B4Q5AA
	HP 125 USB-A Wired Mouse	265A9AA
	HP 128 USB Laser Wired Mouse	265D9AA
	HP 320M USB-A Wired Mouse	9VA80AA

Options and Accessories (Sold separately and availability may vary by country)

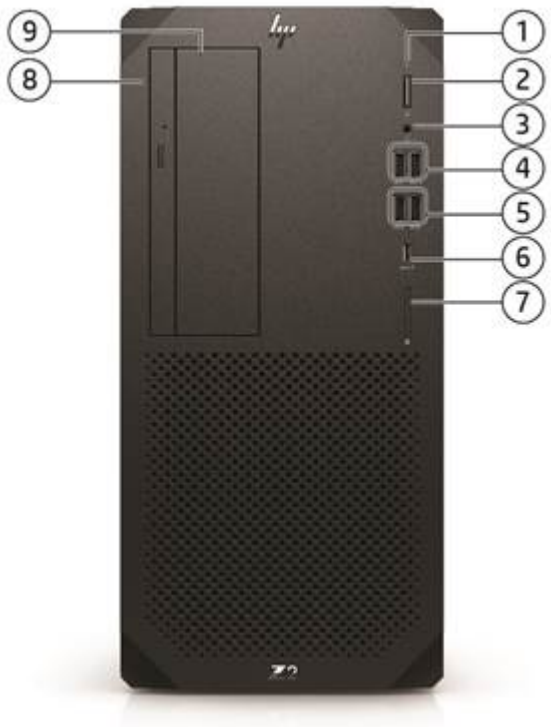
	HP Creator USB-A+Bluetooth 935 Wireless Mouse Black	1D0K8AA
	HP USB-A+Bluetooth Multi-Device 635 Wireless Mouse Black	1D0K2AA
	HP USB-A+Bluetooth Travel Bluetooth Mouse	6SP30AA
Power	HP 65W USB-C Auto Chevy AC Power Adapter	5TQ76AA
	HP 45W USB-C G2 Zeus AC Power Adapter	1HE07AA
	HP 45W USB-C LC Dali AC Power Adapter	1MZ01AA
	HP 65W USB-C Hades AC Power Adapter	1HE08AA
	HP 65W USB-C LC AC Power Adapter	1P3K6AA
	HP 65W USB-C Travel Slim Kermit AC Power Adapter	3PN48AA
Commodity	HP USB DVD-Writer EXT ODD	F2B56AA
	HP Nano Keyed Cable Lock	1AJ39AA
	HP Nano Master Keyed Cable Lock	1AJ40AA
	HP SureKey Standard/Nano/Wedge Cable Lock	6UW42AA

Change Log

Date of change:	Version History:		Description of change:
September 7, 2022	V1 to V2	Removed	Tile App
	V2 to V3		

Overview

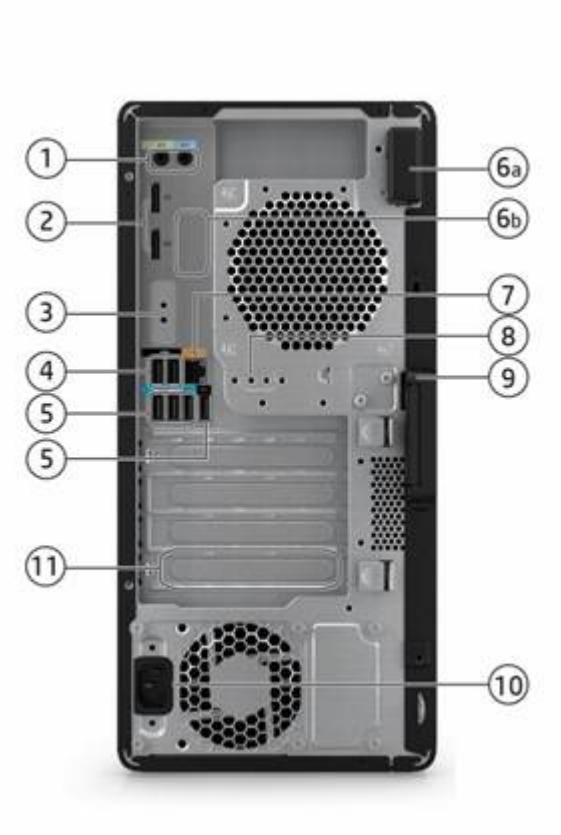
HP Z2 G9 Tower Workstation Desktop PC



front

1. HDD Activity LED
2. Power button
3. Universal audio jack (with CTIA & OMTP headset support)
4. (2) Type-A SuperSpeed USB 10Gbps signaling rate port (1 charge port supports up to 5V/2.1A)
5. (2) Type-A SuperSpeed USB 10Gbps signaling rate port
6. (1) Type-C® SuperSpeed USB 20Gbps signaling rate port (optional, charge supports up to 5V/3A)
7. SD card reader 4.0 (optional)
8. Slim ODD bay
9. External 5.25" bay

Overview



rear

1. (1) Audio Line-in jack
   (1) Audio Line-out jack
2. (2) DisplayPort 1.4
3. Flex I/O module: choose one from the following:
   (1) DisplayPort 1.4, (1) HDMI 2.0b, (1) VGA, (1) Dual Type-A SuperSpeed USB 5Gbps signaling rate port, (1) Type-C® SuperSpeed USB 10Gbps signaling rate port (Power Delivery 15W, Alt Mode DisplayPort), (1) 2nd 1 GbE LAN, (1) Thunderbolt 3 with Type-C® SuperSpeed/ USB4 40Gbps signaling rate* (cabled to PCIe AIC) (1) 1Gbps Fiber LC NIC
4. (2) Hi-Speed USB 480Mbps signaling rate port
5. (2) Type-A SuperSpeed USB 10Gbps signaling rate port
   (1) Type A SuperSpeed USB 5Gbps signaling rate port
   (1) Hi-Speed USB 480Mbps signaling rate port
6. WLAN Antenna (optional)
   a. Internal
   b. External
7. RJ-45
8. 2nd serial port (optional)
9. Hood lock (optional)
10. Power connector

*Maximum speed requires DisplayPort™ and PCIe aggregation.
**Thunderbolt only support on PCI-E slot4.
Note: Onboard Display support DP1.4/HBR2. Flex I/O module Display support DP1.4/HBR3. Resolution all support up to 5120x3200 24bpp @60Hz.

Form Factor	Tower
Operating Systems	Preinstalled: • Windows 11 Pro - HP recommends Windows 11 Pro[2] • Windows 11 Home - HP recommends Windows 11 Pro[2] • Windows 10 Pro (available through downgrade rights from Windows 11 Pro) [1,2,3] • Linux®-ready[5] • Ubuntu 20.04 LTS[4]

Overview

Web-supported only:

- Windows 10 Enterprise 64[2]

Supported Version:

- HP tested Windows 10, versions 20H2, 21H1 and 21H2 on this platform. For testing information on newer versions of Windows 10, please see: https://support.hp.com/document/c05195282.
- Red Hat® Enterprise Linux® Workstation 8[6]
- SUSE Linux® Enterprise Desktop 15[6]
- Ubuntu 20.04, 22.04 LTS[5]

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

[2] Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. Windows is automatically updated and enabled. High speed internet and Microsoft account required. ISP fees may apply and additional requirements may apply over time for updates. See http://www.windows.com.

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

[4] Not all features are available in all editions or versions of Ubuntu. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS to take full advantage of Ubuntu functionality. Ubuntu may be automatically updated. ISP fees may apply and additional requirements may apply over time for updates.

[5]A certified preloaded version of Ubuntu® 20.04 LTS is available from HP for this platform. Not all features are available in all editions or versions of Ubuntu. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS to take full advantage of Ubuntu functionality. Ubuntu may be automatically updated. ISP fees may apply, and additional requirements may apply over time for upgrades.

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

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

Processors

Overview

Name	Cores	Clock Speed (GHz)	Threads	Cache (MB)	Memory Speed (MT/s)[5]	Hyper-Threading	Integrated Graphics	Intel® Turbo Boost Technology[3]	Featuring Intel® vPro® Technology[4]	16GB Intel® Optane™ memory[2]	TDP (W)
Intel® Core™ i9-12900K Processor	16	3.2	24	30	4800	Y	Intel® UHD Graphics 770	5.2	Y	N	125
Intel® Core™ i9-12900 Processor	16	2.1	24	30	4800	Y	Intel® UHD Graphics 770	5.1	Y	N	65
Intel® Core™ i7-12700K Processor	12	3.6	20	25	4800	Y	Intel® UHD Graphics 770	5.0	Y	N	125
Intel® Core™ i7-12700 Processor	12	2.1	20	25	4800	Y	Intel® UHD Graphics 770	4.9	Y	N	65
Intel® Core™ i5-12600K Processor	10	3.7	16	20	4800	Y	Intel® UHD Graphics 770	4.9	Y	N	125
Intel® Core™ i5-12600 processor	6	3.3	12	18	4800	Y	Intel® UHD Graphics 770	4.8	Y	N	65
Intel® Core™ i5-12500 processor	6	3.0	12	18	4800	Y	Intel® UHD Graphics 770	4.6	Y	N	65
Intel® Core™ i5-12400 processor	6	2.5	12	18	4800	Y	Intel® UHD Graphics 730	4.4	N/A	N	65
Intel® Core™ i3-12300 processor	4	3.5	8	12	4800	Y	Intel® UHD Graphics 730	4.4	N/A	N	60
Intel® Core™ i3-12100 processor	4	3.3	8	12	4800	Y	Intel® UHD Graphics 730	4.3	N/A	N	60

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

[2] Intel® Optane™ memory system acceleration does not replace or increase the DRAM in your system.

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

[4] 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

[5] Memory will run at 4400 speed (MT/s) if there is one DIMM per channel. 2 DIMMS per channel will run 4800 speed (MT/s)

Note: ECC memory is supported on the following: Intel® Core™ i9-12900K, Intel® Core™ i9-12900, Intel® Core™ i7-12700K, Intel® Core™ i7-12700, Intel® Core™ i5-12600K, Intel® Core™ i5-12600 and Intel® Core™ i5-12500 processors

Color	Black
Convertibility	No
Expansion Slots (see system board section for more details)	Slot 1: PCIe Gen5 x16 Slot 2: PCIe Gen3 x1 - with x4 Connector Slot 3: PCIe Gen3 x4 - with x16 Connector

Overview

	Slot 4: PCIe Gen3 x4
Expansion Bays (see storage section for more details)	(2) Internal 3.5" bays (1) External 5.25" bay (1) Internal 2.5" bay (for SSD only) (1) Dedicated 9.5mm slim optical disk drive bay
Front I/O	2 Type-A SuperSpeed USB 10Gbps signaling rate port (1 charge port supports up to 5V/2.1A), 2 Type-A SuperSpeed USB 10Gbps signaling rate port, 1 Type-C SuperSpeed® USB 20Gbps signaling rate port (charge supports up to 5V/3A, optional), 1 SD card reader (optional), 1 universal audio jack
Internal I/O [5]	(1) Hi-Speed USB 480Mbps signaling rate header for SD card reader (1) serial port available with header (1) serial and PS/2 available with header
Rear I/O	2 DisplayPort 1.4 [3], 1 Audio Line out, 1 Audio Line in, 1 RJ-45, 3 Hi-Speed USB 480Mbps signaling rate port, 2 Type-A SuperSpeed USB 10Gbps signaling rate port, 1 Type-A SuperSpeed USB 5Gbps signaling rate port, 1 serial (optional), 1 Flex I/O port (VGA, HDMI 2.0b, DisplayPort 1.4, Type-C® SuperSpeed USB 10Gbps signaling rate port (Power Delivery 15W, Alt Mode Display Port), Dual Tye-A SuperSpeed USB 5Gbps signaling rate port, 2nd 1GbE LAN, 1 Thunderbolt 3 with SuperSpeed/USB4 Type-C® 40Gbps signaling rate (cabled to PCIe AIC), 1 1Gbps Fiber LC NIC
Optional I/O	Flex IO* - choose one of the following options: 1 DisplayPort™ 1.4, 1 HDMI 2.0b, 1 VGA,1 2nd 1GbE LAN, 1 1Gbps Fiber LC NIC, 1 Dual SuperSpeed USB Type-A 5Gbps signaling rate,1 SuperSpeed USB Type-C® 10Gbps signaling rate (15W USB Power Delivery, Alt Mode DisplayPort™) 1 Thunderbolt™ 3 with SuperSpeed USB4 Type-C® 40Gbps signaling rate (cabled to PCIe® AIC); Front - 1 SuperSpeed USB Type-C®? 20Gbps signalin charging), 1 SD card reader; Rear -1 serial; Front - choose one of the following options: 1 SuperSpeed USB Type 20Gbps signaling rate (1 charging), 1 SD 4.0 card reader *Flex IO port and one PCIe slot will be occupied when Thunderbolt is installed. Thunderbolt will be available in Q2, 2022 (1st refresh).
Interfaces Supported	SD card reader (optional)
On-board RAID Support	SATA and NVME RAID 0 Striped Array SATA RAID and NVME RAID 1 Mirror Array
Chassis Dimensions (H x W x D)	H: 14" [356mm] W: 6.7" [169mm] D: 15.2" [385mm]
Packaged Dimensions	H: 20.39" (518mm) W: 11.61" (295mm) D: 19.29" (490mm)
Rack Dimensions	4U
Weight	Exact weights depend upon configuration (System weight only). Starting at 6.2kg (13.7lbs.)
Temperature	Operating: 5° to 35° C (40° to 95° F) Above 1524 m (5,000 feet) altitude, the maximum operating temperature is reduced by 1° C (1.8° F) for every 305 m (1,000 feet) increase in elevation Non-operating: -40° to 60° C (-40° to 140° F) Maximum rate of change: 10°C/hr
Humidity	Operating: 10% to 85% RH, non-condensing, 35° C maximum wet bulb Non-operating: 10% to 90% RH, non-condensing, 35° C maximum wet bulb
Maximum Altitude (non-pressurized)[6]	Operating (with Rotational Hard Drives): 3,048 m (10,000 feet) Operating (with only Solid-State Drives): 5,000 m (16,404 feet) Non-operating: 12,192 m (40,000 feet) Maximum operating temperature is reduced as altitude increases. See Temperature for details.
Power Supply	700W wide-ranging, active Power Factor Correction, 92% Efficiency. 500W wide-ranging, active Power Factor Correction, 90% Efficiency. 450W wide-ranging, active Power Factor Correction, 90% Efficiency. 350W wide-ranging, active Power Factor Correction, 92% Efficiency. NOTE: The Power Supply Efficiency Report for the 700W 92% Efficiency, 500W 90% Efficiency, 450W 90% Efficiency and 350W 92% Efficiency Power Supply may be found at the following links:

Overview

	700W PSU: https://www.plugloadsolutions.com/80PlusPowerSuppliesDetail.aspx?id=0&type=2 500W PSU: https://www.plugloadsolutions.com/80PlusPowerSuppliesDetail.aspx?id=0&type=2 450W PSU: https://www.plugloadsolutions.com/80PlusPowerSuppliesDetail.aspx?id=0&type=2 350W PSU: https://www.plugloadsolutions.com/80PlusPowerSuppliesDetail.aspx?id=0&type=2
Backup Devices	For a complete listing of compatible DAT tape drives, LTO tape drives and RDX Removable Disk Backup System offerings, please visit http://www.hp.com/go/connect
Chipset	Intel® W680 chipset
Memory	4 DIMM slots, supporting up to 128GB ECC/non-ECC, DDR5 4800 MT/s speed depending on the system configuration

Supported Components

Processors	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
12th Generation Intel® Core™ Processors*				
Intel® Core™ i9-12900K Processor	Y	N		
Intel® Core™ i9-12900 Processor	Y	N		
Intel® Core™ i7-12700K Processor	Y	N		
Intel® Core™ i7-12700 Processor	Y	N		
Intel® Core™ i5-12600K Processor	Y	N		
Intel® Core™ i5-12600 processor	Y	N		
Intel® Core™ i5-12500 processor	Y	N		
Intel® Core™ i5-12400 processor	Y	N		1
Intel® Core™ i3-12300 processor	Y	N		1
Intel® Core™ i3-12100 processor	Y	N		1

Note: ECC memory is supported on the following: Intel® Core™ i9-12900K, Intel® Core™ i9-12900, Intel® Core™ i7-12700K, Intel® Core™ i7-12700, Intel® Core™ i5-12600K, Intel® Core™ i5-12600 and Intel® Core™ i5-12500 processors

NOTE 1: These processors support only non-ECC memory
NOTE 2: No iGfx. A discrete graphics card must be purchased at the same time.

SATA Hard Drives	Factory Configured	Option Kit	Option Kit Part Number
500GB SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	LQ036AA
1TB SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	LQ037AA
2TB SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	QB576AA
1TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	Y	Y	W0R10AA
2TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	Y	Y	2Z274AA
4TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	Y	Y	K4T76AA
8TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	Y	Y	2Z273AA
12TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	Y	Y	5S461AA
500GB SATA 7.2K SED HDD	Y	Y	D8N29AA

NOTE: For internal bay install, HDD option kits require separate purchase of 6Z9U6AA HP Z2 Tower HDD Cable Kit. For external bay install, HDD options kits require separate purchase of 6Z9U6AA HP Z2 Tower HDD Cable Kit & NQ099AA HP Optical Bay HDD Mounting Bracket.

Supported Components

PCIe Solid State Drives				
	HP ZTurbo 512GB PCIe-Gen 4x4 TLC Z2 SSDKit	Y	Y	201G0AA/AT
	HP ZTurbo 512GB PCIe-Gen 4x4 SED Z2 SSDKit	Y	Y	201F9AA
	HP ZTurbo 1TB PCIe-Gen 4x4 TLC Z2 SSDKit	Y	Y	201F5AA/AT
	HP ZTurbo 2TB PCIe-Gen 4x4 TLC Z2 SSDKit	Y	Y	201F8AA
	Z Turbo 1TB 2280 PCIe-Gen4x4 Self Encrypted OPAL2 TLC M.2 Z2 SSD	Y	Y	223A3AA/AT
	Z Turbo 2TB 2280 PCIe-Gen4x4 Self Encrypted OPAL2 TLC M.2 Z2 SSD	Y	Y	223A4AA/AT
	256GB 2280 PCIe-4x4 NVMe Value M.2 Z2 Kit SSD	Y	Y	4M9Z1AA
	512GB 2280 PCIe-4x4 NVMe Value M.2 Z2 Kit SSD	Y	Y	4M9Z2AA
	1TB 2280 PCIe-4x4 NVMe Value M.2 Z2 Kit SSD	Y	Y	4M9Z3AA
	Z Turbo 4TB 2280 PCIe-4x4 TLC M.2 Z2 Kit SSD	Y	Y	5S492AA
	Z Turbo 2TB PCIe-4x4 TLC SSD Module	Y	Y	38T75AA
	Z Turbo 1TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 SSD Module	Y	Y	38T76AA
	Z Turbo 1TB PCIe-4x4 TLC SSD Module	Y	Y	38T77AA
	Z Turbo 2TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 SSD Module	Y	Y	38T79AA
	Z Turbo 512GB PCIe-4x4 TLC SSD Module	Y	Y	38T80AA
	Z Turbo 512GB 2280 PCIe-4x4 SED OPAL2 TLC M.2 SSD Module	Y	Y	38T81AA
	Z Turbo 4TB 2280 PCIe-4x4 TLC M.2 SSD Module	Y	Y	5S496AA
	Z Turbo 4TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 SSD Module	Y	Y	5S497AA
	Z Turbo 4TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 Z2 Kit SSD	Y	Y	5S498AA

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

Graphics		**Factory Configured**	**Option Kit**	**Option Kit Part Number**	**Supported # of cards**
Graphics Cable Adapters	HP DisplayPort To HDMI True 4k Adapter	Y	Y	2JA63AA	
	HP Single miniDP-to-DP Adapter Cable	Y	Y	2MY05AA	
	HP DisplayPort To DVI-D Adapter	Y	Y	FH973AA	
	HP DisplayPort To DVI Adapter (Bulk 90)	Y	Y	FH973A6	
	HP DisplayPort To VGA Adapter	Y	Y	AS615AA/AT	
	HP DisplayPort to VGA Adapter Bulk Qty.90)	Y	Y	AS615A6	
	HP DisplayPort To VGA Adapter	Y	Y	F7W97AA	
	HP USB-C to DisplayPort Adapter	Y	Y	4SH08AA	
	HP USB-C to HDMI Adapter	Y	Y	4SH07AA	
	HP USB-C to VGA Adapter	Y	Y	4SH06AA	
Entry 3D	NVIDIA® T400 2 GB Graphics[1,2]	Y	Y	340K8AA	2
	NVIDIA® T400 4 GB Graphics[2]	Y	Y	5Z7E0AA/AT	2
	NVIDIA® T600 4 GB Graphics[1,2]	Y	Y	340K9AA	2
	AMD Radeon RX 6400 4 GB DH DP+HDMI Graphics	Y	Y	6Q3U4AA/AT	1
Mid-range 3D	NVIDIA® T1000 4 GB Graphics[2]	Y	Y		2
	NVIDIA® T1000 8 GB Graphics[2]	Y	Y	5Z7D8AA/AT	2
	NVIDIA Long-Life T1000E 8 GB 4mDP Graphics	Y	Y	6V9V4AA/AT	2
	NVIDIA RTX™ A2000 12GB Graphics*[2]	Y	Y	5Z7D9AA/AT	2
	NVIDIA Long-Life RTX A2000E 12 GB 4mDP Graphics	Y	Y	6V9V5AA/AT	2

Supported Components

	AMD Radeon™ Pro W6600 Graphics (8GB GDDR6 dedicated) *	Y	Y	340K5AA	1
High-End 3D	AMD Radeon™ Pro W6800 Graphics (32 GB GDDR6 dedicated) *	Y	Y	340K7AA	1
	NVIDIA® RTX™ A5000 24 GB Graphics*	Y	Y	20X23AA/AT	1

Note 1: May go End of Life in late 2022.
Note 2: When dual graphics is supported (expected May 2022), the 450W and 500W base units will require the AMO HP Z2 TWR Dual Front Fan Kit part number 4N007AA.
***** Requires 700W chassis.
****** Requires at least 500W chassis.

Memory

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP 8GB (1x8GB) DDR5-4800 nECC UDIMM	Y	Y	4M9X9AA	
HP 16GB (1x16GB) DDR5-4800 nECC UDIMM	Y	Y	4M9Y0AA	
HP 16GB (1x16GB) DDR5-4800 ECC UDIMM	Y	Y	4M9Y1AA	1
HP 32GB (1x32GB) DDR5-4800 nECC UDIMM	Y	Y	4M9Y2AA	
HP 32GB (1x32GB) DDR5-4800 ECC UDIMM	Y	Y	4M9Y3AA	1

NOTE 1: ECC memory is supported on the following: Intel® Core™ i9-12900K, Intel® Core™ i9-12900, Intel® Core™ i7-12700K, Intel® Core™ i7-12700, Intel® Core™ i5-12600K, Intel® Core™ i5-12600 and Intel® Core™ i5-12500 processors
NOTE 2: Two channels of DDR5 memory are supported. To realize full performance at least one DIMM must be inserted into each channel.
NOTE 3: Though the memory modules can run up to 4800MHz, the current platform will support maximum memory speed of 4400MHz.

The system speed will be determined by a number of key factors:

Module Configuration	Description of configuration	Max Memory Speed (Actual Memory speed is dependent on CPU)
Single DIMM per channel	Configurations that contain only one or two DIMM modules with DIMMs only in the black slots	4400MHz
Two single ranked DIMMs in a channel	Configurations with 3 or 4 single ranked DIMMs (8GB and 16GB) installed in a system	4000MHz
Two dual ranked DIMMs in a channel	Configurations with 3 or 4 dual ranked DIMMs (32GB) installed in a system	3600MHz

Note: When more than one memory slot is populated, symmetric configurations are required for 2 DIMMs per channel. Mix of different part numbers or mix of single and dual ranks within a channel is not allowed.

Supported Components

Optical and Removable Storage		Factory Configured	Option Kit	Option Kit Part Number
	HP DX175 Removable HDD Frame/Carrier	Y	Y	1ZX71AA
	HP DX175 Removable HDD Spare Carrier	Y	Y	1ZX72AA
	HP Z2 TWR SuperMulti DVD-Writer 9.5mm Slim ODD	Y	Y	4L5K0AA
	HP Z2 TWR DVD-ROM 9.5mm Slim ODD	Y	Y	4L5K1AA
	HP CRU QX328 5.25 in Front Removable Frame/Carrier	Y	Y	4N011AA
	HP CRU Secure High Performance Storage Module with 2TB M.2 SSD	Y	Y	56Q87AA
	HP CRU Secure High Performance Storage Module with 1TB M.2 SSD	Y	Y	56Q88AA
	HP CRU Secure High Performance Storage Module with 512GB M.2 SSD	Y	Y	56Q89AA
	HP CRU SHIPS M.2 Spare Carrier	Y	Y	633X9AA

NOTE: With Blu-Ray, certain disc, digital connection, compatibility and/or performance issues may arise, and do not constitute defects in the product. Flawless playback on all systems is not guaranteed. In order for some Blu-ray titles to play, they may require a DVI or HDMI digital connection and your display may require HDCP support. HD-DVD movies cannot be played on this Desktop PC.
NOTE: Duplication of copyrighted material is strictly prohibited. Actual speeds may vary. Double Layer media compatibility will widely vary with some home DVD players and DVD-ROM drives. Note that DVD-RAM cannot read or write to 2.6GB Single Sided/5.2 Double Sided-Version 1.0 Media.
NOTE: 4N011AA HP CRU QX328 5.25in Front Removeable Frame/Carrier requires a separate purchase of HP CRU SHIPS Storage Module(s).
NOTE: HP CRU SHIPS Storage Module Kit contains CRU SHIPS Storage Module and M.2 SSD for install into a factory configured or after market option front removeable storage carrier (HP CRU QX328 Frame/Carrier).
NOTE: HP CRU QX328 Frame/Carrier requires separate purchase of HP CRU Secure High Performance Storage (SHIPS) Module(s).
NOTE: HP CRU Secure High Performance Storage (SHIPS) Module Kit contains CRU SHIPS Module and M.2 SSD for install into a factory configured or after market option front removeable storage carrier (HP CRU QX328 Frame/Carrier).

Networking and Communications		Factory Configured	Option Kit	Option Kit Part Number
	Integrated Intel® I219LM PCIe GbE Controller (Intel® vPro® with Intel® AMT 16.0)	Y	N	
	HP 1GbE LAN Flex Port 2020	Y	Y	141J6AA/AT
	HP Flex 1GbE Fiber LC Single Port	Y	Y	20J15AA
	NVIDIA Mellanox ConnectX-6 DX Dual Port 10/25GbE SFP28 NIC[1]	Y	Y	436M8AA
	Intel Ethernet I350-T4 4-Port 1Gb NIC*	N	Y	W8X25AA
	Intel X550 10GBASE-T Dual Port NIC	Y	Y	1QL46AA
	Intel Ethernet Network Adapter I225-T1	Y	Y	406L9AA
	Intel Wi-Fi 6E AX211 BT 5.2 M.2 non-vPro[1,**]	Y	N	
	Allied Telesis AT-2911T/2-901 Dual Port 1GbE NIC	Y	Y	6E3Y9AA/AT

*Intel I350-T4 4-port GbE NIC is an After Market Option only.
[1] Intel AX211 with Internal antenna support WIFI 6/WIFI 6E
**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.
NOTE: The integrated network connection is required to support Intel® vPro® Technology.
NOTE: If AMT is provisioned, then network teaming with the integrated LAN port is not possible.
NOTE: "Gigabit" Ethernet indicates compliance with IEEE standard 802.3ab for Gigabit Ethernet, and does not

Supported Components

connote actual operating speed of 1 Gb/sec. For high-speed transmission, connection to a Gigabit Ethernet server and network infrastructure is required.

Input Devices	Factory Configured	Option Kit	Option Kit Part Number
HP USB 320K Keyboard	Y	Y	9SR37AA
HP 320M Wired Mouse	Y	Y	9VA80AA
HP Wired Desktop 320MK Mouse and Keyboard	N	Y	9SR36AA
HP 125 Wired Keyboard	Y	Y	266C9AA
HP 975 USB+BT Dual Mode Wireless	N	Y	3Z726AA
HP 655 Wireless USB BLK KBD/MSE Kit	N	Y	N/A
HP 125 Wired Mouse	Y	Y	265A9AA
HP 128 Laser Wired Mouse	Y	Y	265D9AA
HP 935 Creator Wireless Mouse	N	Y	1D0K8AA
HP 455 Programmable Wireless Keyboard	Y	Y	4R177AA
HP 455 Programmable Wireless Keyboard (Bulk Qty.12)	Y	Y	4R177A6
HP 655 Wireless Keyboard and Mouse Combo	Y	Y	4R009AA
HP 655 Wireless Keyboard and Mouse Combo (Blk Qty.10)	Y	Y	4R009A6
HyperX Cloud MIX Wireless GAM HEADSET	N	Y	4P5K9AA
HyperX Cloud Core BLK GAM HEADSET	N	Y	4P4F2AA
HyperX Cloud Flight - Wireless Gaming Headset (Black-Red) (HX-HSCF-BK/AM)	N	Y	4P5L4AA
HyperX Cloud Stinger Core GAM HEADSET PC	N	Y	4P4F4AA
HyperX SoloCast - USB Microphone (Black) (HMIS1X-XX-BK/G)	N	Y	4P5P8AA

Note: Keyboard and Mouse are optional or add on features.

Flex Module (Rear IO)	Factory Configured	Option Kit	Option Kit Part Number
HP 1GbE LAN Flex Port 2020	Y	Y	141J6AA/AT
HP DP Flex Port 2020	Y	Y	141J7AA/AT
HP Dual USB-A 3.2 Gen1 Flex Port 2020	Y	Y	141J8AA/AT
HP HDMI Flex Port	Y	Y	69D47AA/AT
HP USB-C 3.2 Gen2 Alt Flex Port 2020	Y	Y	141K6AA/AT
HP VGA Flex Port 2020	Y	Y	141K7AA/AT
HP Flex 1GbE Fiber LC Single Port	Y	Y	20J15AA

Supported Components

Other Hardware	Factory Configured	Option Kit	Option Kit Part Number
HP Single TBT3 wType C and USB4 PCIe x4 Card	Y	N	N/A
HP Z2 Internal Serial Port and PS/2 Port	Y	Y	141K9AA/AT
HP Z2 Power Cord Kit	Y	Y	1N1D5AA
HP Z2 2nd serial port adapter	Y	Y	141K8AA/AT
HP Z2 Tower Dust Filter	Y	Y	141L2AA/AT
HP Z2 Tower Dust Filter and bezel	Y	Y	141L3AA/AT
HP PCIe x1 Parallel Port Card	Y	Y	N1M40AA
HP Z2 G9 Single Type-C SuperSpeed USB 20Gbps Front Port	Y	Y	4M9X8AA/AT
HP Z2 TWR Dual Front Fan Kit	Y	Y	4N007AA
HP Optical Bay HDD Mounting Bracket	Y	Y	NQ099AA
HP Z2 Tower HDD Cable Kit	N	Y	6Z9U6AA

[1]Available in Q3, 2021

Racking and Physical Security	Factory Configured	Option Kit	Option Kit Part Number
HP Z2 Mini and Z2/Z4/Z6 TWR Depth Adjustable Fixed Rail Rack Kit	Y	Y	2A8Y5AA
HP Keyed Cable Lock	Y	Y	T1A62AA
HP Master Keyed Cable Lock 10mm	Y	Y	T1A63AA
HP Business PC Security Lock V3 Kit	Y	Y	3XJ17AA

Software	Factory Configured	Option Kit	Support Notes
HP Performance Advisor	Y	N	1
HP PC Hardware Diagnostics UEFI (Windows OS only)	Y	N	2
HP PC Hardware Diagnostics Windows		N	3
HP Wolf Security	Y	N	
HP Notifications	Y	N	
HP Desktop Support Utility	Y	N	
HP Documentation	Y	N	
HP Image Assistant	N	N	
HP Support Assistant	N	N	
HP Quick Drop	Y	N	
myHP	Y	N	
HP Easy Clean	Y	N	
HP Smart Health	Y	N	7
Kingsoft WPS Office	Y	N	4
My Office	Y	N	5
Adobe Substance 3D Collection Plan	N	Y	6
WSL2/Ubuntu Data Science Stack	Y	N	7

Notes:

1. Supports, and preinstalled with Windows 10 only. Also available as a free download from http://www.hp.com/go/performanceadvisor
2. Windows OS only

Supported Components

3. Not available in Russia
4. Only available in China
5. Only available in Russia
6. Not available in China
7. Optional Software

Operating Systems

Windows 11 Pro - HP recommends Windows 11 Pro[2]
Windows 11 Home - HP recommends Windows 11 Pro[2]
Windows 10 Pro (available through downgrade rights from Windows 11 Pro) [1,2,3]
Linux®-ready[5]
Ubuntu 20.04 LTS[4]

[1] Device comes with Windows 10 and a free Windows 11 upgrade or may be preloaded with Windows 11. Upgrade timing may vary by device. Features and app availability may vary by region. Certain features require specific hardware (see Windows 11 Specifications).
[2] Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. Windows is automatically updated and enabled. High speed internet and Microsoft account required. ISP fees may apply and additional requirements may apply over time for updates. See http://www.windows.com.
[3]This system is preinstalled with Windows 10 Pro software and also comes with a license for Windows 11 Pro software and provision for recovery software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.
[4] Not all features are available in all editions or versions of Ubuntu. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS to take full advantage of Ubuntu functionality. Ubuntu may be automatically updated. ISP fees may apply and additional requirements may apply over time for updates.
[5]For detailed Linux® OS/hardware support information, see:
http://www.hp.com/support/linux_hardware_matrix

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

Supported Components

HP BIOS

Additional HP BIOS Features:

- Power-On password - Helps prevent an unauthorized user from powering on the system.
- Administrator password - Also known as the BIOS Setup password, this helps prevent unauthorized changes to the system configuration. If the administrator password is not known, the BIOS cannot be updated and changes cannot be made to BIOS settings using BIOS Setup or under the OS.
- S4/S5 Maximum Power Savings setting supports EU Lot6 requirement and allows the computer to power down below 0.5W in S4/S5 (when turned off). When S4/S5 Maximum Power Savings feature is enabled below features are turned off:
  - -Power to expansion connectors / slots
  - -Most Wake events other than power buttons and WOL(Wake on LAN supported by embedded Lan controller under S4/S5 Maximum Power Saving Enabled)
  - -USB charging ports

HP Sure Start Gen7 Start

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

Note: HP Sure Start Gen7 is available on HP Workstation products equipped with Intel® 12th generation processors.

SOFTWARE COMPONENTS AND APPLICATIONS WITH WINDOWS

Software

HP Support Assistant [14]
HP Image Assistant
HP Desktop Support Utility
HP Documentation
HP Notifications
HP PC Hardware Diagnostics UEFI
HP PC Hardware Diagnostics Windows
HP Performance Advisor[1]
myHP
HP QuickDrop[19]
HP Easy Clean[20]
HP Smart Health[21]
WSL/Ubuntu Data Science Stack
HP Privacy Settings
Touchpoint Customizer for Commercial

Manageability Features

HP Driver Packs[2]
HP UWP Pack

Supported Components

HP System Software Manager (SSM)
HP Manageability Integration Kit Gen4[3]
HP Smart Support[5]
HP Client Catalog (download)
HP Image Assistant (download)
HP Cloud Recovery
HP Client Management Script Library (download)
HP BIOSphere Gen6 [13]

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

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

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

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

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

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

[5] HP Smart Support automatically collects the telemetry necessary upon initial boot of the product to deliver device-level configuration data and health insights and is available preinstalled on select products, thru HP Factory Configuration Services; or it can be downloaded. For more information about how to enable HP Smart Support or for download, please visit http://www.hp.com/smart-support.

[6] HP Password Manager requires Internet Explorer or Chrome or FireFox. Some websites and applications may not be supported. User may need to enable or allow the add-on / extension in the internet browser.

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

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

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

[10] HP Sure Recover Gen4 is available on select HP PCs and requires Windows 10 and an open network connection. You must back up important files, data, photos, videos, etc. before using HP Sure Recover to avoid loss of data. Network based recovery using Wi-Fi is only available on PCs with Intel Wi-Fi Module

[11] HP Sure Click requires Windows 10 Pro or higher or Enterprise. See https://bit.ly/2PrLT6A_SureClick for complete details.
[12] HP Sure Sense requires Windows 11 Pro or Enterprise and supports Microsoft Internet Explorer, Google Chrome™, and Chromium™. Supported attachments include Microsoft Office (Word, Excel, PowerPoint) and PDF files in read only mode, when Microsoft Office or Adobe Acrobat are installed.
[13] HP BIOSphere Gen6 features may vary depending on the platform and configurations.
[14] HP Support Assistant requires Windows and Internet access.
[16] Secure Erase - For the methods outlined in the National Institute of Standards and Technology Special Publication 800-88 "Clear" sanitation method. HP Secure Erase does not support platforms with Intel® Optane.
[17] HP Sure Admin requires Windows 11, HP BIOS, HP Manageability Integration Kit from http://www.hp.com/go/clientmanagement and HP Sure Admin Local Access Authenticator smartphone app from the Android or Apple store.
[18] HP Wolf Pro Security Edition is available preloaded on select SKUs and, depending on the HP product purchased, includes a paid 1-

Supported Components

year or 3-year license. The HP Wolf Pro Security Edition software is licensed under the license terms of the HP Wolf Security Software - End-User license Agreement (EULA) that can be found at: https://support.hp.com/us-en/document/ish_3875769-3873014-16 as that EULA is modified by the following: "7. Term. Unless otherwise terminated earlier pursuant to the terms contained in this EULA, the license for the HP Wolf Pro Security Edition (HP Sure Sense Pro and HP Sure Click Pro) is effective upon activation and will continue for either a twelve (12) month or thirty-six (36) month license term ("Initial Term"?). At the end of the Initial Term you may either (a) purchase a renewal license for the HP Wolf Pro Security Edition from HP.com, HP Sales or an HP Channel Partner, or (b) continue using the standard versions of HP Sure Click and HP Sure Sense at no additional cost with no future software updates or HP Support.

[19] HP Quick Drop requires Internet access and Windows 10 or higher PC preinstalled with HP QuickDrop app and either an Android device (phone or tablet) running Android 7 or higher with the Android HP QuickDrop app, and /or an iOS device (phone or tablet) running iOS 12 or higher with the iOS HP QuickDrop app.

[20] HP Easy Clean requires Windows 10 RS3 and higher and will disable the keyboard, touchscreen, and clickpad only. Ports are not disabled. See user guide for cleaning instructions.

[21] HP Smart Health 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.

[22] HP Wolf Security for Business requires Windows 10 or higher, includes various HP security features and is available on HP Pro, Elite, RPOS and Workstation products. See product details for included security features

System Board

System Board Form Factor	Customized PCB 36.056 x 25.130 mm (14.197 x 9.894 inch)
Processor Socket	Single LGA-1700
CPU Bus Speed	DMI Gen4
Chipset	Intel® PCH W680
Super I/O Controller	Nuvoton SIO21
Memory Expansion Slots	4 DDR5 memory slots
Memory Type Supported	DDR5, UDIMM (Unbuffered), ECC& non-ECC
Memory Modes	Non-Interleaved for single channel. Interleaved when both channels are populated.
Memory Speed Supported	3600MT/s to 4400MT/s DDR5, dependent on memory configuration[1]

[1]Though the memory modules can run up to 4800MHz, the current platform will only be able to support the maximum memory speed of 4400MHz.

The system speed will be determined by a number of key factors:

Module Configuration	Description of configuration	Max Memory Speed (Actual Memory speed is dependent on CPU)
Single DIMM per channel	Configurations that contain only one or two DIMM modules with DIMMs only in the black slots	4400MHz
Two single ranked DIMMs in a channel	Configurations with 3 or 4 single ranked DIMMs (8GB and 16GB) installed in a system	4000MHz
Two dual ranked DIMMs in a channel	Configurations with 3 or 4 dual ranked DIMMs (32GB) installed in a system	3600MHz

Memory Protection	ECC available on data
Maximum Memory	128GB
Memory Configuration (Supported)	8GB, 16GB and 32GB non-ECC, 16GB and 32GB ECC unbuffered DIMMs are supported. ECC and non-ECC memory DIMMs cannot be mixed in the same system
PCI Express Connectors	(1) PCI Express Gen5 slot x16 mechanical/ x16 electrical (full height, full length) (1) PCI Express Gen3 slot x4 mechanical/ x1 electrical (full height, full length, open-ended) (1) PCI Express Gen3 slot x16 mechanical/ x4 electrical (full height, full length) (1) PCI Express Gen3 slot x4 mechanical/ x4 electrical (full height, full length, open-ended) (1) M.2 2280 Storage (PCIe Gen4 x4) (1) M.2 2280 Storage (PCIe Gen4 x4) (1) M.2 2280 Storage (PCIe Gen4 x4) (1) M.2 2230 WLAN (PCIe Gen3 x1+ Intel CNVi)

NOTE: The PCIe Gen5 x16 slot has validated and passed PCI-SIG electrical compliance test ONLY. HP does not guarantee and support any PCIe Gen5 cards in the market.

Supported Interfaces	**SATA**	Integrated (4) Serial ATA interfaces (6Gb/s SATA). RAID 0 and 1 supported. Factory integrated RAID for Microsoft Windows only.
	Integrated Graphics	Intel® UHD Graphics 730 (on Core i5-12400/i3-12300/i3-12100) processors); Intel® UHD Graphics 770 (on Core i5/i7/i9 processors); Based on Unified Memory Architecture (UMA) - a region of system memory is reserved and dedicated to the graphics display. Support for Microsoft DirectX 12, OpenGL 4.6 and OpenCL 3.0 on Intel® UHD Graphics 730/770; Based on Unified Memory Architecture (UMA) - a region of system memory is reserved and dedicated to the graphics

		display. 2 DP 1.4 graphics ports integrated in motherboard; Supports up to three simultaneous displays across DisplayPort*/HDMI*/DVI outputs. Max. resolution supported on onboard DP 1.4/HBR2 ports: 4096x2304 @ 60Hz, 24bpp Max. resolution supported on FlexIO DP 1.4/HBR3 port: 5120x3200 @60Hz, 24bpp
	Network Controller	Integrated Ethernet PHY Connection I219LM. Management capabilities: WOL, PXE 2.1 and AMT 16
	Serial	1 internal header (requires optional Serial Port and PS/2 Combo Kit with PCIe bracket)
	2nd Serial	1 internal header(requires optional Serial Port Adapter Kit)
USB Connector(s)	**Front**	2 Type-A SuperSpeed USB 10Gbps signaling rate port (charge supports up to 5V/2.1A); 2 Type-A SuperSpeed USB 10Gbps signaling rate port; 1 Type-C® SuperSpeed USB 20Gbps signaling rate port (optional, charge supports up to 5V/3A)
	Rear	3 High-speed USB 480Mbps signaling rate port; 1 Type-A SuperSpeed USB 5Gbps signaling rate port; 2 Type-A SuperSpeed USB 10Gbps signaling rate port; Flex I/O option: 1 SuperSpeed USB Type-C® 10Gbps signaling rate (Power Delivery 15W, Alt Mode DisplayPort); 1 Dual SuperSpeed USB Type-A 5Gbps signaling rate
	Internal	1 High-speed USB 480Mbps signaling rate header for SD Card Reader
HD Integrated Audio	Realtek ALC3252	
Flash ROM	Yes	
CPU Fan Header	Yes	
Memory Fan Header	None	
Chassis Fan Header	1 Rear System Chassis Fan Header, 1 Graphic chassis Fan Header.	
Front PCI Fan Header	None	
Front Control Panel/Speaker Header	Yes	
CMOS Battery Holder - Lithium	Yes	
Integrated Trusted Platform Module	Integrated TPM 2.0 (Infineon SLB9672) Convertible to FIPS 140-2 Certified mode through firmware v15.21	
Power Supply Headers	Yes	
Power Switch, Power LED & Hard Drive LED Header	Yes	
Clear Password Jumper	None	
Keyboard/Mouse	USB or PS/2 (option)	
Power Supply	700W EPA92, 500W EPA90, 450W EPA90 and 350W EPA92	

[1]Maximum memory capacities assume 64-bit operating systems, such as Genuine Windows® 10 Professional 64 bit, Red Hat Linux 64-bit. 32-bit Windows Operating Systems support up to 4 GB.
[2]M.2 storage supports compatible devices up to 80mm

System Technical Specifications

System Configurations		
Example Configuration #1	**Processor Info**	Core i5-12500,6C 3.0G 65W
	Memory Info	2 x 8G DDR5 4800 UDIMM NECC
	Graphics Info	NVIDIA T400 4GB
	Disks/Optical/Floppy	512GB SSD Z Turbo
	PSU	350W
	Other	NA

Energy Consumption (Watts)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows long Idle (S0)	17.866		17.912		17.804	
	Windows short Idle (S0)	18.926		19.024		18.883	
	Windows Busy Typ (S0)	160.167		155.973		161.10	
	Windows Busy Max (S0)	192.557		187.067		193.063	
	Sleep (S3)	1.367	1.259	1.401	1.367	1.259	1.401
	Off (S5)	0.555	0.552	0.561	0.555	0.552	0.561
	Zero Power Mode (EuP)	0.171		0.173		0.168	

Heat Dissipation (Btu/hr)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	60.959		61.116		60.747	
	Windows short Idle (S0)	64.576		64.91		64.429	
	Windows Busy Typ (S0)	546.489		532.181		549.707	
	Windows Busy Max (S0)	657.003		638.271		658.732	
	Sleep (S3)	4.664	4.296	4.78	4.664	4.296	4.78
	Off (S5)	1.894	1.883	1.914	1.894	1.883	1.914
	Zero Power Mode (EuP)	0.583		0.59		0.573	

Example Configuration #2	**Processor Info**	Core i7-12700,12C 2.1G 65W
	Memory Info	2 x 16G DDR5 4800 UDIMM NECC
	Graphics Info	NVIDIA T1000 8GB
	Disks/Optical/Floppy	512GB SSD Z Turbo
	PSU	450W
	Other	NA

Energy Consumption (Watts)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows long Idle (S0)	20.169		20.335		20.087	
	Windows short Idle (S0)	21.222		21.547		21.195	
	Windows Busy Typ (S0)	119.48		117.953		120.406	
	Windows Busy Max (S0)	157.13		155.03		157.833	
	Sleep (S3)	1.575	1.461	1.582	1.575	1.461	1.582
	Off (S5)	0.944	0.941	0.952	0.944	0.941	0.952
	Zero Power Mode (EuP)	0.204		0.207		0.202	

System Technical Specifications

Heat Dissipation (Btu/hr)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	68.817		69.383		68.537	
	Windows short Idle (S0)	72.409		73.518		72.317	
	Windows Busy Typ (S0)	407.666		402.457		410.824	
	Windows Busy Max (S0)	536.128		528.962		538.527	
	Sleep (S3)	5.374	4.985	5.398	5.374	4.985	5.398
	Off (S5)	3.221	3.211	3.248	3.221	3.211	3.248
	Zero Power Mode (EuP)	0.696		0.706		0.689	

Example Configuration #3	**Processor Info**	Core i9-12900,16C 2.4G 65W
	Memory Info	2 x 16G DDR5 4800 UDIMM ECC
	Graphics Info	NVIDIA RTX A2000
	Disks/Optical/Floppy	512GB SSD Z Turbo
	PSU	450W
	Other	NA

Energy Consumption (Watts)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows long Idle (S0)	22.555		23.324		22.484	
	Windows short Idle (S0)	23.414		24.656		23.397	
	Windows Busy Typ (S0)	159.883		156.853		161.463	
	Windows Busy Max (S0)	189.99		185.89		190.127	
	Sleep (S3)	1.585	1.492	1.694	1.585	1.492	1.694
	Off (S5)	0.952	0.95	1.083	0.952	0.95	1.083
	Zero Power Mode (EuP)	0.21		0.217		0.198	

Heat Dissipation (Btu/hr)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	76.958		79.581		76.715	
	Windows short Idle (S0)	79.889		84.126		79.831	
	Windows Busy Typ (S0)	545.522		535.184		550.913	
	Windows Busy Max (S0)	648.246		634.257		648.712	
	Sleep (S3)	5.408	5.091	5.78	5.408	5.091	5.78
	Off (S5)	3.248	3.241	3.695	3.248	3.241	3.695
	Zero Power Mode (EuP)	0.717		0.74		0.676	

Example Configuration #4	**Processor Info**	Core i7-12700K,12C 3.6G 125W
	Memory Info	4 x 16G DDR5 4800 UDIMM NECC
	Graphics Info	NVIDIA RTX A4000
	Disks/Optical/Floppy	1T SSD Z Turbo
	PSU	700W
	Other	NA

System Technical Specifications

Energy Consumption (Watts)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows long Idle (S0)	22.551		22.964		22.486	
	Windows short Idle (S0)	23.911		24.168		23.749	
	Windows Busy Typ (S0)	272.74		267.963		274.65	
	Windows Busy Max (S0)	322.833		316.03		323.367	
	Sleep (S3)	1.994	1.892	1.997	1.994	1.892	1.997
	Off (S5)	0.653	0.641	0.666	0.653	0.641	0.666
	Zero Power Mode (EuP)	0.215		0.217		0.212	

Heat Dissipation (Btu/hr)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	76.944		78.353		76.722	
	Windows short Idle (S0)	81.584		82.461		81.032	
	Windows Busy Typ (S0)	930.589		914.291		937.106	
	Windows Busy Max (S0)	1101.507		1078.294		1103.327	
	Sleep (S3)	6.804	6.456	6.814	6.804	6.456	6.814
	Off (S5)	2.228	2.187	2.272	2.228	2.187	2.272
	Zero Power Mode (EuP)	0.734		0.74		0.723	

Example Configuration #5	**Processor Info**	Core i9-12900K,16C 3.2G 125W
	Memory Info	4 x 32G DDR5 4800 UDIMM ECC
	Graphics Info	NVIDIA RTX A5000
	Disks/Optical/Floppy	1T SSD Z Turbo
	PSU	700W
	Other	NA

Energy Consumption (Watts)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows long Idle (S0)	24.038		24.681		23.994	
	Windows short Idle (S0)	25.764		25.958		25.621	
	Windows Busy Typ (S0)	465.05		459.71		468.377	
	Windows Busy Max (S0)	467.623		438.733		474.68	
	Sleep (S3)	2.261	2.148	2.273	2.261	2.148	2.273
	Off (S5)	0.772	0.659	0.777	0.772	0.659	0.777
	Zero Power Mode (EuP)	0.318		0.319		0.315	

Heat Dissipation (Btu/hr)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	82.018		84.212		81.868	
	Windows short Idle (S0)	87.907		88.569		87.419	
	Windows Busy Typ (S0)	1586.75		1568.531		1598.101	
	Windows Busy Max (S0)	1595.531		1496.958		1619.608	
	Sleep (S3)	7.715	7.329	7.755	7.715	7.329	7.755
	Off (S5)	2.634	2.249	2.651	2.634	2.249	2.651
	Zero Power Mode (EuP)	1.085		1.088		1.075	

NOTE: The Power Supply Efficiency report may be found at the following links:

https://www.plugloadsolutions.com/80PlusPowerSuppliesDetail.aspx?id=0&type=2

System Technical Specifications

Operating Voltage Range	90-269 VAC
Rated Voltage Range	100-240 VAC
Rated Line Frequency	50-60 Hz
Operating Line Frequency Range	47-63 Hz
Rated Input Current	8.2A @ 100-240V
Heat Dissipation	Typical: 1598.101 btu/hr (402.984 kcal/hr) Maximum: 1619.608 btu/hr (408.407 kcal/hr)
ENERGY STAR® certified (Config Dependent)	Yes
CECP Compliant @ 220V	Yes
FEMP Standby Power Compliant	Yes, with Wake-on-LAN disabled: <1W in S4/S5 - Power Off
Built-in Self Test (BIST) **LED**	Yes
Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)	Yes
Hood Lock Header	Yes
ErP Lot 6- Tier 1 Compliance @ 230V (<1W in S5 - Power Off)	Yes
ErP Lot 6- Tier 2 Compliance @ 230V (<0.5W in S5 - Power Off)	Yes

Declared Noise Emissions (Entry-level, Mid-level, and High-end configurations; tested on floor)		
System Configuration (Entry level)	**Processor Info**	Intel® CPU Core i5-12400 6C LGA 2.50G 18 MB 65W (Intel - Alder Lake-S)
	Memory Info	32GB 4800 SK hynix memory
	Graphics Info	Intel® UHD
	Disks/Optical	1*2TB Samsung M.2 SSD
	Power Supply	Chicony 700W EPA92

Declared Noise Emissions		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	3.36	14.9
	Hard drive Operating (Drive Random Seek)	3.78	20.3
	Hard drive Operating (Active mode)	3.45	17.7

System Configuration (Mid-level)	**Processor Info**	Intel® CPU Core i9-12900 16C LGA 2.40G 30 MB 65W ECC (Intel - Alder Lake-S)
	Memory Info	4* 32GB 4800 SK hynix memory
	Graphics Info	NVIDIA® RTX A5000
	Disks/Optical	3*2TB Samsung M.2 SSD; 2*WD 2TB 7200RPM SATA HDD
	Power Supply	Chicony 700W EPA92

System Technical Specifications

Declared Noise Emissions		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	3.59	18.5
	Hard drive Operating (Drive Random Seek)	3.82	20.1
	Hard drive Operating (Active mode)	3.97	23.6

System Configuration (High-end)	**Processor Info**	Intel® Core i9-12900K 16C 3.20G LGA 30 MB 125W ECC (Intel - Alder Lake-S)
	Memory Info	4* 32GB 4800 SK hynix memory
	Graphics Info	NVIDIA® RTX A5000
	Disks/Optical	3*2TB Samsung M.2 SSD; 2*WD 2TB 7200RPM SATA HDD
	Power Supply	Chicony 700W EPA92

Declared Noise Emissions		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	3.58	18.2
	Hard drive Operating (Drive Random Seek)	3.78	20
	Hard drive Operating (Active mode)	4.05	20.9

Environmental Requirements	**Temperature**	Operating: 5° to 35° C (40° to 95° F) Non-operating: -40° to 60° C (-40° to 140° F) Maximum rate of change: 10°C/hr
	Humidity	Operating: 10% to 85% RH, non-condensing, 35° C maximum wet bulb Non-operating: 10% to 90% RH, non-condensing, 35° C maximum wet bulb
	Maximum Altitude	Operating (with Rotational Hard Drives): 3,048 m (10,000 feet) Operating (with only Solid-State Drives): 5,000 m (16,404 feet) Non-operating: 12,192 m (40,000 feet) Maximum operating temperature is reduced as altitude increases. See Cooling for details.
	Dynamic	Shock Operating: ?-sine: 40g, 2-3ms (~62 cm/sec) Non-operating: ?-sine: 160 cm/s, 2-3ms (~105g) square: 422 cm/s, 20g Vibration Operating random: 0.5g (rms), 5-300 Hz, up to 0.0025g?/Hz Non-operating random: 2.0g (rms), 5-500 Hz, up to 0.0150 g?/Hz
	Cooling	Above 1524 m (5,000 feet) altitude, the maximum operating temperature is reduced by 1° C (1.8° F) for every 305 m (1,000 feet) increase in elevation, up to 3048 m (10,000 feet)
	NOTE:	System enduring or operating beyond the environmental requirement range is not recommended and may compromise system reliability permanently.

System Technical Specifications

Physical Security and Serviceability

Access Panel	Tool-less Includes support information
Optical Drive	Tool-less, except for Screw-In carrier
Hard Drives	Tool-less, except for 2.5" bay
Expansion Cards	Tool-less
Processor Socket	Tool-less, except for the processor heatsink
Blue User Touch Points	Yes, on tool-less internal chassis mechanisms
Color-coordinated Cables and Connectors	Yes
Memory	Tool-less
System Board	Screw-In
Padlock Support	Yes (optional): Locks side cover and secures chassis from theft 0.22-in diameter padlock loop at rear of system
Cable Lock Support	Yes, Kensington Cable Lock (optional): Locks side cover and secures chassis from theft 3 mm x 7 mm slot at rear of system
Universal Chassis Clamp Lock Support	Yes (optional): Locks side cover and locks cables to chassis. Secures chassis from theft and allows multiple units to be chained together when used with optional cable Threaded feature at rear of system
Solenoid Lock and Hood Sensor	Yes (optional) The Solenoid Hood Lock eliminates the need for a physical key by making the chassis lockable through software and a password. You can also lock and unlock the chassis remotely over the network. The Sensor Kit detects when the access panel has been removed.
Rear Port Control Cover	No
CPUs and Heatsinks	A T-15 Torx or flat blade screwdriver is needed to remove the CPU heatsink before the CPU can be removed. CPU removal is tool-less
Internal Speaker	Yes
Power Supply Fans	70mm x 70mm x 25mm 4-wire PWM (non-serviceable)
Access Panel Key Lock	No
Integrated Chassis Handles	Rear Recessed Handle
Power Supply	Requires T15 Torx or flat blade screwdriver
PCI Card Retention	Yes, rear (all), middle (optional), front (full-length cards with extender)

Service, Support, and Warranty

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

NOTE 1: Terms and conditions may vary by country. Certain restrictions and exclusions apply.
NOTE 2: On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.
NOTE 3: Technical telephone support applies only to HP-configured, HP and HP-qualified, third-party hardware and software. Toll-free calling and 24x7 support service may not be available in some countries.
HP Care Pack Services extend service contracts beyond the standard warranties. Service starts from date of hardware purchase. To choose the right level of service for your HP product, use the HP Care Pack Services Lookup Tool at: http://www.hp.com/go/lookuptool. Service levels and response times for HP Care Packs may vary depending on your geographic location.

BIOS

BIOS 64-bit Services	BIOS supports 64-bit Operating systems only.
PCI 3.0 Support	Full BIOS support for PCI Express through industry standard interfaces.
ATAPI	ATAPI Removable Media Device BIOS Specification Version 1.0.
BBS	BIOS Boot Specification v1.01.(Not support)
WMI Support	WMI is Microsoft's implementation of Web-Based Enterprise Management (WBEM) for Windows. WMI is fully compliant with the Distributed Management Task Force (DMTF) Common Information Model (CIM) and WBEM specifications.
BIOS Boot Spec 1.01+	Provides more control over how and from what devices the workstation will boot.(Not Support)
BIOS Power On	Users can define a specific date and time for the system to power on.
ROM Based Computer Setup Utility (F10)	Review and customize system configuration settings controlled by the BIOS.
System/Emergency ROM Flash Recovery with Video	Recovers system BIOS in corrupted Flash ROM.
Replicated Setup	Saves BIOS settings to USB flash device in human readable file (HpSetup.txt). BiosConfigurationUtility.exe utility can then replicate these settings on machines being deployed without entering Computer Configuration Utility (F10 Setup).
SMBIOS	System Management BIOS 3.4, for system management information.
Boot Control	Disables the ability to boot from removable media on supported devices.
Memory Change Alert	Alerts management console if memory is removed or changed.
Thermal Alert	Monitors the temperature state within the chassis. Three modes: • NORMAL - normal temperature ranges. • ALERTED - excessive temperatures are detected. Raises a flag so action can be taken to avoid shutdown or provide for a smoother system shutdown. • SHUTDOWN - excessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs.
Remote ROM Flash	Provides secure, fail-safe ROM image management from a central network console.
ACPI (Advanced Configuration and Power Management Interface)	Allows the system to enter and resume from low power modes (sleep states). Enables an operating system to control system power consumption based on the dynamic workload. Makes it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system. Supports ACPI 6.0 for full compatibility with 64-bit operating systems.
Ownership Tag	A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen.
Remote Wakeup/Remote Shutdown	System administrators can power on, restart, and power off a client computer from a remote location.
Instantly Available PC (Suspend to RAM - ACPI sleep state S3)	Allows for very low power consumption with quick resume time.
Remote System Installation via F12 (PXE 2.1) (Remote Boot from Server)	Allows a new or existing system to boot over the network and download software, including the operating system.
ROM revision levels	Reports the system BIOS revision level in Computer Configuration Utility (F10 Setup). Version is available through an industry standard interface (SMBIOS and WMI) so that management SW applications can use and report this information.
System board revision level	Allows management SW to read revision level of the system board. Revision level is digitally encoded into the HW and cannot be modified.
Start-up Diagnostics (Power-on Self-Test)	Assesses system health at boot time with selectable levels of testing.

System Technical Specifications

Auto Setup when new hardware installed	System automatically detects addition of new hardware.
Keyboard-less Operation	The system can be booted without a keyboard.
Localized ROM Setup	Common BIOS image supports System Configuration Utility (F10 Setup) menus in 15 languages with local keyboard mappings.
Asset Tag	The user or MIS to set a unique tag string in non-volatile memory.
Per-slot Control	Allows I/O slot parameters (option ROM enable/disable, bus latency) to be configured individually.
Adaptive Cooling	Control parameters are set according to detected hardware configuration for optimal acoustics.
Pre-boot Diagnostics	(Pre-video) critical errors are reported via beeps and blinks on the power LED.
UEFI Specification Revision	2.7
ACPI	Advanced Configuration and Power Management Interface, Version 6.0
ATA (IDE)	AT Attachment 6 with Packet Interface (ATA/ATAPI-6), Revision 3b
CD Boot	"El Torito" Bootable CD-ROM Format Specification Version 1.0
EDD	Enhanced Disk Drive Specification Version 1.1 BIOS Enhanced Disk Drive Specification Version 3.0(Not support)
EHCI	Enhanced Host Controller Interface for Universal Serial Bus, Revision 1.0
PCI	PCI Local Bus Specification, Revision 2.3 PCI Power Management Specification, Revision 1.1 PCI Firmware Specification, Revision 3.0, Draft .7
PCI Express	PCI Express Base Specification, Revision 2.0 PCI Express Base Specification, Revision 3.0 PCI Express Base Specification, Revision 4.0 PCI Express Base Specification, Revision 5.0 Ready
PMM	POST Memory Manager Specification, Version 1.01
SATA	Serial ATA Specification, Revision 1.0a Serial ATA 3 Gb/s: Serial ATA Specification, Revision 2.5 Serial ATA 6 Gb/s: Serial ATA Specification, Revision 3.0
SPD	JEDEC JESD300-5
TPM	Trusted Computing Group TPM Specification Version 2.0 (Infineon SLB 9670). Common Criteria EAL4+ certified. FIPS 140-2 Certification TCG TPM Certified products list: http://www.trustedcomputinggroup.org/certification/tpm-certified-products/
UHCI	Universal Host Controller Interface Design Guide, Revision 1.1
USB	Universal Serial Bus Revision 1.1 Specification Universal Serial Bus Revision 2.0 Specification Universal Serial Bus Revision 3.1 Specification Universal Serial Bus Revision 3.2 Specification
SMBIOS	System Management BIOS Reference Specification, Version 3.4 External BIOS simulator found at: http://csrsml.itcs.hp.com/

Social and Environmental Responsibility

Eco-Label Certifications & Declarations

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

- IT ECO declaration
- US ENERGY STAR®
- US Federal Energy Management Program (FEMP)
- EPEAT[?] Gold registered in the United States. See http://www.epeat.net for registration status in your country.

System Technical Specifications

- 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

- Ocean-bound plastic in System FAN, CPU FAN and Speaker
- 50% post-consumer recycled plastic
- Low halogen
- Outside Box and corrugated cushions are 100% sustainably sourced and recyclable
- Molded Paper Pulp Cushion inside box is 100% sustainably sourced and recyclable
- Bulk packaging available

System Configuration The configuration used for the Energy Consumption and Declared Noise Emissions data for the Notebook model is based on a "Typically Configured Notebook"?.

Energy Consumption (in accordance with US ENERGY STAR® test method)	**115VAC, 60Hz**	**230VAC, 50Hz**	**100VAC, 50Hz**
Normal Operation (Sort idle)	34.16 W	34.01 W	34.39 W
Normal Operation (Long idle)	32.77 W	32.74 W	33.15 W
Sleep	2.57 W	2.54 W	2.57 W
Off	0.67 W	0.68 W	0.67 W

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

Heat Dissipation*	**115VAC, 60Hz**	**230VAC, 50Hz**	**100VAC, 50Hz**
Normal Operation (Short idle)	116.8 BTU/hr	116.3 BTU/hr	117.6 BTU/hr
Normal Operation (Long idle)	112.1 BTU/hr	112 BTU/hr	113.4 BTU/hr
Sleep	8.8 BTU/hr	8.7 BTU/hr	8.8 BTU/hr
Off	2.3 BTU/hr	2.3 BTU/hr	2.3 BTU/hr

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

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)	Sound Power (L_{WAd}, bels)	Sound Pressure (L_{pAm}, decibels)
Typically Configured - Idle	3.36	14.9
Fixed Disk - Random writes	3.78	20.3
Optical Drive - Sequential reads	5.00	33.4

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

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

Batteries

This battery in this product complies with EU Directive 2006/66/EC

Battery size: CR2032 (coin cell)

Battery type: Lithium Metal

The battery in this product does not contain:

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

Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC.
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive - 2002/96/EC.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This product is in compliance with the IEEE 1680 (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 94.8% recycle-able when properly disposed of at end of life.

Packaging Materials

External:	PAPER/Corrugated	1214 g
	PAPER/Molded Pulp	890 g
Internal:	PLASTIC/Polyethylene low density - LDPE	40 g

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

The corrugated paper packaging materials contains at least 62.5% recycled content.

RoHS Compliance

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

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

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

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

Material Usage

This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at 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:

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

End-of-life Management and Recycling

HP offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/go/reuse-recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the 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.

HP, Inc. Corporate Environmental Information

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

Global Citizenship Report

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

Eco-label certifications

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

ISO 14001 certificates:
http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842
and
http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf

footnotes

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

Technical Specifications - Processors

Name	Cores	Clock Speed (GHz)	Threads	Cache (MB)	Memory Speed (MT/s)	Hyper-Threading	Integrated Graphics	Intel® Turbo Boost Technology[3]	Featuring Intel® vPro® Technology[4]	16GB Intel® Optane™ memory[2]	TDP (W)
Intel® Core™ i9-12900K Processor	16	3.2	24	30	4800	Y	Intel® UHD Graphics 770	5.2	Y	N	125
Intel® Core™ i9-12900 Processor	16	2.1	24	30	4800	Y	Intel® UHD Graphics 770	5.1	Y	N	65
Intel® Core™ i7-12700K Processor	12	3.6	20	25	4800	Y	Intel® UHD Graphics 770	5.0	Y	N	125
Intel® Core™ i7-12700 Processor	12	2.1	20	25	4800	Y	Intel® UHD Graphics 770	4.9	Y	N	65
Intel® Core™ i5-12600K Processor	10	3.7	16	20	4800	Y	Intel® UHD Graphics 770	4.9	Y	N	125
Intel® Core™ i5-12600 processor	6	3.3	12	18	4800	Y	Intel® UHD Graphics 770	4.8	Y	N	65
Intel® Core™ i5-12500 processor	6	3.0	12	18	4800	Y	Intel® UHD Graphics 770	4.6	Y	N	65
Intel® Core™ i5-12400 processor	6	2.5	12	18	4800	Y	Intel® UHD Graphics 730	4.4	N/A	N	65
Intel® Core™ i3-12300 processor	4	3.5	8	12	4800	Y	Intel® UHD Graphics 730	4.4	N/A	N	60
Intel® Core™ i3-12100 processor	4	3.3	8	12	4800	Y	Intel® UHD Graphics 730	4.3	N/A	N	60

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

[2] Intel® Optane™ memory system acceleration does not replace or increase the DRAM in your system.

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

[4] 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

Note: ECC memory is supported on the following: Intel® Core™ i9-12900K, Intel® Core™ i9-12900, Intel® Core™ i7-12700K, Intel® Core™ i7-12700, Intel® Core™ i5-12600K, Intel® Core™ i5-12600 and Intel® Core™ i5-12500 processors

Technical Specifications - Hard Drives

SATA Hard Drives for HP Workstations

500GB SATA 7200 rpm 6Gb/s 3.5" HDD

Capacity	500GB	
Protocol	SATA	
Form Factor	3.5"	
Controller	AHCI	
Height	1 in; 2.54 cm	
Width	**Media Diameter**	3.5 in; 8.9 cm
	Physical Size	4 in; 10.17 cm
Interface	Serial ATA (6.0Gb/s), NCQ enabled	
Synchronous Transfer Rate (Maximum)	Up to 600MB/s *	
Buffer	32MB	
Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2 ms *
	Average	11 ms *
	Full Stroke	21 ms *
Rotational Speed	7,200 rpm	
Logical Blocks	976,773,168	
Operating Temperature	41° to 131° F (5° to 55° C)	

*Actual performance may vary.

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

1TB SATA 7200 rpm 6Gb/s 3.5" HDD

Capacity	1TB	
Protocol	SATA	
Form Factor	3.5"	
Controller	AHCI	
Height	1 in; 2.54 cm	
Width	**Media Diameter**	3.5 in; 8.9 cm
	Physical Size	4 in; 10.17 cm
Interface	Serial ATA (6.0Gb/s), NCQ enabled	
Synchronous Transfer Rate (Maximum)	Up to 600 MB/s *	
Buffer	64MB	
Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2 ms *
	Average	11 ms *
	Full Stroke	21 ms *
Rotational Speed	7,200 rpm	
Logical Blocks	1,953,525,168	
Operating Temperature	41° to 131° F (5° to 55° C)	

*Actual performance may vary.

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

Technical Specifications - Hard Drives

2TB SATA 7200 rpm 6Gb/s 3.5" HDD	**Capacity**	2TB	
	Protocol	SATA	
	Form Factor	3.5"	
	Controller	AHCI	
	Annualized Failure Rate (based on Rated POH)	<0.62%	
	Height	1 in; 2.54 cm	
	Width	**Media Diameter**	3.5 in; 8.9 cm
		Physical Size	4 in; 10.17 cm
	Interface	Serial ATA (6.0 Gb/s), NCQ Enabled	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s *	
	Buffer	64MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2.0 ms *
		Average	11 ms *
		Full Stroke	21 ms *
	Rotational Speed	7,200 rpm	
	Logical Blocks	3,907,029,168	
	Operating Temperature	41° to 131° F (5° to 55° C)	

*Actual performance may vary.

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

1TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	**Capacity**	1TB	
	Height	1 in; 2.54 cm	
	Protocol	SATA	
	Form Factor	3.5"	
	Controller	AHCI	
	Reliability	2.0M hours	
	Rated Power On Hours	8760/yr	
	Annualized Failure Rate (based on Rated POH)	<0.62%	
	Width	**Media Diameter**	3.5 in; 8.9 cm
		Physical Size	4 in; 10.17 cm
	Interface	Serial ATA (6.0 Gb/s), NCQ Enabled	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s *	
	Buffer	128MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.32ms*
		Average	7.45ms*
		Full Stroke	14.2ms*
	Rotational Speed	7,200 rpm	
	Operating Temperature	41° to 140° F (5° to 60° C)	
	Performance	**Sequential Read**	up to 226MB/s*
		Sequential Write	up to 226MB/s*
	Enterprise Class Features	High Reliability	

*Actual performance may vary.

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

2TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	**Capacity**	2TB	
	Protocol	SATA	
	Form Factor	3.5"	
	Controller	AHCI	
	Reliability (MTBF)	2.0M hours	
	Rated Power On Hours	8760/yr	
	Annualized Failure Rate (based on Rated POH)	<0.62%	
	Rated for 24/7/365 Operation		
	Physical Size (Height)	1 in; 2.54 cm	
	Physical Size (Width)	4 in; 10.17 cm	
	Media Diameter	3.5 in; 8.9 cm	
	Interface	Serial ATA (6Gb/s), NCQ enabled	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s*	
	Buffer	128MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.7ms*
		Average	8.5ms*
		Full Stroke	15.7ms*
	Rotational Speed	7,200 rpm	
	Operating Temperature	41° to 131° F (5° to 55° C)	
	Performance	**Sequential Read**	up to 226MB/s*
		Sequential Write	up to 226MB/s*
	Enterprise Class Features	High Reliability	

*Actual performance may vary.

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

4TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	**Capacity**	4TB
	Protocol	SATA
	Form Factor	3.5"
	Controller	AHCI
	Reliability	2.0M hours
	Rated Power On Hours	8760/yr
	Annualized Failure Rate (based on Rated POH)	<0.62%
	Rated for 24/7/365 Operation	
	Physical Size (Height)	1 in; 2.54 cm
	Physical Size (Width)	4 in; 10.17 cm
	Media Diameter	3.5 in; 8.9 cm
	Physical Size	4 in; 10.17 cm
	Interface	Serial ATA (6Gb/s), NCQ enabled
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s*
	Buffer	256MB

Technical Specifications - Hard Drives

	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.7ms*
		Average	8.5ms*
		Full Stroke	15.7ms*
	Rotational Speed	7,200 rpm	
	Operating Temperature	41° to 131° F (5° to 55° C)	
	Performance	**Sequential Read**	up to 226MB/s*
		Sequential Write	up to 226MB/s*
	Enterprise Class Features	High Reliability	

*Actual performance may vary.

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

8TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	**Capacity**	8TB	
	Protocol	SATA	
	Form Factor	3.5"	
	Controller	AHCI	
	Reliability	2.0M hours	
	Width	**Media Diameter**	3.5 in; 8.9 cm
		Physical Size	4 in; 10.17 cm
	Interface	Serial ATA (6.0Gb/s), NCQ enabled	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s [1]	
	Buffer	256MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.7ms*
		Average	8.5ms*
		Full Stroke	15.7ms*
	Rotational Speed	7,200 rpm	
	Operating Temperature	41° to 140° F (5° to 60° C)	
	Performance	**Sequential Read**	up to 226MB/s[1]
		Sequential Write	up to 226MB/s[1]
	Enterprise Class Features	High Reliability	

*Actual performance may vary.

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

Technical Specifications - Hard Drives

500GB SATA 7.2K SED 2.5" HDD	**Capacity**	500GB	
	Protocol	SATA	
	Form Factor	2.5"	
	Height	0.275 in; 0.7 cm	
	Width	Media Diameter	2.5 in; 6.36 cm
		Physical Size	2.75 in; 6.99 cm
	Interface	Serial ATA (6.0Gb/s), NCQ enabled	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s*	
	Buffer	64MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	1ms*
		Average	4.2ms*
		Full Stroke	25ms (Typical)*
	Rotational Speed	7,200 rpm	
	Operating Temperature	32° to 131° F (0° to 60° C)	
	Self-Encrypting Drive Support	Yes	

*Actual performance may vary.

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

HP Z Turbo Drv PCIE-4X4 512GB TLC PCIe SSD (Z2G9)	**Capacity**	512GB	
	Protocol	PCIe	
	Form Factor	M.2 in native Slot on motherboard	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	150TBW (TB Written)	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 178° F (0° to 81° C)	
	Performance	**Sequential Read**	6400MB/s*
		Sequential Write	3400MB/s*
		Random Read	600K IOPS*
		Random Write	600K IOPS*

*Actual performance may vary.

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

Technical Specifications - Hard Drives

HP Z Turbo Drv PCIE-4X4 1TB TLC PCIe SSD (Z2G9)	**Capacity**	1TB	
	Protocol	PCIe	
	Form Factor	M.2 in native Slot on motherboard	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	300TBW (TB Written)	
	Reliability	1.5M Hours	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 178° F (0° to 81° C)	
	Performance	**Sequential Read**	6500MB/s*
		Sequential Write	5000MB/s*
		Random Read	800K IOPS*
		Random Write	800K IOPS*

*Actual performance may vary.

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

HP Z Turbo Drv PCIE-4X4 2TB TLC PCIe SSD (Z2G9)	**Capacity**	2TB	
	Protocol	PCIe	
	Form Factor	M.2 in native Slot on motherboard	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	600TBW (TB Written)	
	Reliability	1.5M Hours	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 178° F (0° to 81° C)	
	Performance	**Sequential Read**	6500MB/s*
		Sequential Write	5000MB/s*
		Random Read	800K IOPS*
		Random Write	800K IOPS*

*Actual performance may vary.

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

Technical Specifications - Hard Drives

HP Z Turbo Drv PCIE-4X4 4TB TLC PCIe SSD	**Capacity**	4TB	
	Protocol	PCIe	
	Form Factor	M.2 in native Slot on motherboard	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	1200TBW (TB Written)	
	Reliability (MTBF)	1.5M Hours	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 178° F (0° to 81° C)	
	Performance	**Sequential Read**	6500MB/s*
		Sequential Write	5000MB/s*
		Random Read	700K IOPS*
		Random Write	700K IOPS*

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

HP Z Turbo Drv PCIE Gen4x4 4TB TLC PCIe SED OPAL2	**Capacity**	4TB	
	Protocol	PCIe	
	Form Factor	M.2 in native Slot on motherboard	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	1200TBW (TB Written)	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 178° F (0° to 81° C)	
	Performance	**Sequential Read**	6500MB/s*
		Sequential Write	5000MB/s*
		Random Read	700K IOPS*
		Random Write	700K IOPS*
	Self-Encrypting Drive Support	OPAL2	

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

Technical Specifications - Hard Drives

HP Z Turbo Drv 512GB TLC PCIe SED OPAL2 (Z2G9)	**Capacity**	512GB	
	Protocol	PCIe	
	Form Factor	M.2 in native Slot on motherboard	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	150TBW (TB Written)	
	Reliability	1.5M Hours	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 178° F (0° to 81° C)	
	Performance	**Sequential Read**	6400MB/s*
		Sequential Write	3400MB/s*
		Random Read	600K IOPS*
		Random Write	600K IOPS*
	Self-Encrypting Drive Support	OPAL2	

*Actual performance may vary.

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

HP Z Turbo Drv 1TB TLC PCIe SED OPAL2 (Z2G9)	**Capacity**	1TB	
	Protocol	PCIe	
	Form Factor	M.2 in native Slot on motherboard	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	300TBW (TB Written)	
	Reliability	1.5M Hours	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 178° F (0° to 81° C)	
	Performance	**Sequential Read**	6500MB/s*
		Sequential Write	5000MB/s*
		Random Read	800K IOPS*
		Random Write	800K IOPS*
	Self-Encrypting Drive Support	OPAL2	

*Actual performance may vary.

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

Technical Specifications - Hard Drives

HP Z Turbo Drv 2TB TLC PCIe SED OPAL2 (Z2G9)	**Capacity**	2TB	
	Protocol	PCIe	
	Form Factor	M.2 in native Slot on motherboard	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	600TBW (TB Written)	
	Reliability	1.5M Hours	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 178° F (0° to 81° C)	
	Performance	**Sequential Read**	6500MB/s*
		Sequential Write	5000MB/s*
		Random Read	800K IOPS*
		Random Write	800K IOPS*
	Self-Encrypting Drive Support	OPAL2	

*Actual performance may vary.

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

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

*Actual performance may vary.

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

Technical Specifications - Hard Drives

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

*Actual performance may vary.

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

1TB 2280 PCIe-4x4 Value M.2 SSD	**Capacity**	1TB	
	Protocol	PCIe	
	Form Factor	M.2 in native Slot on motherboard	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	400TBW (TB Written)	
	Reliability	1.5M Hours	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	3400MB/s*
		Sequential Write	2500MB/s*
		Random Read	500K IOPS*
		Random Write	440K IOPS*

*Actual performance may vary.

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

Technical Specifications - Graphics

AMD Radeon™ Pro W6600 8GB Graphics	**Form Factor**	Single slot, full-height, 9.5" length
	Graphics Controller	Navi23 architecture Power: 122 Watts Cooling Solution: Active Fan Heatsink
	Bus Type	PCI Express 4.0 x8
	Memory	8GB GDDR6 Memory Memory Bandwidth: 224 GB/s Memory Interface: 128 bit
	Connectors	4x DisplayPort™ 1.4 with DSC - HDR Ready - Supports Multi-Stream Transport (MST)
	Max simultaneous displays	@ 60Hz with HDR Enabled 4x @ 3840x2160px (4K) 4x @ 5120x2880px (5K) 1x @ 7680x4320px (8K)
	Shading Architecture	DirectX 12 Shader Model 6.5
	Supported Graphics APIs	DirectX®12 Ultimate OpenGL® 4.6 OpenCL™ 2.1 Vulkan™ 1.2
	Available Graphics Drivers	Windows 10 64-bit Windows 11 64-bit Linux® 64-bit (selected Enterprise distributions) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html

AMD Radeon™ Pro W6800 32GB Graphics	**Form Factor**	Double slot, full-height, 10.5"? length
	Graphics Controller	Navi21 architecture Power: 261 Watts Cooling Solution: Active Fan Heatsink
	Bus Type	PCI Express 4.0 x16
	Memory	8GB GDDR6 Memory Memory Bandwidth: 512 GB/s Memory Interface: 256 bit
	Connectors	6x Mini-DisplayPort™ 1.4 with DSC - HDR Ready - Supports Multi-Stream Transport (MST)
	Max simultaneous displays	@ 60Hz with HDR Enabled 6x @ 3840x2160px (4K) 6x @ 5120x2880px (5K) 2x @ 7680x4320px (8K)
	Shading Architecture	DirectX 12 Shader Model 6.5
	Supported Graphics APIs	DirectX®12 Ultimate OpenGL® 4.6 OpenCL™ 2.1 Vulkan™ 1.2

Technical Specifications - Graphics

NVIDIA® T400 2GB Graphics*	**Form Factor**	Single Slot, Low Profile (2.7"? H x 6.1"? L)
	Graphics Controller	Turing architecture Max Power: 30 Watts Cooling Solution: Active fan heatsink
	Bus Type	PCI Express 3.0 x16
	Memory	2GB GDDR6 Memory Memory Bandwidth: 80 GB/s Memory Interface: 64 bit
	Connectors	3x mDP (Mini DisplayPort™) 1.4 Connectors
	Max simultaneous displays	- 3x 3840 x 2160 @ 120Hz - 3x 5120 x 2880 @ 60Hz - supports Multi-Stream Transport (MST)
	Shading Architecture	DirectX 12 Shader Model 5.1
	Supported Graphics APIs	OpenGL 4.6 DirectX 12 Vulkan 1.2 API support includes: CUDA, OpenCL 1.2
	Available Graphics Drivers	Windows 10 64-bit Windows 11 64-bit Linux® 64-bit (selected Enterprise distributions) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html

*May go End of Life in late 2022

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

Technical Specifications - Graphics

NVIDIA® T600 4GB Graphics*	**Form Factor**	Single Slot, Low Profile (2.7"? H x 6.1"? L)
	Graphics Controller	Turing architecture Max Power: 40 Watts Cooling Solution: Active fan heatsink
	Bus Type	PCI Express 3.0 x16
	Memory	4GB GDDR6 Memory Memory Bandwidth: 160 GB/s Memory Interface: 128 bit
	Connectors	4x mDP (Mini DisplayPort™) 1.4 Connectors
	Max simultaneous displays	- 4x 3840 x 2160 @ 120Hz - 4x 5120 x 2880 @ 60Hz - 2x 7680 x 4320 @ 60Hz - supports Multi-Stream Transport (MST)
	Shading Architecture	DirectX 12 Shader Model 5.1
	Supported Graphics APIs	OpenGL 4.6 DirectX 12 Vulkan 1.2 API support includes: CUDA, OpenCL 1.2
	Available Graphics Drivers	Windows 10 64-bit Windows 11 64-bit Linux® 64-bit (selected Enterprise distributions) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html

*May go End of Life in late 2022

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

		Linux® 64-bit (selected Enterprise distributions) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
NVIDIA® T1000 8GB Graphics	**Form Factor**	Single Slot, Low Profile (2.7"? H x 6.1" ? L)
	Graphics Controller	Turing architecture Max Power: 50 Watts Cooling Solution: Active fan heatsink
	Bus Type	PCI Express 3.0 x16
	Memory	8GB GDDR6 Memory Memory Bandwidth: 160 GB/s Memory Interface: 128 bit
	Connectors	4x mDP (Mini DisplayPort™) 1.4 Connectors
	Max simultaneous displays	- 4x 3840 x 2160 @ 120Hz - 4x 5120 x 2880 @ 60Hz - 2x 7680 x 4320 @ 60Hz - supports Multi-Stream Transport (MST)
	Shading Architecture	DirectX 12 Shader Model 5.1
	Supported Graphics APIs	OpenGL 4.6 DirectX 12 Vulkan 1.2 API support includes: CUDA, OpenCL 1.2
	Available Graphics Drivers	Windows 10 64-bit Windows 11 64-bit Linux® 64-bit (selected Enterprise distributions) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
NVIDIA® RTX™ A2000 12GB Graphics	**Form Factor**	Low-Profile Double Slot (2.7"? H x 6.1" ? L)
	Graphics Controller	Ampere architecture Power: 70 Watts Cooling: Active Fan Heatsink
	Bus Type	PCI Express 4.0 x16
	Memory	12GB GDDR6 memory Memory Bandwidth: 288 GB/s Memory Interface: 192 bit Support Error-correcting code (ECC)
	Connectors	4x mDP (Mini DisplayPort™) 1.4 Connectors
	Max simultaneous displays	4x 4096 x 2160 @ 120 Hz, 4x 5120 x 2880 @ 60 Hz 2x 7680 x 4320 @ 60 Hz
	Shading Architecture	Shader Model 6.5

Technical Specifications - Graphics

	Supported Graphics APIs	OpenGL 4.6 DirectX 12 Vulkan 1.2 API support includes: CUDA, OpenCL 1.2
	Available Graphics Drivers	Windows 10 64-bit Windows 11 64-bit Linux® 64-bit (selected Enterprise distributions) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
NVIDIA® RTX™ A4000 16GB Graphics	**Form Factor**	Full Height Single Slot (9.5"? Length)
	Graphics Controller	Ampere architecture Power: 140 Watts Cooling: Active Fan Heatsink
	Bus Type	PCI Express 4.0 x16
	Memory	16GB GDDR6 memory Memory Bandwidth: 448 GB/s Memory Interface: 256 bit Support Error-correcting code (ECC)
	Connectors	4x DP 1.4 Connectors
	Max simultaneous displays	4x 4096 x 2160 @ 120 Hz, 4x 5120 x 2880 @ 60 Hz, 2x 7680 x 4320 @ 60 Hz
	Shading Architecture	Shader Model 6.5
	Supported Graphics APIs	OpenGL 4.6 DirectX 12 Vulkan 1.2 API support includes: CUDA, OpenCL 1.2
	Available Graphics Drivers	Windows 10 64-bit Windows 11 64-bit Linux® 64-bit (selected Enterprise distributions) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html

Technical Specifications - Graphics

NVIDIA® RTX™ A4500 20GB Graphics	**Form Factor**	Full Height Double Slot (10.5"? Length)
	Graphics Controller	Ampere architecture Power: 200 Watts Cooling: Active Fan Heatsink
	Bus Type	PCI Express 4.0 x16
	Memory	20GB GDDR6 memory Memory Bandwidth: 640 GB/s Memory Interface: 320 bit Support Error-correcting code (ECC)
	Connectors	4x DP 1.4 Connectors
	Max simultaneous displays	4x 4096 x 2160 @ 120 Hz, 4x 5120 x 2880 @ 60 Hz, 2x 7680 x 4320 @ 60 Hz
	Shading Architecture	Shader Model 6.5
	Supported Graphics APIs	OpenGL 4.6 DirectX 12 Vulkan 1.2 API support includes: CUDA, OpenCL 1.2
	Available Graphics Drivers	Windows 10 64-bit Windows 11 64-bit Linux® 64-bit (selected Enterprise distributions) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html

NVIDIA® RTX™ A5000 24GB Graphics	**Form Factor**	Full Height Double Slot (10.5"? Length)
	Graphics Controller	Ampere architecture Power: 230 Watts Cooling: Active Fan Heatsink
	Bus Type	PCI Express 4.0 x16
	Memory	24GB GDDR6 memory Memory Bandwidth: 768 GB/s Memory Interface: 384 bit Support Error-correcting code (ECC)
	Connectors	4x DP 1.4 Connectors
	Max simultaneous displays	4x 4096 x 2160 @ 120 Hz, 4x 5120 x 2880 @ 60 Hz, 2x 7680 x 4320 @ 60 Hz
	Shading Architecture	Shader Model 6.5
	Supported Graphics APIs	OpenGL 4.6 DirectX 12 Vulkan 1.2 API support includes: CUDA, OpenCL 1.2
	Available Graphics Drivers	Windows 10 64-bit Windows 11 64-bit Linux® 64-bit (selected Enterprise distributions) HP qualified drivers may be preloaded or available from the HP support Web site:

Technical Specifications - Graphics

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

AMD Radeon™ RX 6700 XT	**Form Factor**	Dual slot, Full Length (254mm L x 38mm W x 108.65mm H)
	Graphics Controller	AMD Radeon™ RX 6700 XT Graphics GPU: 2560 Navi2 Stream Processors Memory: 12GB GDDR6 Power: 230 Watts, Standard graphics 8pin + 6pin auxiliary power Cooling: Active, Dual Axial fan
	Bus Type	PCI Express 4.0 x16
	Connectors	3DP 1.4 + HDMI 2.1 Outputs
	Maximum Resolution	DisplayPort™ 1.4 with DSC: - up to 4x 5210 x 3200 x 24 bpp @ 60Hz, uncompressed - up to 7680 x 4320, compressed Display Outputs 3 DP + 1 HMDI
	Shading Architecture	Microsoft DirectX 12 Shader Model 6.1
	Supported Graphics APIs	OpenGL 4.6 DirectX 12 Feature Level 12_1 Vulkan 1.1 OpenCL 2.2
	Available Graphics Drivers	Windows 11 Linux® 64-bit (selected distributions) Typically, latest drivers will be available from amd.com

Notes: This is a Prosumer or Consumer graphics card, and not a Professional graphics card. As such, it does not have formal professional application validation, but is intended per AMD to function properly for game development, real-time engine, and many prosumer application workloads. Customers using Prosumer or Consumer graphic cards are likely to experience higher acoustics in comparison with Professional graphic cards. The higher acoustics observed with non-professional graphics is expected, as HP Workstations' designs do not have control in this area.

Technical Specifications - Optical and Removable Storage

HP 9.5mm Slim DVD Writer	**Description**	9.5mm height, tray-load	
	Mounting Orientation	Either horizontal or vertical	
	Interface Type	SATA/ATAPI	
	Dimensions (WxHxD)	128 x 9.5 x 127mm	
	Supported Media Types	DVD+R DVD+RW DVD+R DL DVD-R DL DVD-R DVD-RW CD-R CD-RW	
	Disc Capacity	**DVD-ROM**	8.5 GB DL or 4.7 GB standard
	Access Times	**Full Stroke DVD**	< 200 ms (seek)
		Full Stroke CD	< 200 ms (seek)
	Maximum Data Transfer Rates	**CD ROM Read**	CD-ROM, CD-R Up to 24X CD-RW Up to 24X
		DVD ROM Read	DVD+RW Up to 8X DVD-RW Up to 8X DVD+R DL Up to 8X DVD-R DL Up to 8X DVD-ROM Up to 8X DVD-ROM DL Up to 8X DVD+R Up to 8X DVD-R Up to 8X
	Power	**Source**	SATA DC power receptacle
		DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p
		DC Current	5 VDC -< 800 mA typical, <1600 mA maximum
	Operating Environmental (all conditions non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)
		Relative Humidity	10% to 80%
		Maximum Wet Bulb Temperature	84° F (29° C)
	Operating Systems Supported	Windows 11, Windows 10, Windows 7 Professional 64-bit, Windows Vista Business 64*, Windows 2000. Linux®.	
	Kit Contents	HP SATA DVD Writer drive, installation guide.	
	Approvals	USB-IF, WHQL, Compliant with USB Mass Storage Class Bulk only Transport Specification Rev. 1.0, Compliant Intel Front Panel I/O Connectivity Design Guide V. 1.3, FCC, CE, BSMI, C-Tick, VCCI, MIC, cUL, TUVT	

NOTE: Actual speeds may vary. No support for DVD-RAM (DVD Writer). Does not permit copying of commercially available DVD movies or other copyright protected materials. Intended for creation and storage of your original material and other lawful uses. Double Layer discs can store more data than single layer discs. However, double-layer discs burned with this drive may not be compatible with many existing single-layer DVD drives and players.

Technical Specifications - Optical and Removable Storage

HP 9.5mm Slim DVD-ROM Drive	**Description**	9.5mm height, tray-load	
	Mounting Orientation	Either horizontal or vertical	
	Interface Type	SATA / ATAPI	
	Dimensions (WxHxD)	128 x 9.5 x 127mm	
	Disc Capacity	**DVD-ROM**	Single layer: Up to 4.7 GB Double layer: Up to 8.5 GB
	Access Times	**DVD-ROM Single Layer**	< 110 ms (typical)
		CD-ROM Mode 1	< 110 ms (typical)
		Full Stroke DVD	< 230 ms (typical)
		Full Stroke CD	< 220 ms (typical)
	Power	**Source**	SATA DC power receptacle
		DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p
		DC Current	5 VDC - <800mA typical, < 1600 mA maximum
	Operating Environmental (all conditions non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)
		Relative Humidity	10% to 80%
		Maximum Wet Bulb Temperature	84° F (29° C)
	Operating Systems Supported	Windows 11, Windows 10, Windows 7 Professional 64-bit, Windows Vista Business 64*, Windows 2000. Linux®.	
	Kit Contents	9.5mm Slim DVD-ROM Drive, slim SATA data/power cable, installation guide	
	Approvals	USB-IF, WHQL, Compliant with USB Mass Storage Class Bulk only Transport Specification Rev. 1.0, Compliant Intel Front Panel I/O Connectivity Design Guide V. 1.3, FCC, CE, BSMI, C-Tick, VCCI, MIC, cUL, TUVT	

NOTE: Actual speeds may vary. No support for DVD-RAM (DVD Writer). Does not permit copying of commercially available DVD movies or other copyright protected materials. Intended for creation and storage of your original material and other lawful uses. Double Layer discs can store more data than single layer discs. However, double-layer discs burned with this drive may not be compatible with many existing single-layer DVD drives and players.

Technical Specifications - Networking and Communications

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

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

HP 1-Port 1GbE Flex IO NIC	**Connector**	RJ-45
	Cabling	1GbE over Category 5e (or better) up to 100m
	Controller	Realtek RTL8153
	Data Rates Supported	10/100/1000 Mbps
	Compliance	802.3 (LAN) 802.3u (100BASE-TX) 802.3ab (1000BASE-T) 802.3x (Ethernet Flow Control) 802.1Q (Virtual LAN) 802.3az (Energy Efficient Ethernet)
	Bus Architecture	USB
	Power Requirement	Requires 3.3V (integrated regulators for core Vdc)
	Boot ROM Support	Yes
	Network Transfer Mode	Full-duplex; Half-duplex
	Network Transfer Rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps
	Operating Temperature	32° to 131° F (0° to 55° C)
	Dimensions (HxW)	1.5 in x 1.5 in. x 0.75 in (3.81 cm x 3.81 cm x 1.9 cm)

Technical Specifications - Networking and Communications

	Operating System Driver Support	Windows 11 64-bit Windows 10 64-bit Linux®

Intel® X550-T2 2-Port 10GbE NIC	**Connector**	Dual-port RJ-45
	Cabling	10GbE: Cat6a (or better) up to 100m 5GbE and below: Cat5e (or better) up to 100m
	Controller	Intel® Ethernet Controller X550
	Network Transfer Rates Supported	10GbE, 5GbE, 2.5GbE, 1GbE, 100MbE
	Data Path Width	PCIe Gen3x4
	Power Requirement	11.2W (typical) 13.0 (Maximum)
	Operating Temperature	32° to 131° F (0° to 55° C)
	Dimensions (HxW)	5.1 x 2.7 in (without brackets)
	Operating System Driver Support	Windows 11 64-Bit Windows 10 64-bit Linux®
	Kit Contents	• Intel® X550-T2 2-Port 10GbE NIC with standard height bracket attached • Low-profile bracket • Product Literature

Intel® I350-T4 4-Port 1GbE NIC	**Connector**	4 RJ-45
	Cabling	Cat5e (or better) up to 100m
	Controller	Intel® Ethernet I350 Controller
	Network Transfer Rates Supported	1GbE, 100MbE, 10MbE
	Data Path Width	PCIe Gen2.1x4
	Power Requirement	5W (typical)
	Operating Temperature	32° to 131° F (0° to 55° C)
	Dimensions (HxW)	2.75 x 5.5 inches (without brackets)
	Operating System Driver Support	Windows 11 Windows 10 Linux®
	Kit Contents	• Intel® I350-T4 4-Port 1GbE NIC with standard height bracket attached • Low-profile bracket • Product Literature

Technical Specifications - Networking and Communications

HP Flex 1GbE Fiber LC Single Port	**Connector**	Fiber
	Cabling	1GbE over Category OM1 (or better) up to 100m
	Controller	Microchip LAN7801
	Data Rates Supported	100/1000 Mbps
	Compliance	IEEE 802.1p priority encoding/tagging (QoS, CoS) IEEE 802.1q VLAN tagging IEEE 802.3x flow control
	Bus Architecture	USB
	Power Requirement	Requires 3.3V (integrated regulators for core Vdc)
	Boot ROM Support	Yes
	Network Transfer Mode	Full-duplex; Half-duplex
	Network Transfer Rate	100BASE-X (half-duplex) 100 Mbps 1000BASE-X (half-duplex) 1000 Mbps 1000BASE-X (full-duplex) 2000 Mbps
	Operating Temperature	32° to 158° F (0°C to 70°C)
	calvin	1.5 in x 1.7 in. x 0.75 in (3.84 cm x 4.3 cm x 1.9 cm)
	Operating System Driver Support	Windows 11 64-Bit Windows 10 64-bit Linux®

Intel® I225-T1 1-Port 2.5GbE NIC	**Connector**	RJ-45
	Cabling	Cat5e (or better) up to 85m
	Controller	Intel® Ethernet I225 Controller
	Network Transfer Rates Supported	2.5GbE, 1GbE, 100MbE, 10MbE
	Data Path Width	PCIe Gen3.1x1
	Power Requirement	1.9W (typical)
	Operating Temperature	32° to 158° F (0°C to 70°C)
	Dimensions (HxW)	2.7 in x 2.57 in. (68.7mm x 65.3mm)
	Operating System Driver	Windows 11 64-Bit Windows 10 64-bit Linux®
	Kit Contents	• Intel® I225-T1 1-Port 2.5GbE NIC with standard height bracket attached Low-profile bracket • Product Literature

Technical Specifications - Networking and Communications

Intel® Wi-Fi 6E* AX211 802.11ax, BT 5.2, M.2 With Internal Antenna	**WLAN Standards**	802.11abgn+acR2+axR2(Pre-Standard) MIMO 2x2 High performance, low power dual band Pre-Standard-802.11ax R2 2x2, both with 160MHz channel support - Wi-Fi 6E
	Antenna	2x2 Dual-Band (internal)
	Bluetooth Standards	5.2
	Operating Temperature	32° to 176° F (0° to 80° C)
	Interface	M.2 CNVio2
	Dimensions	M.2 2230
	Kit Contents	Not Available

NOTE: The AX211 with internal antenna only support WIFI 6

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

Intel® Wi-Fi 6E* AX211 802.11ax, BT 5.2, M.2 With External Antenna	**WLAN Standards**	802.11abgn+acR2+axR2(Pre-Standard) MIMO 2x2 High performance, low power dual band Pre-Standard-802.11ax R2 2x2, both with 160MHz channel support - Wi-Fi 6E
	Antenna	2x2 Dual-Band (External)
	Bluetooth Standards	5.2
	Operating Temperature	32° to 176° F (0° to 80° C)
	Interface	M.2 CNVio2
	Dimensions	M.2 2230
	Kit Contents	ANTENNA, External, Dipole, WLAN, WIFI 6E

NOTE: The AX211 with external antenna support WIFI 6E

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

Summary of Changes

Date of change:	Version History:		Description of change:
March 8, 2022	From v1 to v2	Changed	Format
March 16, 2022	From v2 to v3	Changed	Social and Environmental Responsibility section
May 6, 2022	From v3 to v4	Changed	Processors, Graphics, Networking and Communications sections
June 1, 2022	From v4 to v5	Changed	Operating Systems and SATA Hard Drives sections
June 15, 2022	From v5 to v6	Changed	Networking and Communications section
July 1, 2022	From v6 to v7	Changed	Graphics section
July 8, 2022	From v7 to v8	Changed	System Board section
August 1, 2022	From v8 to v9	Changed	SATA Hard Drives, Other Hardware sections
August 4, 2022	From v9 to v10	Changed	Format
September 1, 2022	From v10 to v11	Changed	Storage / Hard Drives, Graphics, Optical and Removable Storage Networking and Communications sections

title

Overview

Important Note: Features and Supported Configurations will differ between the Z4 G4 Workstations with Intel® Xeon®W Processors and the Z4 G4 Workstation with Intel® Core™ X Processors. Where different - features are shown side by side. Supported configurations are indicated by the CPU Support references.

HP Z4 G4 Workstation

Front view

1. Front I/O module options
   - Premium (optional): power button, 2 USB 3.1 G1 Type-A, 2 USB 3.1 G2 Type-C™, Headset audio, SD Card Reader (optional) (Left-most Type-A port has charging capability)
   - Standard (shown here): power button, 4 USB 3.1 G1 Type-A (left-most Type-A port has charging capability), Headset audio, SD Card Reader (optional)
2. Front handle
3. 2 x 5.25"? external drive bays

Overview

Internal view

	Intel® Xeon® W Processors	Intel® Core™ X-series Processors
4.	Intel® Xeon® Processors: W-2100 family	Intel® Core ™ i7-X-series processors Intel® Core ™ i9-X Series processors Intel® Core ™ i9 Extreme Edition processor
5.	2 PCIe G3 x16, 2 PCIe G3 x4, 1 PCIe G3 x8	Core i9-X configs/Core i7 9800X: 2 PCIe G3 x16, 2 PCIe G3 x4, 1 PCIe G3 x8 Other Core i7-X configs: 1 PCIe G3 x16, 1 PCIe G3 x16 (x8 electrical), 2 PCIe G3 x4, 1 PCIe G3 x8 (mechanical only)
6.	2 PCIe G3 x4 M.2 for SSDs	1 PCIe G3 x4 M.2 for SSDs
7.	8 DIMM slots; DDR4-2666 ECC Registered RAM	8 DIMM slots: DDR4-2666 Non-ECC Unbuffered RAM
8.	PSU options: - 465W 90% efficient with 0 graphics power adapters - 750W 90% efficient with 2 graphics power adapters - 1000W 90% efficient with up to 4 graphics power Adapters	PSU: - 1000W 90% efficient with up to 4 graphics power Adapters
9.	2 x 5.25"? external drive bays	
10.	2 x 2.5"?/3.5"? internal drive bays	
11.	Front card guide and fan (select configurations)	
12.	6 x 6Gb/s SATA ports	

Overview

Rear view

	Intel® Xeon® W Processors	**Intel® Core™ X-series Processors**
13.		Rear power button
14.		Rear handle
15.		Padlock loop
16.		Kensington lock slot
17.	Rear I/O (top to bottom):	17. Rear I/O (top to bottom):
	- Audio in/out,	- Audio in/out,
	- Keyboard/Mouse PS/2	- Keyboard/Mouse PS/2
	- USB: 6 USB 3.1 G1 Type-A	USB: 5 USB 3.1 G1 Type-A
	- 2x 1GbE ports	- 1x 1GbE port
18.		Side panel barrel keylock (optional)

Supported Components

Overview

Form Factor Minitower

Operating Systems

Intel® Xeon® W Processors

Preinstalled:

- Windows 11 Pro for Workstations**
- Windows 10 Pro for Workstations*,**
- Ubuntu 20.04 LTS
- HP Linux-ready (minimal OS ready for customer OS installation)
- Red Hat® Enterprise Linux® Desktop Workstation (Paper license with 1-year support; no preinstalled OS)

Tested and Documented:

- Red Hat® Enterprise Linux® Workstation 6, 7, 8
- SUSE Linux® Enterprise Desktop 12, 15
- Ubuntu 16.04, 18.04, 20.04 LTS

Intel® Core™ X-series Processors

Preinstalled:

- Windows 11 Pro**
- Windows 10 Pro*,**
- HP Linux-ready (minimal OS ready for customer OS installation)
- Red Hat® Enterprise Linux® Desktop Workstation (Paper license with 1-year support; no preinstalled OS)

Tested and Documented:

- Red Hat® Enterprise Linux® Workstation 6, 7, 8
- SUSE Linux® Enterprise Desktop 12, 15
- Ubuntu 16.04, 18.04, 20.04 LTS

Notes: For detailed Linux® OS/hardware support information, see: http://www.hp.com/support/linux_hardware_matrix

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

*Not all features are available in all editions or versions of Ubuntu. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS to take full advantage of Ubuntu functionality. Ubuntu may be automatically updated. ISP fees may apply, and additional requirements may apply over time for updates.

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

Available Processors

Supported Components

Name	Cores	Clock Speed (GHz)	Cache (MB)	Memory Speed (MT/s)	ECC memory support	Max memory support	Hyper-Threading	Featuring Intel® vPro™ Technology	Intel® Turbo Boost Technology 2.0 (GHz)[1]	Intel® Turbo Boost Max Technology 3.0 (GHz)[2]	TDP (W)
Intel® Xeon® W Processors											
Intel® Xeon® W-2295 processor	18	3.0	24.75	2933	YES	512GB	YES	YES	3.8, 4.6	4.8	168
Intel® Xeon® W-2275 processor	14	3.3	19.25	2933	YES	512GB	YES	YES	4.1, 4.6	4.8	165
Intel® Xeon® W-2265 processor	12	3.5	19.25	2933	YES	512GB	YES	YES	4.3, 4.6	4.8	165
Intel® Xeon® W-2255 processor	10	3.7	19.25	2933	YES	512GB	YES	YES	4.3, 4.5	4.7	165
Intel® Xeon® W-2245 processor	8	3.9	16.5	2933	YES	512GB	YES	YES	4.5, 4.5	4.7	155
Intel® Xeon® W-2235 processor	6	3.8	8.25	2933	YES	512GB	YES	YES	4.3, 4.6	N/A	130
Intel® Xeon® W-2225 processor	4	4.1	8.25	2933	YES	512GB	YES	YES	4.5, 4.6	N/A	105
Intel® Xeon® W-2223 processor	4	3.6	8.25	2666	YES	512GB	YES	YES	3.7, 3.9	N/A	120
Intel® Core™ X-Series Processors											
Intel® Core™ i9-10980XE Extreme Edition processor	18	3.0	24.75	2933	NO	256GB	YES	NO	3.8, 4.6	4.8	165
Intel® Core™ i9-10940X X-series processor	14	3.3	19.25	2933	NO	256GB	YES	NO	4.1, 4.6	4.8	165
Intel® Core™ i9-10920X X-series processor	12	3.5	19.25	2933	NO	256GB	YES	NO	4.3, 4.6	4.8	165
Intel® Core™ i9-10900X X-series processor	10	3.7	19.25	2933	NO	256GB	YES	NO	4.3, 4.5	4.7	165
	[1]For Intel ® Xeon® W processors, the specifications shown in this column represent the following: all core maximum turbo frequency, dual core maximum turbo frequency). For Intel® Core™ processors, the specifications shown in this column refer to dual core maximum turbo frequency. [2]Intel Turbo Boost Max Technology 3.0 identifies the best performing core(s) on a processor and provides increased performance on those cores by taking advantage of power and thermal headroom. Intel® Turbo Boost Max Technology 3.0 frequency is the clock frequency of the CPU when running in this mode. **NOTE:** Processors that do not have certain turbo functionality are denoted as N/A.										

Available Processors

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

Color Black

Convertibility No

Expansion Slots (see system board section for

Intel® Xeon® W Processors **Intel® Core™ X-series Processors**

Slot 0: Mechanical-only, for use with devices that require only rear bulkhead mounting

Supported Components

more details)

Slot 1: PCI Express Gen3 x16 (from CPU)

Slot 2: PCI Express Gen3 x4 (from PCH) with open-ended connector*

Slot 3:	**Slot 3:**
PCI Express Gen3 x16 (from CPU)	Core i9-X and Core i7-9800X configs: PCI Express Gen3 x16 (from CPU) Other Core i7-X configs: PCI Express Gen3 x16(mechanical) x8(electrical) (from CPU)

Slot 4: PCI Express Gen3 x4 (from PCH) with open-ended connector*

Slot 5:	**Slot 5:**
PCI Express Gen3 x8 (from CPU) with open-ended connector*	- Core i9-X and Core i7-9800X configs: PCI Express Gen3 x8 (from CPU) with open-ended connector* - Other Core i7-X configs: PCI Express Gen3 x8 (mechanical-only, no data) with open-ended connector*

M.2 Slot 1: M.2 PCIe Gen 3 x4 (from CPU) up to 80mm storage devices

M.2 Slot 2:	**M.2 Slot 2:**
M.2 PCIe Gen 3 x4 (from CPU) up to 80mm storage devices	No 2nd M.2 connector/slot available

* Open-ended connector allows a greater bandwidth (e.g. x16) card to be installed physically into a lower bandwidth connector/slot.

Expansion Bays (see storage section for more details)

2 internal 3.5"? bays (with acoustic dampening drive carriers pre-installed). Optional 2.5"? adapter available.
2 external 5.25" bays

- 3rd and 4th 3.5" HDD each occupy one external bay
- 3rd and 4th 2.5" HDD/SSD occupy a single external bay within a 2:1 carrier

Front I/O

- Base: Power button with power/fault LED, 1 Headset audio port, 4 USB 3.1 G1 Type A (1 charging, provides 1.5A at 5V)
- Premium (optional): Power button with power/fault LED, Drive activity LED, 1 Headset audio port, 2 USB 3.1 G1 Type-A (1 charging, provides 1.5A at 5V), 2 USB 3.1 G2 Type-C™ (each provides 3A at 5V)
- Optional: SD reader

Internal I/O

1 USB 3.1 G1 single-port header, 1 USB 2.0 single-port header and 1 USB 2.0 dual-port header

Rear I/O

Intel® Xeon® W Processor Family	**Intel® Core™ X- Series Processor Family**
6x USB 3.1 G1 Type-A*	5x USB 3.1 G1 Type-A
2x 1GbE LAN ports (1x supporting Intel AMT)	1x 1GbE LAN ports

Audio: 1 Line out, 1 Line in (Line in can be retasked as microphone), 1 PS/2 mouse port, 1 PS/2 keyboard port, 1 Rear power button
Optional: 1 serial port (cable up to rear bulkhead), 2 Thunderbolt 3**

*All rear I/O motherboard USB-A ports are 0.9A at 5V
**HP's add-in Thunderbolt card provides two USB-C ports which provide 3A at 5V each

Interfaces Supported

SD card reader (optional)
6-channel SATA interface (6 @ 6.0 Gb/s)
6 channels are eSATA configurable for use with eSATA CTO/AMO Kit (No hot plug / hot swap supported)
Thunderbolt 3 (optional)
USB 2.0, USB 3.1 G1 (aka USB 3.0), USB 3.1 G2 (optional)

On-board RAID Support

SATA RAID 0 Striped Array Configuration
SATA RAID 1 Mirrored Array Configuration
SATA RAID 5 Striped/Parity Configuration
SATA RAID 10 Striped/Mirrored Configuration

Supported Components

Chassis Dimensions (H x W x D)	H: 15.2" (386mm) W: 6.65" (169mm) D: 17.5" (445mm)
Packaged Dimensions	H: 22.5" (572mm) W: 12.4" (314mm) D: 22.2" (563mm)
Palletization Profile	6 units x 3 layers = 18 units per pallet 1200x1000x1836mm (pallet included)
Rack Dimensions	4U
Weight	Exact weights depend upon configuration (System weight only). Minimum: 10.2 kg (22.4 lbs.) Standard: 11.3 kg (24.9 lbs.) Maximum: 17.3 kg (38.2 lbs.)
Temperature	Non-operating: -40° to 60° C (-40° to 140° F) Operating: 5° to 35° C (40° to 95° F) Above 1524 m (5,000 feet) altitude, the maximum operating temperature is reduced by 1° C (1.8° F) for every 305 m (1,000 feet) increase in elevation Maximum rate of change: 10 °C/hr No direct sustained sunlight
Humidity	Operating: 10% to 85% relative humidity, non-condensing, 35° C maximum wet bulb Non-operating: 10% to 90% relative humidity, non-condensing, 35° C maximum wet bulb
Maximum Altitude (non-pressurized)	Operating (with Rotational Hard Drives): 3,048 m (10,000 feet) Operating (with only Solid-State Drives): 5,000 m (16,404 feet) Non-operating: 12,192 m (40,000 feet) Maximum operating temperature is reduced as altitude increases. See Temperature for details.
Power Supply	**Processor Support**
	XW **ENTRY** 465 watts wide-ranging, active Power Factor Correction, 90% Efficient, with no 6-pin graphics power cables. The Z4 G4 465W power supply efficiency report can be found at this link: https://plugloadsolutions.com/psu_reports/HP%20INC_DPS-465AB-3%20A_465W_ECOS%204939_Report.pdf
	XW **MID_RANGE** 750 watts wide-ranging, active Power Factor Correction, 90% Efficient, with 2x 6-pin graphics power cables. The Z4 G4 750W power supply efficiency report can be found at this link: https://plugloadsolutions.com/psu_reports/HP%20INC_DPS-750AB-36%20A_750W_ECOS%204938_Report.pdf
	HIGH-END
	XW, CX (i9) 1000 watts wide-ranging, active Power Factor Correction, 90% Efficient. Includes 4x 6+2-pin graphics power cables: also includes a Front Fan and Card Guide kit to enable support for dual high end graphics solutions.
	CX (i7) 1000 watts wide-ranging, active Power Factor Correction, 90% Efficient. Includes 2x 6+2-pin graphics power cables.
	The Z4 G4 1000W power supply efficiency report can be found at this link: https://plugloadsolutions.com/psu_reports/HP_D15-1K0P1A_1000W_ECOS%204838_Report.pdf
	NOTE: 1000 W internal power supply, up to 90% efficiency, active PFC available the first half of 2018
	NOTE: All power cords supplied by HP for Desktop Workstations are between 1.83m and 2.5m (dependent on country localization and platform).

Supported Components

Workstation ISV Certifications	See the latest list of certifications at http://www8.hp.com/us/en/campaigns/workstations/industries-and-partners.html

Processors

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Intel® Xeon® W-Series CPU				
Intel® Xeon® W-2295 3.0 2933 18C CPU	Y	N		
Intel® Xeon® W-2275 3.3 2933 14C CPU	Y	N		
Intel® Xeon® W-2265 3.5 2933 12C CPU	Y	N		
Intel® Xeon® W-2255 3.7 2933 10C CPU	Y	N		
Intel® Xeon® W-2245 3.9 2933 8C CPU	Y	N		
Intel® Xeon® W-2235 3.8 2933 6C CPU	Y	N		
Intel® Xeon® W-2225 4.1 2933 4C CPU	Y	N		
Intel® Xeon® W-2223 3.6 2933 4C CPU	Y	N		
Intel® Xeon® W-2145 3.7 2666 8C CPU	Y	N		
Intel® Xeon® W-2133 3.6 2666 6C CPU	Y	N		
Intel® Core™ X-Series CPU				
Intel® Core™ i9-10980XE 3.0 2933 18C CPU	Y	N		
Intel® Core™ i9-10940X 3.3 2933 14C CPU	Y	N		
Intel® Core™ i9-10920X 3.5 293312C CPU	Y	N		
Intel® Core™ i9-10900X 3.7 2933 10C CPU	Y	N		
Intel® Core™ i7-9800X 3.8 2666 8C CPU	Y	N		

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Monitors / Displays

	Processor Supports	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Z Display Z22n G2	XW, CX		Y	1JS05AA	
HP Z Display Z23n G2	XW, CX		Y	1JS06AA	
HP Z Display Z24i G2	XW, CX		Y	1JS08AA	
HP Z Display Z24n G2	XW, CX		Y	1JS09AA	
HP Z Display Z24nf G2	XW, CX		Y	1JS07AA	
HP Z Display Z27n G2	XW, CX		Y	1JS10AA	
HP Z Display Z27s (4K display)	XW, CX		Y	J3G07AA	

Supported by all operating systems available from HP
Screen size measured diagonally

Storage / Hard Drives*

Supported Components

SAS Hard Drives

SAS Hard Drives for HP Workstations	Processor Supports	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP 300GB 15k SAS SFF	XW	Y	Y	L5B74AA	

NOTE: Only available on Xeon W configs SAS controller add-in card required

*For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity may be less. Up to 32GB (for Windows 10) is reserved for system recovery software.

SATA Hard Drives

SATA (Serial ATA) Hard Drives for HP Workstations	Processor Supports	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
500GB SATA 7200RPM 6Gb/s 3.5"? HDD	XW, CX	Y	Y	LQ036AA	
500GB SATA 7200RPM 6Gb/s OPAL2 SFF 3.5"? HDD	XW, CX	Y	Y	D8N29AA	
1TB SATA 7200RPM 3.5"? HDD	XW, CX	Y	Y	LQ037AA	
1TB SATA 7200RPM Ent 3.5"? HDD	XW, CX	Y	Y	W0R10AA	
2TB SATA 7200RPM 3.5"? CMR HDD	XW, CX	Y	Y	QB576AA	
2TB SATA 7200RPM 3.5"? SMR HDD	XW, CX	Y	Y	8VE04AA/AT	
2TB 7200RPM SATA 3.5in Enterprise		Y	Y	2Z274AA	
4TB SATA 7200RPM Ent 3.5"? HDD	XW, CX	Y	Y	K4T76AA	
6TB SATA 7200RPM Ent 3.3"? HDD	XW, CX	Y	Y	3DH90AA	
8TB 7200RPM SATA 3.5in Enterprise		Y	Y	2Z273AA	

NOTE: Up to (4) 3.5-inch 7200 rpm SATA drives: 32 TB max total (4x 8TB)

SATA Solid State Drives

HP Solid State Drives (SSDs) for Workstations	Processor Supports	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP 256GB SATA SSD	XW, CX	Y	Y	A3D26AA/AT	
HP 512GB SATA SSD	XW, CX	Y	Y	D8F30AA	
HP 1TB SATA SSD	XW, CX	Y	Y	F3C96AA/AT	
HP 2TB SATA SSD	XW, CX	Y	Y	Y6P08AA/AT	
HP 256GB SATA SED OPAL2 SSD	XW, CX	Y	Y	G7U67AA	
HP 512GB SATA SED OPAL2 SSD	XW, CX	Y	Y	N8T26AA	
HP 240GB SATA Enterprise SSD	XW, CX	Y	Y	T3U07AA	
HP 480GB SATA Enterprise SSD	XW, CX	Y	Y	T3U08AA	
HP 960GB 2.5in Enterprise SATA-3 SSD		Y	Y	1W6P8AA	
1920GB 2.5in Enterprise SATA-3 SSD		Y	Y	1W6P9AA	

PCIe Solid State Drives

PCIe SSDs for HP Workstations	Processor Supports	Factory Configured	Option Kit	Option Kit Part Number	Support Notes

Supported Components

HP Z Turbo Drive 256GB MLC Z4/Z6 G4 SSD Kit	XW, CX	N	N	EOL	
HP Z Turbo Drive 512GB MLC Z4/Z6 G4 SSD Kit	XW, CX	N	N	EOL	
HP Z Turbo Drive 1TB MLC Z4/Z6 G4 SSD Kit	XW, CX	N	N	EOL	
HP Z Turbo Drive 256GB TLC Z4/Z6 G4 SSD Kit	XW, CX	Y	Y	1PD59AA/AT	
HP Z Turbo Drive 512GB TLC Z4/Z6 G4 SSD Kit	XW, CX	Y	Y	1PD60AA	
HP Z Turbo Drive 1TB TLC Z4/Z6 G4 SSD Kit	XW, CX	Y	Y	1PD61AA	
HP Z Turbo Drive 2TB TLC Z4/Z6 G4 SSD Kit	XW, CX	Y	Y	3KP39AA	
HP Z Turbo Drive 256GB Z4/Z6 G4 SED Kit	XW, CX	Y	Y	4YZ41AA	
HP Z Turbo Drive 512GB Z4/Z6 G4 SED Kit	XW, CX	Y	Y	4YZ44AA/AT	
HP Z Turbo Drive 1TB SED TLC Z4/Z6 G4 SSD Kit	XW, CX	Y	Y	6YT76AA	
HP Z Turbo Drive 1TB SED TLC Z4/Z6 G4 SSD Module	XW, CX	Y	Y	6YT79AA	2
HP Z Turbo 2TB SED OPAL2 TLC M.2 Z4/Z6 SSD	XW, CX	Y	Y	2Y7W6AA	
HP 256GB M.2 2280 PCIe NVMe TLC SSD Z2/Z4/Z6 Kit	XW, CX	Y	Y	8PE68AA	
HP 512GB M.2 2280 PCIe NVMe TLC SSD Z2/Z4/Z6 Kit	XW, CX	Y	Y	8PE69AA	
HP 1TB M.2 2280 PCIe NVMe TLC SSD Z2/Z4/Z6 Kit	XW, CX	Y	Y	8PE70AA	
HP 256GB M.2 2280 PCIe NVMe TLC SSD Module	XW, CX	N	Y	8PE62AA	2
HP 512GB M.2 2280 PCIe NVMe TLC SSD Module	XW, CX	N	Y	8PE63AA	2
HP 1TB M.2 2280 PCIe NVMe TLC SSD Module	XW, CX	N	Y	8PE64AA	2
HP 2TB PCIe NVME TLC M.2 Z4/6 G4 SSD	XW, CX	Y	Y	35F74AA	
HP Z Turbo Drive Quad Pro					
HP Z Turbo Drive Quad Pro 2x256GB TLC PCIe® SSD	XW, CX (i9)	Y	Y	4YZ38AA	1, 3
HP Z Turbo Drive Quad Pro 2x512GB TLC PCIe® SSD	XW, CX (i9)	Y	Y	4YZ39AA/AT	1, 3
HP Z Turbo Drive Quad Pro 2x1TB TLC PCIe® SSD	XW, CX (i9)	Y	Y	4YZ40AA	1, 3
HP Z Turbo Drive Quad Pro 2x2TB PCIe® SSD	XW, CX (i9	Y	Y	3KP42AA	
HP Z Turbo Drive Quad Pro 256GB TLC SSD module	XW, CX (i9)	N	Y	4YZ35AA	1, 2, 3
HP Z Turbo Drive Quad Pro 512GB TLC SSD module	XW, CX (i9)	N	Y	4YZ36AA/AT	1, 2, 3
HP Z Turbo Drive Quad Pro 1TB TLC SSD module	XW, CX (i9)	N	Y	4YZ37AA	1, 2, 3
HP Z Turbo Drive Quad Pro 2TB TLC SSD module	XW, CX (i9	N	Y	3KP43AA	2
HP Z Turbo Drive Dual Pro					
HP Z Turbo Drive Dual Pro 256GB TLC SSD		Y	Y	4YF60AA	
HP Z Turbo Drive Dual Pro 512GB TLC SSD		Y	Y	4YF61AA	
HP Z Turbo Drive Dual Pro 1TB TLC SSD		Y	Y	4YF62AA	
HP Z Turbo Drive Dual Pro 2TB TLC SSD		Y	Y	4YF63AA	
HP 256GB M.2 2280 PCIe NVMe TLC SSD Dual Pro Kit	XW, CX	Y	Y	8PE74AA	
HP 512GB M.2 2280 PCIe NVMe TLC SSD Dual Pro Kit	XW, CX	Y	Y	8PE75AA	
HP 1TB M.2 2280 PCIe NVMe TLC SSD Dual Pro Kit	XW, CX	Y	Y	8PE76AA	
Intel® 905p Series SSD (Opatane SSD)					
Intel® Optane SSD 905p 280GB AiC**		Y	Y	2SC47AA	
Intel® Optane SSD 905p 480GB AiC**		Y	Y	2SC48AA	
Intel® Optane SSD 905P 380GB M.2 PCIe Dual		Y	Y	6LA63AA	1
Intel® Optane SSD 905P 2x380GB M.2 PCIe Quad		Y	Y	6LA65AA	1
Intel® Optane SSD 905P 380GB M.2 SSD Module		Y	Y	6LA66AA	2, 3

Note 1: All HP Z Turbo Drive Quad Pro modules require the Z4 G4 Fan & Front Card Kit, available as CTO (1MY89AV) and AMO (1XM33AA)

Note 2: M.2 SSD module only, designed to be installed into the Z Turbo Drive Quad Pro or Dual Pro carrier

Note 3: Z Turbo Drive Quad Pro is not supported on Core i7-X configurations

** PCIe card installed in standard PCIe x4 slot

Supported Components

Intel® Virtual RAID on CPU (Intel ® VROC) for NVMe	Processor Supports	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Intel® VROC NVMe SSD Standard Controller Module		N	Y	3FJ80AA	1,3
Intel® VROC NVMe SSD Premium Controller Module		N	Y	3FJ81AA	2,3

NOTE 1: Enables RAID 0, 1 & 10
NOTE 2: Enables RAID 0, 1 & 10 plus RAID 5 with write hole closure options.
NOTE 3: Xeon processor required

Hard Drive Controllers	Processor Supports	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
SAS Controller					
MicroSemi SmartHBA2100-4i4e SAS Controller	XW	Y	Y	1FV90AA	
NOTE: Only available on Xeon W configurations					

Graphics

	Processor Supports	Factory Configured	Option Kit	Option Kit Part Number	Support Notes	Supported # of cards
Graphics Cable Adapters						
HP DisplayPort to HDMI Adapter	XW, CX	Y	Y	K2K92AA		
HP DisplayPort to Dual Link DVI Adapter	XW, CX	Y	Y	NR078AA		
HP DisplayPort to DVI-D Adapter	XW, CX	Y	Y	FH973AA		
HP DisplayPort to DVI-D Adapter (2-pack)	XW, CX	Y	N			
HP DisplayPort to DVI-D Adapter (4-pack)	XW, CX	Y	N			
HP DisplayPort to DVI-D Adapter (6-pack)	XW, CX	Y	N			
HP miniDP-to-DP Adapter	XW, CX	Y	Y	2MY05AA		
HP miniDP-to-DP Adapter (2-pack)	XW, CX	Y	N			
HP miniDP-to-DP Adapter (4-pack)	XW, CX	Y	N			
HP miniDP-to-DP Adapter (8-pack)	XW, CX	Y	N			
Graphics Card Connectors						
NVIDIA® SLI 2-slot Graphics Connector	XW, CX	Y	Y	2YY84AA		
Quadro® RTX NVLink 2-slot Bridge (RTX 5000)	XW, CX	N	Y	6FY12AA		
Quadro® RTX NVLink High-Bandwidth 2-slot Bridge (RTX 6000 & 8000)	XW, CX	N	Y	6FY11AA		
NVIDIA NVLink 2-Slot Bridge (RTX A6000, RTX A5000)		N	Y	340L2AA		2
Entry 3D						
NVIDIA® Quadro® P620 2GB Graphics	XW, CX	Y	Y	3ME25AA	4	2
NVIDIA® T400 2GB Graphics	XW, CX	Y	Y	340K8AA	4	2
NVIDIA® T400 4GB Graphics	XW, CX	Y	Y	5Z7E0AA/AT	4	2
NVIDIA® T600 4GB Graphics	XW, CX	Y	Y	340K9AA	4	2
Mid-range 3D						
NVIDIA® T1000 8GB Graphics	XW, CX	Y	Y	5Z7D8AA	3,4	2
NVIDIA® T1000 4GB Graphics	XW, CX	Y	Y	20X22AA	3,4	2
NVIDIA® Quadro® P1000 4GB Graphics	XW, CX	Y	Y	1ME01AA	3, 4	2

Supported Components

NVIDIA® RTX A2000 6GB Graphics	XW, CX	Y	Y	340L0AA	3, 4	2
NVIDIA® RTX A2000 12GB Graphics	XW, CX	Y	Y	5Z7D9AA	3, 4	2
AMD Radeon™ Pro WX 3100 4GB Graphics	XW, CX	Y	Y	2TF08AA	3, 4	2
AMD Radeon™ Pro WX 3200 4GB Graphics	XW, CX	Y	Y	6YT68AA	3, 4	2
AMD Radeon™ Pro WX 4100 4GB Graphics	XW, CX	N	Y	Z0B15AA	3, 4	2
AMD Radeon™ Pro W6600 8GB Graphics	XW, CX	Y	Y	340K5AA	1,2	2
AMD Radeon™ RX 6700 XT 12GB Graphics	XW, CX	Y	N		2	
High-End 3D						
NVIDIA® Quadro® P4000 8GB Graphics	XW, CX	Y	Y	1ME40AA	1, 2, 5	2
NVIDIA® Quadro® RTX 4000 8GB Graphics	XW, CX	Y	Y	5JV89AA	1, 2	2
NVIDIA® RTX A4000 16GB 4DP Graphics	XW, CX	Y	Y	20X24AA/AT	1, 2	2
NVIDIA® RTX A4500 20GB Graphics	XW, CX	Y	Y	5S458AA/AT	1, 2, 5	2
AMD Radeon™ Pro W5500 8GB Graphics	XW, CX	Y	Y	9GC16AA	1, 2	2
AMD Radeon™ Pro W5700 8GB Graphics	XW, CX	Y	Y	9GC15AA/AT	1, 2, 5	2
AMD Radeon™ Pro W6800 32GB Graphics	XW, CX	Y	Y	340K7AA	1, 2, 5	2
AMD Radeon™ Pro WX 7100 8GB Graphics	XW, CX	Y	Y	Z0B14AA	1, 2	2
Ultra High-End 3D						
NVIDIA® Quadro® GP100 16GB Graphics	XW, CX	N		1ZE81AA	1, 2, 5	2
NVIDIA® Quadro® GV100 32GB Graphics	XW, CX	Y		3ME26AA	1, 2, 5	2
NVIDIA® Quadro® P5000 16GB Graphics	XW, CX	Y	Y	Z0B13AA	1, 2, 5	2
NVIDIA® Quadro® P6000 24GB Graphics	XW, CX	Y	Y	Z0B12AA	1, 2, 5	2
NVIDIA® Quadro® RTX 5000 16GB Graphics	XW, CX	Y	Y	5JH81AA	1, 2	2
NVIDIA® Quadro® RTX 6000 24GB Graphics	XW, CX	Y	Y	5JH80AA	1, 2	2
NVIDIA® Quadro® RTX 8000 48 GB Graphics	XW, CX	Y	Y	6NB51AA	1, 2	2
NVIDIA® RTX A5000 24 GB Graphics	XW, CX	Y	Y	20X23AA	1,2, 5	2
NVIDIA® RTX A6000 48GB Graphics	XW, CW	Y	Y	2S6U3AA	1,2, 5	2
AMD Radeon™ Pro WX 9100 16GB Graphics	XW, CX	Y		2TF01AA	1, 2	1
NVIDIA® Quadro® Sync II	XW, CX	N	Y	1WT20AA		

NOTE 1: Single graphics configuration requires the HP Z4 G4 Fan and Front Card Guide Kit, which is available both CTO (1MY89AV) and AMO (1XM33AA).
NOTE 2: Single graphics configuration requires the 750W chassis or 1000W chassis.
NOTE 3: Dual graphics configuration requires the HP Z4 G4 Fan and Front Card Guide Kit, which is available both CTO (1MY89AV) and AMO (1XM33AA).
NOTE 4: Dual graphics configuration requires the 750W chassis or 1000W chassis.
NOTE 5: Dual graphics configuration requires the 1000W chassis.

Supported Components

Memory	SL Processor	CL Processor	Processor Supports	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP 8GB (1x8GB) DDR4-2666 ECC Reg RAM	Y	N	XW	Y	Y	1XD84AA/AT	1
16GB (1x16GB) DDR4-2666 ECC Reg RAM	Y	N	XW	Y	Y	1XD85AA/AT	1
32GB (1x32GB) DDR4-2666 ECC Reg RAM	Y	N	XW	Y	Y	1XD86AA/AT	1,2
HP 8GB (1x8GB) DDR4- 2933 ECC Reg RAM	Y	Y	XW	Y	Y	5YZ56AA /AT	1,3
16GB (1x16GB) DDR4- 2933 ECC Reg RAM	N	Y	XW	Y	Y	5YZ54AA/AT	1,3
32GB (1x32GB) DDR4- 2933 ECC Reg RAM	N	Y	XW	Y	Y	5YZ55AA / AT	1,2,3
64GB (1x64GB) DDR4- 2933 ECC Reg RAM	N	Y	XW	Y	Y	5YZ57AA / AT	1,3,4
HP 8GB (1x8GB) DDR4-2933 nECC RAM	Y	Y	CX	Y	Y	7ZZ64AA /AT	1,3,5
HP 16GB (1x16GB) DDR4-2933 nECC RAM	N	Y	CX	Y	Y	7ZZ65AA / AT	1,3,5
HP 32GB (1x32GB) DDR4-2933 nECC RAM	N	Y	CX	Y	Y	7ZZ66AA/AT	1,3,4

SL Processor: Are processors formerly known as as Intel® Skylake that are sold under the model name Intel® Xeon® W-2100 Family or Intel® Core™ i7X, Core™ i9-7900X/XE, and Core™ i9-9000X/XE family

CL Processor: Are processors formerly known as Cascade Lake that are in model name Intel® Xeon® W-2200 family or Intel® Core™ i9-10900X/XE family

NOTES

1: ONLY DDR4 DIMMs are supported.

2: Memory configurations using Xeon Skylake (W-21xx) processors and 32GB Registered DIMMs require the HP Z4 Memory Cooling Solution, which is available both CTO (1MY90AV) and AMO (8TC68AA). Memory configurations using Xeon Cascade Lake and 32GB Registered DIMMs do not require the Memory Cooling Solution.

3: Intel® Core™ i9-10900X/XE and Intel® Xeon® W-2200 family processors only support 2933 speed memory.

4:

- 32GB nECC Memory is only available with Intel® Core™ i9-10900X/XE family processors.
- 64GB Registered Memory is only available with Intel® Xeon® W-2200 family processors.

5: Discontinued Core i7X, Core i9-7900X/XE, and Core i9-9000X/XE family processors are only compatible with Memory Option Kit 7ZZ64AA/AT 8GB (1x8GB) DDR4 2933 NECC UDIMM Memory
Option Kit 7ZZ65AA/AT 16GB (1x16GB) DDR4 2933 NECC UDIMM Memory has transitioned to newer 16Gbit DRAM and is incompatible with these discontinued Core X processors.

NOTE: Factory-configured CTO (xxxxxAV) and aftermarket AMO (xxxxxAA, xxxxxAT) HP memory part numbers designated as "2666"? may ship with "2933" or "3200" speed memory components. Similarly, HP Memory part numbers designated as "2933 may ship with "3200" speed memory. This does not affect HP part number availability, nor does it affect system performance or operation. All hardware configurations currently supporting HP memory part numbers designated as "2666"? or 2933 have been fully qualified to work with fast speed memory and are fully supported by HP under standard support terms.

Supported Components

Factory Configured System Memory Solutions	Available with Intel Xeon Processor & Registered Memory	Available with Intel Core X Processor & nECC Memory
8GB (1x8GB) DDR4	Yes	Yes
16GB (1x16GB) DDR4	Yes	Yes
16GB (2x8GB) DDR4	Yes	Yes
24GB (3x8GB) DDR4	Yes	Yes
32GB (2x16GB) DDR4	Yes	Yes
32GB (4x8GB) DDR4	Yes	Yes
64GB (2x32GB) DDR4	Yes	Yes (Note 1)
64GB (4x16GB) DDR4	Yes	Yes
64GB (8x8GB) DDR4	Yes	Yes
128GB (2x64GB) DDR4	Yes (Note 2)	No
128GB (4x32GB) DDR4	Yes	Yes (Note 1)
128GB (8x16GB) DDR4	Yes	Yes
192GB (6x32GB) DDR4	Yes	Yes (Note 1)
256GB (4x64GB) DDR4	Yes (Note 2)	No
256GB (8x32GB) DDR4	Yes	Yes (Note 1)
384GB (6x64GB) DDR4	Yes (Note 2)	No
512GB (8x64GB) DDR4	Yes (Note 2)	No

NOTE 1: 32GB nECC Memory Configurations are only available with Intel® Core™ i9-10900X/XE family processors.
NOTE 2: 64GB Registered Memory Configurations are only available with Intel® Xeon® W-2200 family processors.

Multimedia and Audio Devices

	Processor Supports	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Integrated Realtek HD ALC221 Audio	XW, CX	Y	N		

Optical and Removable Storage

Supported Components

	Processor Supports	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP SlimTray Optical Drives					
HP 9.5mm Slim Blu Ray Disc Writer	XW, CX	Y	Y	K3R65AA	1
HP 9.5mm Slim DVD ROM	XW, CX	Y	Y	K3R63AA	1
HP 9.5mm Slim DVD Writer*	XW, CX	Y	Y	K3R64AA	1
HP HH DVD Writer (16x RW DVD-R)	XW, CX	Y	Y	4AR67AA	
HP SD Card Reader					
HP SD 4 Card Reader	XW, CX	Y	Y	2VK54AA	
NVMe Frame/Carrier					
HP QX310 Removable NVMe Frame/Carrier w/PCIe card	XW, CX	Y	N		
HP QX310 Removable Carrier only	XW, CX	N	Y	8GQ91AA/AT	2

NOTE 1: Installing an optical drive into Z4 G4 requires a 5.25"? external bay adapter (Option Kit Part number NQ099A).
NOTE 2: Only approved HP Z Turbo storage devices are supported.

*Actual speeds may vary. No support for DVD-RAM (DVD Writer). Does not permit copying of commercially available DVD movies or other copyright protected materials. Intended for creation and storage of your original material and other lawful uses. Double Layer discs can store more data than single layer discs. However, double-layer discs burned with this drive may not be compatible with many existing single-layer DVD drives and players.

With Blu-ray, certain disc, digital connection, compatibility and/or performance issues may arise, and do not constitute defects in the product. Flawless playback on all systems is not guaranteed. In order for some Blu-ray titles to play, they may require a DVI or HDMI digital connection and your display may require HDCP support. HD-DVD movies cannot be played on this workstation.

Networking and Communications

	Processor Supports	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Intel® i350-T2 PCIe Dual Port Gigabit NIC	XW, CX	Y	Y	V4A91AA	
Intel® i350-T4 PCIe 4-Port Gigabit NIC	XW, CX	N	Y	W8X25AA	
Intel® Ethernet I210-T1 PCIe x1 Gb NIC	XW, CX	Y	Y	E0X95AA	
Aquantia® AQN-108 Single-Port 5GbE NIC	XW, CX	N	Y	1PM63AA	
Intel® X550-T2 10GbE Dual Port NIC	XW, CX	Y	Y	1QL46AA	
Intel® X710-DA2 10GbE SFP+ Dual Port NIC	XW, CX	Y	Y	1QL47AA	1
HP 10GbE SFP+ SR Transceiver	XW, CX	Y	Y	C3N53AA	
Intel 8265 802.11 a/b/g/n/ac + BT PCIe WLAN	XW, CX	N	Y	1QL48AA	
Intel® Wi-Fi 6 AX200 & BT PCIe	XW, CX	N	Y	7CE01AA	
Intel AX210 Wi-Fi 6e non-vPro +Bluetooth 5.2 External Antenna WLAN	XW, CX	N	Y	340L7AA	
Allied Telesis AT-2911T/2-901 Dual Port 1GbE NIC		Y	Y	6E3Y9AA/AT	
Allied Telesis AT-2914SX/LC-901 1GB LC Fiber NIC		Y	Y	1C7Q2AA	

Note 1: Windows 7 is NOT supported

Racking and Physical Security

Supported Components

	Processor Supports	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Z4/Z6 Side Panel Barrel Keylock	XW, CX	Y	N		
HP Solenoid Lock / Hood Sensor	XW, CX	Y	N		
HP Z4/Z6 G4 Depth Adjustable Fixed Rail Rack Kit	XW, CX	N	Y	2HW42AA	
HP Z2 Mini/Z2 TWR/Z4/Z6 Depth Adj Rail Rak Kit			Y	2A8Y5AA	
HP Keyed Cable Lock 10mm	XW, CX	N	Y	T1A62AA	
HP Master Keyed Cable Lock 10mm	XW, CX	N	Y	T1A63AA	

Input Devices

	Processor Supports	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Wireless Business Slim Keyboard and Mouse	XW, CX	Y	Y	N3R88AA	
Business Slim PS/2 Wired Keyboard	XW, CX	Y	Y	N3R86AA	
USB Business Slim Wired Keyboard	XW, CX	Y	Y	N3R87AA	
USB Premium Wired Keyboard	XW, CX	Y	Y	Z9N40AA/AT	
USB Wired SmartCard CCID Keyboard	XW, CX	Y	Y	E6D77AA	
HP Optical USB Mouse	XW, CX	Y	Y	QY777AA/AT	
HP PS/2 Mouse	XW, CX	Y	Y	QY775AA/AT	
HP USB Hardened Mouse	XW, CX	Y	Y	P1N77AA/AT	
HP Creator 935 Black Wireless Mouse	XW, CX	N	Y	1D0K8AA	
HP Wired 320M Mouse	XW, CX	Y	Y	9VA80AA	

Other Hardware

	Processor Supports	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP ENERGY STAR® Certified Configuration	XW, CX	Y			
HP Z Premium Front I/O 2xUSB-A 2xUSB-C	XW, CX	Y	Y	1XM32AA	
HP Thunderbolt 3 PCIe 2 Port I/O Card	XW, CX	Y	Y	3UU05AA	
HP Z4 G4 Memory Cooling Solution	XW, CX	Y	Y	8TC68AA	Note 1
HP Z4 G4 Fan and Front Card Guide Kit	XW, CX	Y	Y	1XM33AA	Note 2
HP Internal USB Port Kit	XW, CX	N	Y	EM165AA	Note 3
HP eSATA 2 port PCIe Bulkhead Kit	XW, CX	Y	Y	GM110AA	
HP Serial Port Adapter	XW, CX	Y	Y	PA716A	
HP Workstation Mouse Pad	XW, CX	Y			

Note 1: The HP Z4 G4 Memory Cooling Solution is available to add to any configuration for improved system cooling, but is required for memory configurations using Xeon Processors and 32GB Registered DIMMs.

Note 2: Fan and Front Card Guide required with the following components:
- Specific graphics configurations (see Graphics section above)
- Any HP Z Turbo Quad Pro configuration

Note 3: The HP Internal USB Port kit has a single USB 2.0 type A connector.

Supported Components

Application Software

	Processor Supports	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Sobey Video Editing SW	XW, CX	Y	N		China only
ZCentral Remote Boost	XW, CX	N	N		
Data Science Stack	XW, CX	Y	N		1, 2
WSL2/Ubuntu Data Science Stack	XW, CX	Y	N		1,3

*Not all Application Software for Z Desktop Workstations is included with purchase.
Note 1: Only available with NVIDIA graphics cards selections. Available on products equipped with Intel® 7th generation processors.
Note 2: Only available with Ubuntu 20.04 LTS preinstall.
Note 3: Only available with Windows 10 Pro/Pro for Workstations or Windows 11 Pro/Pro for Workstations.

Operating Systems

	Processor Supports	Support Notes
Windows 11 Pro for Workstations	XW	Note 1,5,6
Windows 11 Pro	CX	Note 5,6
Windows 10 Pro for Workstations	XW	Note 1,4,5,6
Windows 10 Pro	CX	Note 4,5,6
Ubuntu 20.04 LTS	XW	Note 2
HP Linux® Ready	XW, CX	Note 2
Red Hat® Enterprise Linux® (RHEL) Workstation - Paper License (1yr)	XW, CX	Note 2,3

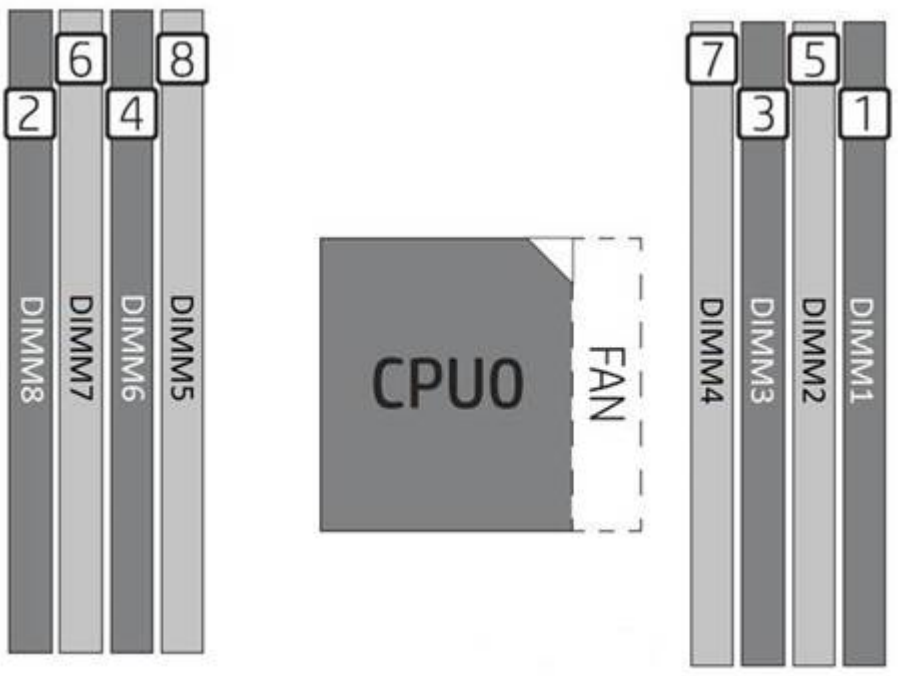
NOTE 1: Only applicable to Xeon W configurations.

NOTE 2: For detailed Linux® OS/hardware support information, see: http://www.hp.com/support/linux_hardware_matrix

NOTE 3: This second OS must be ordered with the HP Linux® Installer Kit as the first OS.
NOTE 4: Device comes with Windows 10 and a free Windows 11 upgrade or may be preloaded with Windows 11. Upgrade timing may vary by device. Features and app availability may vary by region. Certain features require specific hardware (see Windows 11 Specifications).
NOTE 5: 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.
NOTE 6: Available with Windows Subsystem for Linux® (WSL 2).

System Board

System Board Form Factor	Main System Board: 27.7 x 28.0 cm 10.9 x 11.0 inches	
Processor Socket	Single LGA2066 R4	
Chipset	**Intel® Xeon® W Processor Family** Intel® C422 Chipset	**Intel® Core™ X-series Processors** Intel® X299 chipset
Super I/O Controller	Nuvoton NPCD315HA0DX (SIO-15)	
Memory Expansion Slots	8 DDR4 memory slots	
Memory Type Supported	DDR4, RDIMM (Registered), ECC	DDR4, UDIMM, non-ECC
Memory Modes	Channel Interleaved	
Memory Speed Supported	2933MT/s, 2666MT/s, 2400MT/s, and 2133MT/s	
Memory Protection	ECC available on data, parity on address and command	N/A
Maximum Memory	Supports up to 512GB	Supports up to 256GB
Memory Configuration (Supported)	Only Registered DIMMs are supported.	Only non-ECC unbuffered DIMMs are supported
Memory Load Order		



Note on Maximum Memory	Maximum memory capacities assume 64-bit operating systems such as Windows 10 Pro. For systems installed with Microsoft Windows 7 (Ultimate, Enterprise or Pro), the maximum accessible system memory is 192GB	
PCI Express Connectors	**Intel® Xeon® W Processor Family**	**Intel® Core™ X-series Processors**
	Slot 1 (top): PCI Express Gen3 x16 supplied by CPU. **Slot 2 (PCH):** PCI Express Gen3 x4 supplied by PCH with open-ended connector. **	

System Technical Specifications

	Slot 3: PCI Express Gen3 x16 supplied by CPU	**Slot 3:** Core i9-X and Core i7-9800X configs: PCI Express Gen3 x16 supplied by CPU Core i7-X configs: PCI Express Gen3 x16 (mechanical)/ x8 (electrical)supplied by CPU
	Slot 4 (PCH): PCI Express Gen3 x4 supplied by PCH with open-ended connector**	
	Slot 5: PCI Express Gen3 x8 supplied by CPU with open-ended connector**	**Slot 5:** - Core i9-X and Core i7-9800X configs: PCI Express Gen3 x8 supplied by CPU with open-ended connector** - Other Core i7-X configs: PCI Express Gen3 x8 (mechanical-only, no data) with open-ended connector**
	NOTE: Slots 1 through 5 support full-height, full-length cards (with extender)	
	M.2 Slot 1: PCI Express Gen3 x4 supplied by CPU Socket Type 3, Key M, H4.2, sizes 2260-D5-M, 2280-D5-M, 22110-D5-M	
	M.2 Slot 2: PCI Express Gen3 x4 supplied by CPU Socket Type 3, Key M, H4.2, sizes 2260-D5-M, 2280-D5-M, 22110-D5-M	**M.2 Slot 2:** No 2nd M.2 connector/slot available
	** Open-ended connector allows a greater bandwidth (e.g. x16) card to be installed physically into a lower bandwidth connector/slot.	

Supported Drive Interfaces		
SATA	6 SATA @ 6GB/s, supports RAID 0,1, 5, and 10 Factory integrated Intel® SATA RAID is Microsoft Windows only	
Serial Attached SCSI	**Intel® Xeon® W Processor Family** Requires Optional PCIe card	**Intel® Core™ X-series Processors** not supported
Factory Configured RAID	• RAID 0 striped array • RAID 1 mirrored array • RAID 10 striped and mirrored array *HW RAID functionality not supported by Linux®. Use SW RAID functionality provided in the Red Hat® Operating system instead.	
Integrated Graphics	No	
Network Controller	**Intel® Xeon® W Processor Family** Intel® I219-LM PCIe GbE LAN Intel® I210-AT PCIe GbE LAN Supports the following management functionalities: Intel AMT11.1x, TXT, DASH 1.1, WOL, VLAN, Teaming and PXE 2.1	**Intel® Core™ X-series Processors** Intel® I219-V PCIe GbE LAN Supports the following management functionalities: WOL and PXE 2.1
External SATA (eSATA)	Supported on all SATA ports configurable with optional eSATA* cable kit * hot plug / hot swap not supported with eSATA	
IDE connector	No	
Floppy connector	No	
Serial	1 internal header	
2nd Serial	No	
Parallel	No	

System Technical Specifications

AUX IN (audio)	No
IEEE 1394 Connector(s)	
Front	None
Rear	None
Internal	None
USB Connector(s)	
Front	Front USB depends on which FIO module is selected: - Standard: 4 USB 3.1 G1 Type A (1 charging) - Premium: 2 USB 3.1 G2 Type C™, 2 USB 3.1 G1 Type A (1 charging)

Rear	**Intel® Xeon® W Processor Family**	**Intel® Core™ X-series Processors**
	6 USB 3.1 G1 Type A	5 USB 3.1 G1 Type-A
Internal	1 USB 3.1 G1 single-port header 1 USB 2.0 single-port header 1x USB 2.0 dual-port header	

HD Integrated Audio	Realtek ALC221
Flash ROM	Yes
CPU Fan Header	Yes
Rear Chassis Fan Header	Yes
Front PCI Fan Header	Yes
Front Control Panel/Speaker Header	Yes
CMOS Battery Holder - Lithium	Yes
Integrated Trusted Platform Module	Trusted Platform Module (TPM) 2.0 (Infineon SLB 9670) Common Criteria EAL4+ Certified Convertible to FIPS 140-2 Certified mode through firmware v7.85 TPM Certified products list: https://trustedcomputinggroup.org/membership/certification/tpm-certified-products/
Power Supply Headers	Yes
Power Switch, Power LED & Hard Drive LED Header	Yes
Clear Password Jumper	Yes
Serial Port	1 internal header
Parallel Port	No
Keyboard/Mouse	USB or PS/2
Hood Lock Header	Yes
Hood Sensor Header	Yes
Memory Fan	1 Memory Fan Header
AUX IN (audio)	No

Power Supply				
Power Supply	750W 90% Efficient, Custom PSU (Wide-Ranging, Active PFC)		465W 90% Efficient, Custom PSU (Wide-Ranging, Active PFC)	
Operating Voltage Range	90-269 VAC		90-269 VAC	
Rated Voltage Range	100-240 VAC	118 VAC	100-240 VAC	118 VAC
Rated Line Frequency	50-60 Hz	400 Hz	50-60 Hz	400 Hz

System Technical Specifications

Operating Line Frequency Range	47-66 Hz	393-407 Hz	47-66 Hz	393-407 Hz
Rated Input Current	100-240V @ 10A	118V @ 10A	100-240V @ 6A	118V @ 6A
Heat Dissipation (Configuration and software dependent)	Typical = 1850 btu/hr Max = 3084 btu/hr		Typical = 1147 btu/hr Max = 1912 btu/hr	
Power Supply Fan	80x25 mm variable speed		80x25 mm variable speed	
ENERGY STAR® Certified (Configuration dependent)	Yes		Yes	
	90% Efficient		90% Efficient	
80 PLUS® Compliant	The Z4 G4 750W power supply efficiency report can be found at this link: https://plugloadsolutions.com/psu_reports/HP%20INC_DPS-750AB-36%20A_750W_ECOS%204938_Report.pdf		The Z4 G4 465W power supply efficiency report can be found at this link: https://plugloadsolutions.com/psu_reports/HP%20INC_DPS-465AB-3%20A_465W_ECOS%204939_Report.pdf	
Power Supply	1000W 90% Efficient, Custom PSU (Wide-Ranging, Active PFC)			
Operating Voltage Range	90-269 VAC			
Rated Voltage Range	100-127 VAC 200-240 VAC		118 VAC	
Rated Line Frequency	50-60 Hz		400 Hz	
Operating Line Frequency Range	47-66 Hz		393-407 Hz	
Rated Input Current	12A @100-127 VAC 6.3A @ 200-240 VAC		12A @ 118VAC	
Heat Dissipation (Configuration and software dependent)	Typical = 2467 btu/hr Max = 4112 btu/hr			
Power Supply Fan	80x25 mm variable speed			
ENERGY STAR® Certified (Configuration dependent)	Yes			
	90% Efficient			
80 PLUS® Compliant	The Z4 G4 1000W power supply efficiency report can be found at this link: https://plugloadsolutions.com/psu_reports/HP_D15-1K0P1A_1000W_ECOS%204838_Report.pdf			
FEMP Standby Power Compliant @115V <1W in S5 - Power Off)	Yes		Yes	
EuP Compliant @ 230V (<0.5 W in S5 - Power Off)	Yes		Yes	
CECP Compliant @ 220V (<4W in S3 - Suspend to RAM)	Yes; Configuration dependent		Yes; Configuration dependent	
Power Consumption in sleep mode (as defined by ENERGY STAR®) - Suspend to RAM (S3) (Instantly Available PC)	TBD		TBD	
Built-in Self Test LED	Yes		Yes	
Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)	Yes		Yes	

NOTE: 1000 W internal power supply, up to 90% efficiency, active PFC available the first half of 2018

System Configuration

Example Z4 G4 Workstation Configuration #1 ENERGY STAR® Certified	Processor	1x Intel Xeon W-2102 4C 2.9GHz					
	Memory	1x 8GB DDR4-2666 (Registered DIMM)					
	Graphics	1x NVIDIA Quadro P400					
	Disks / Optical	1x 500GB SATA 7200 ; 1x Slim DVD-ROM SATA					
	Power Supply	465W 90% custom PSU					
	Other	N/A					
Energy Consumption		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	42.323		41.338		42.585	
	Windows Busy Typ(S0)	TBD		TBD		TBD	
	Windows Busy Max (S0)	90.231		92.323		90.786	
	Sleep (S3)	3.449	3.440	3.566	3.558	3.530	3.410
	Off (S5)	1.041	1.014	1.242	1.231	1.310	1.180
	Zero Power Mode (ErP)	0.187		0.43		0.174	
Heat Dissipation **(Btu/hr)**		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled
	Windows Idle (S0)	144.406		141.045		145.301	
	Windows Busy Typ(S0)	TBD		TBD		TBD	
	Windows Busy Max (S0)	307.868		315.006		309.761	
	Sleep (S3)	11.767	11.737	12.167	12.140	12.044	11.634
	Off (S5)	3.551	3.459	4.237	4.200	4.469	4.026
	Zero Power Mode (ErP)	0.638		1.467		0.594	

Example Z4 G4 Workstation Configuration #2 ENERGY STAR® Certified	Processor	1x Intel Xeon W-2123 4C 3.6GHz					
	Memory	2x 8GB DDR4-2666 (Registered DIMM)					
	Graphics	1x NVIDIA QuadroP1000					
	Disks / Optical	1x 500GB SATA 7200 ; 1x Slim DVD-ROM SATA					
	Power Supply	750W 90% custom PSU					
	Other	N/A					
Energy Consumption (Watts)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	39.947		39.569		40.956	
	Windows Busy Typ(S0)	TBD		TBD		TBD	
	Windows Busy Max (S0)	149.543		150.789		147.845	
	Sleep (S3)	3.615	3.566	3.801	3.798	3.634	3.621
	Off (S5)	1.079	1.016	1.440	1.238	1.320	1.170
	Zero Power Mode (ErP)	0.204		0.430		0.191	
		115 VAC		230 VAC		100 VAC	

System Technical Specifications

Heat Dissipation (Btu/hr)		LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled
	Windows Idle (S0)	136.299		135.009		139.741	
	Windows Busy Typ(S0)	TBD		TBD		TBD	
	Windows Busy Max (S0)	510.241		514.492		504.447	
	Sleep (S3)	12.338	12.167	12.969	12.959	12.399	12.355
	Off (S5)	3.681	3.466	4.913	4.224	4.504	3.992
	Zero Power Mode (ErP)	0.696		1.467		0.651	

Example Z4 G4 Workstation Configuration #3	Processor	1x Intel Xeon W-2133 6C 3.6GHz					
	Memory	4x 8GB DDR4-2666 (Registered DIMM)					
	Graphics	1x NVIDIA QuadroP2000					
	Disks/Optical	2x 1TB SATA7200 ; 1x Slim SuperMulti DVDRW SATA					
	Power Supply	750W 90% custom PSU					
	Other	N/A					
Energy Consumption (Watts)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	48.759		46.321		46.578	
	Windows Busy Typ(S0)	TBD		199.56		206.055	
	Windows Busy Max (S0)	209.60		208.66		198.82	
	Sleep (S3)	4.360	4.351	4.538	4.508	4.299	4.277
	Off (S5)	1.039	1.017	1.42	1.219	1.015	0.997
	Zero Power Mode (ErP)	0.203		0.399		0.191	
Heat Dissipation (Btu/hr)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled
	Windows Idle (S0)	166.366		258.047		158.924	
	Windows Busy Typ(S0)	TBD		TBD		TBD	
	Windows Busy Max (S0)	715.155		711.947		678.373	
	Sleep (S3)	14.876	14.845	15.483	15.381	14.668	14.593
	Off (S5)	3.544	3.470	4.845	4.179	3.463	3.402
	Zero Power Mode (ErP)	0.692		1.361		0.651	

System Technical Specifications

Example Z4 G4 Workstation Configuration #4	Processor	1x Intel Xeon W-2155 10C 3.3GHz					
	Memory	8x 32GB DDR4-2666 (Registered DIMM)					
	Graphics	1x NVIDIA QuadroP6000					
	Disks / Optical	4x 2TB SATA 7200 ; 0x ODD					
	Power Supply	750W 90% custom PSU					
	Other	N/A					
Energy Consumption (Watts)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	65.959		69.321		68.635	
	Windows Busy Typ(S0)	TBD		TBD		TBD	
	Windows Busy Max (S0)	463.23		456.95		503.125	
	Sleep (S3)	6.336	6.102	6.971	6.189	6.266	6.264
	Off (S5)	1.047	1.036	1.254	1.222	1.014	0.995
	Zero Power Mode (ErP)	0.203		0.399		0.191	
Heat Dissipation (Btu/hr)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled
	Windows Idle (S0)	225.052		236.523		234.183	
	Windows Busy Typ(S0)	TBD		TBD		TBD	
	Windows Busy Max (S0)	1580.541		1559.113		1716.663	
	Sleep (S3)	21.618	20.821	23.785	21.117	21.379	21.372
	Off (S5)	3.572	3.534	4.278	4.169	3.459	3.394
	Zero Power Mode (ErP)	0.692		1.361		0.652	

Example Z4 G4 Workstation Configuration #5	Processor	1x Intel Core i7-7800X 3.5GHz 6C					
	Memory	2x 8GB DDR4-2666 (non-ECC DIMM)					
	Graphics	1x NVIDIA Quadro P1000					
	Disks / Optical	1x 1TB SATA 7200 : 1x Slim DVD-ROM SATA					
	Power Supply	1000W 90% custom PSU					
	Other	N/A					
Energy Consumption (Watts)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	46.909		47.175		46.909	
	Windows Busy Typ(S0)	TBD		TBD		TBD	
	Windows Busy Max (S0)	201.83		199.97		203.41	
	Sleep (S3)	3.041	2.971	3.165	3.041	2.971	3.165
	Off (S5)	0.978	0.898	1.159	0.978	0.898	1.159
	Zero Power Mode (ErP)	0.199		0.379		0.187	
Heat Dissipation (Btu/hr)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled
	Windows Idle (S0)	160.053		160.961		160.053	
	Windows Busy Typ(S0)	TBD		TBD		TBD	
	Windows Busy Max (S0)	688.644		682.297		694.035	
	Sleep (S3)	10.376	10.137	10.799	10.376	10.137	10.799

System Technical Specifications

	Off (S5)	3.337	3.064	3.954	3.337	3.064	3.954
	Zero Power Mode (ErP)	0.678		1.293		0.638	

Example Z4 G4 Workstation Configuration #6	Processor	1x Intel Core i7-7920X 2.9GHz 12C					
	Memory	4x 16GB DDR4-2666 (non-ECC DIMM)					
	Graphics	1x NVIDIA Quadro P4000					
	Disks / Optical	2x 2TB SATA 7200 : 1x Slim DVD-ROM SATA					
	Power Supply	1000W 90% custom PSU					
	Other	N/A					
Energy Consumption (Watts)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	53.392		51.332		53.367	
	Windows Busy Typ(S0)	TBD		TBD		TBD	
	Windows Busy Max (S0)	318.58		307.82		319.71	
	Sleep (S3)	3.558	3.486	3.694	3.558	3.486	3.694
	Off (S5)	0.972	0.895	1.160	0.972	0.895	1.160
	Zero Power Mode (ErP)	0.201		0.391		0.186	
Heat Dissipation (Btu/hr)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled
	Windows Idle (S0)	182.174		175.144		182.088	
	Windows Busy Typ(S0)	TBD		TBD		TBD	
	Windows Busy Max (S0)	1086.994		1050.281		1090.851	
	Sleep (S3)	12.139	11.894	12.604	12.139	11.894	12.604
	Off (S5)	3.316	3.054	3.957	3.316	3.054	3.957
	Zero Power Mode (ErP)	0.685		1.334		0.634	

NOTE: Power consumption measurements do not take advantage of the Intel Turbo Boost Technology. As a result, power consumption measurements may be higher.

Declared Noise Emissions

Declared Noise Emissions (Entry-level and High-end configurations)		
System Configuration (Entry level)	**Processor Info**	Intel® Xeon® W-2125 4.0 2666 4C CPU
	Memory Info	32GB (4x8GB) DDR4-2666 ECC Reg RAM
	Graphics Info	1-NVIDIA® Quadro® P400 2GB
	Disks/Optical	1-500GB SATA 7200RPM 3.5"? HDD / 1-HP 9.5mm Slim Blu Ray Disc Writer
	Power Supply	465 W

System Technical Specifications

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	3.2	13
	Hard drive Operating (random reads)	3.4	15

System Configuration (High end)	**Processor Info**	Intel® Xeon® W-2155 3.3 2666 10C
	Memory Info	128GB (8x16GB) DDR4-2666 ECC Reg RAM
	Graphics Info	1-NVIDIA® Quadro® P6000 24GB
	Disks/Optical	2-4TB SATA 7200RPM Ent 3.5"? / 1-HP 9.5mm Slim Blu Ray Disc Writer
	Power Supply	750 W

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	3.5	22
	Hard drive Operating (random reads)	3.7	23

System Configuration (Entry Level 2)	**Processor Info**	Intel® Core i9-7900X 3.3 2666 10C
	Memory Info	32GB (4x8GB) DDR4-2666 nECC RAM
	Graphics Info	1-NVIDIA® Quadro® P400 2GB
	Disks/Optical	1-500GB SATA 7200RPM Ent 3.5"? / 1-HP 9.5mm Slim Blu Ray Disc Writer
	Power Supply	1000 W

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	3.4	16
	Hard drive Operating (random reads)	3.5	17

System Configuration (High end 2)	**Processor Info**	Intel®Core i9-7980XE 2.6 2666 18C
	Memory Info	128GB (8x16GB) DDR4-2666 nECC RAM
	Graphics Info	1-NVIDIA® Quadro® P6000 24GB
	Disks/Optical	2-4TB SATA 7200RPM Ent 3.5"? / 1-HP 9.5mm Slim Blu Ray Disc Writer
	Power Supply	1000 W

System Technical Specifications

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	3.5	20
	Hard drive Operating (random reads)	3.7	21

NOTE: Higher noise levels may be experienced with non-HP approved graphic card(s). Some consumer graphics cards have side blowing fans that may heat up thermal sensor(s) on the mother board causing fans to ramp.

Environmental Data

Environmental Requirements	**Temperature**	Non-operating: -40° to 60° C (-40° to 140° F) Operating: 5° to 35° C (40° to 95° F) Above 1524 m (5,000 feet) altitude, the maximum operating temperature is reduced by 1° C (1.8° F) for every 305 m (1,000 feet) increase in elevation Maximum rate of change: 10 °C/hr No direct sustained sunlight
	Humidity	Operating: 10% to 85% RH, non-condensing, 35° C maximum wet bulb Non-operating: 10% to 90% RH, non-condensing, 35° C maximum wet bulb
	Maximum Altitude	Operating (with Rotational Hard Drives): 3,048 m (10,000 feet) Operating (with only Solid-State Drives): 5,000 m (16,404 feet) Non-operating: 12,192 m (40,000 feet) Maximum operating temperature is reduced as altitude increases. See Temperature for details.
	Shock (non-repetitive)	Operating: ?-sine: 40g, 2-3ms (~62 cm/sec) Non-operating: ?-sine: 160 cm/s, 2-3ms (~105g) Non-operating square: 422 cm/s, 20g
	Vibration	Operating random: 0.5g (rms), 5-300 Hz, up to 0.0025g?/Hz Non-operating random: 2.0g (rms), 5-500 Hz, up to 0.0150 g?/Hz

Physical Security and Serviceability

Access Panel	Tool-less Includes system board and memory information.
Hard Drives	Tool-less
Expansion Cards	Tool-less
Processor Socket	Tool-less
Blue User Touch Points	Yes, on primary serviceable components.
Color-coordinated Cables and Connectors	Yes
Memory	Tool-less
System Board	Screw-In
Dual Color Power/Failure LED	Yes

System Technical Specifications

HDD Activity LED	Yes Note: HDD Activity LED is not dual-color
Configuration Record SW	Yes
Over-Temp Warning on Screen	Yes, at POST screen on reboot
Restore CD/DVD Set	Restores the computer to its original factory shipping image; can be obtained via HP Support.
Dual Function Front Power Switch	Yes, causes a fail-safe power off when held for 4 seconds
Padlock Support	Yes (optional): Locks side cover and secures chassis from theft 7.0 mm (0.2756 in) diameter padlock loop at rear of system
Cable Lock Support	Yes, Kensington Cable Lock (optional): Locks side cover and secures chassis from theft 3 mm x 7 mm slot at rear of system
Universal Chassis Clamp Lock Support	Yes (optional): Locks side cover and locks cables to chassis. Secures chassis from theft and allows multiple units to be chained together when used with optional cable Threaded feature at rear of system
Solenoid Lock and Hood Sensor	Yes (optional) The Solenoid Hood Lock eliminates the need for a physical key by making the chassis lockable through software and a password. You can also lock and unlock the chassis remotely over the network. The Sensor Ki detects when the access panel has been removed
Serial, Parallel, USB, Audio, Network, Enable/Disable Port Control	Yes, enables or disables serial, USB, audio, and network ports
Removable Media Write/Boot Control	Yes, prevents ability to boot from removable media on supported devices (and can disable writes to media)
Power-On Password	Yes, prevents an unauthorized person from booting up the workstation
Setup Password	Yes, prevents an unauthorized person from changing the workstation configuration
3.3V Aux Power LED on System PCA	Yes
NIC LEDs (integrated) (Green & Amber)	Yes
CPUs and Heatsinks	A T-15 Torx or flat blade screwdriver is needed to remove the CPU heatsink before the CPU can be removed. CPU removal is tool-less
Power Supply Diagnostic LED	Yes
Front Power Button	Yes, ACPI multi-function
Rear Power Button	Yes
Front Power LED	Yes, white (normal), red (fault)
Front Hard Drive Activity LED	Yes, white
Front ODD Activity LED	Yes, on device
Internal Speaker	Yes
System/Emergency ROM Flash Recovery	Recovers corrupted system BIOS.
Cooling Solutions	Air cooled forced convection heatsinks
Power Supply Fans	80 mm x 80 mm x 25 mm (non-serviceable)

CPU Heatsink Fan	**Intel® Xeon® W Processor Family**	**Intel® Core™ X-series Processors**
	CPU configs <= 140W: 92 mm x 92 mm x 25 mm, 5-wire, PWM	CPU configs <= 140W: 92 mm x 92 mm x 25 mm, 5-wire, PWM
	CPU configs > 140W: 92 mm x 92 mm x 25 mm, 6-wire, PWM (includes 6-to-5pin cable adapter)	CPU configs > 140W: 92 mm x 92 mm x 25 mm, 6-wire, PWM (includes 6-to-5pin cable adapter)

System Technical Specifications

Chassis Fan	Front: (Optional) 92 mm x 92mm x 25 mm, 4-wire, PWM Rear: 120 mm x 120mm x 25 mm, 4-wire, PWM
Memory Heatsink Fan	Dual 60 mm x 60 mm x 25 mm, 6-wire, PWM, Blindmate (optional based on configuration)
HP PC Hardware Diagnostics UEFI	HP PC Hardware Diagnostics (UEFI) enables hardware level testing outside the operating system on many components. The diagnostics can be invoked by pressing ESC then F2 upon the PC reboot, and is available as a download from HP Support.
Access Panel Key Lock	Yes, side panel barrel keylock (optional from the factory only)
ACPI-Ready Hardware	Advanced Configuration and Power Management Interface (ACPI). • Allows the system to wake from a low-power mode. • Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system
Trusted Platform Module Chip	Infineon TPM 2.0 Certified
Integrated Chassis Handles	Yes, Front handle and dedicated rear recess
Power Supply	Requires T15 Torx or flat blade screwdriver
PCIe Card Retention	Yes, rear (all), middle (all), front (full-length cards with extender, using HP Z4 G4 Fan and Front Card Guide Kit)
Flash ROM	Yes
Diagnostic Power Switch LED on board	Yes
Clear Password Jumper	Yes
Clear CMOS Button	Yes
CMOS Battery Holder	Yes
DIMM Connectors	Yes

BIOS

BIOS 32-bit Services	Standard BIOS 32-bit Service Directory Proposal v0.4
PCI 3.0 Support	Full BIOS support for PCI Express through industry standard interfaces.
ATAPI	ATAPI Removable Media Device BIOS Specification Version 1.0.
BBS	BIOS Boot Specification v1.01.
WMI Support	WMI is Microsoft's implementation of Web-Based Enterprise Management (WBEM) for Windows. WMI is fully compliant with the Distributed Management Task Force (DMTF) Common Information Model (CIM) and WBEM specifications.
BIOS Boot Spec 1.01+	Provides more control over how and from what devices the workstation will boot.
BIOS Power On	Users can define a specific date and time for the system to power on.
ROM Based Computer Setup Utility (F10)	Review and customize system configuration settings controlled by the BIOS.
System/Emergency ROM Flash Recovery with Video	Recovers system BIOS in corrupted Flash ROM.
Replicated Setup	Saves BIOS settings to USB flash device in human readable file (HpSetup.txt). BiosConfigUtility.exe utility can then replicate these settings on machines being deployed without entering Computer Configuration Utility (F10 Setup).
SMBIOS	System Management BIOS 2.8, for system management information.
Boot Control	Disables the ability to boot from removable media on supported devices.
Memory Change Alert	Alerts management console if memory is removed or changed.
Thermal Alert	Monitors the temperature state within the chassis. Three modes: • NORMAL - normal temperature ranges.

System Technical Specifications

	• ALERTED - excessive temperatures are detected. Raises a flag so action can be taken to avoid shutdown or provide for a smoother system shutdown. • SHUTDOWN - excessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs.
Remote ROM Flash	Provides secure, fail-safe ROM image management from a central network console.
ACPI (Advanced Configuration and Power Management Interface)	Allows the system to enter and resume from low power modes (sleep states). Enables an operating system to control system power consumption based on the dynamic workload. Makes it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system. Supports ACPI 5.0 for full compatibility with 64-bit operating systems.
Ownership Tag	A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen.
Remote Wakeup/Remote Shutdown	System administrators can power on, restart, and power off a client computer from a remote location with Intel Xeon W Processors. For systems with Intel Core X-Series Processors, Wake on LAN is supported, however to remotely restart or shutdown a system, a remote desktop application must be used to manually Restart or Shutdown.
Instantly Available PC (Suspend to RAM - ACPI sleep state S3)	Allows for very low power consumption with quick resume time.
Remote System Installation via F12 (PXE 2.1) (Remote Boot from Server)	Allows a new or existing system to boot over the network and download software, including the operating system.
ROM revision levels	Reports the system BIOS revision level in Computer Configuration Utility (F10 Setup). Version is available through an industry standard interface (SMBIOS and WMI) so that management SW applications can use and report this information.
System board revision level	Allows management SW to read revision level of the system board. Revision level is digitally encoded into the HW and cannot be modified.
Start-up Diagnostics (Power-on Self-Test)	Assesses system health at boot time with selectable levels of testing.
Auto Setup when new hardware installed	System automatically detects addition of new hardware.
Keyboard-less Operation	The system can be booted without a keyboard.
Localized ROM Setup	Common BIOS image supports System Configuration Utility (F10 Setup) menus in 14 languages with local keyboard mappings.
Asset Tag	The user or MIS to set a unique tag string in non-volatile memory.
Per-slot Control	Allows I/O slot parameters (option ROM enable/disable, bus latency) to be configured individually.
Adaptive Cooling	Control parameters are set according to detected hardware configuration for optimal acoustics.
Pre-boot Diagnostics	(Pre-video) critical errors are reported via beeps and blinks on the power LED.
Industry Standard Specification Support	
Industry Standard	Revision Supported by the BIOS
UEFI Specification Revision	2.6
ACPI	Advanced Configuration and Power Management Interface, Version 5.0
ATA (IDE)	AT Attachment 6 with Packet Interface (ATA/ATAPI-6), Revision 3b
CD Boot	"El Torito" Bootable CD-ROM Format Specification Version 1.0
EDD	- Enhanced Disk Drive Specification Version 1.1 - BIOS Enhanced Disk Drive Specification Version 3.0
EHCI	Enhanced Host Controller Interface for Universal Serial Bus, Revision 1.0
PCI	PCI Local Bus Specification, Revision 2.3 PCI Power Management Specification, Revision 1.1 PCI Firmware Specification, Revision 3.0, Draft .7
PCI Express	PCI Express Base Specification, Revision 2.0 PCI Express Base Specification, Revision 3.0
PMM	POST Memory Manager Specification, Version 1.01

System Technical Specifications

SATA	Serial ATA Specification, Revision 1.0a Serial ATA 3 Gb/s: Serial ATA Specification, Revision 2.5 Serial ATA 6 Gb/s: Serial ATA Specification, Revision 3.0
SPD	PC SDRAM Serial Presence Detect (SPD) Specification, Revision 1.2B
TPM	Trusted Platform Module (TPM) 2.0 (Infineon SLB 9670) Common Criteria EAL4+ Certified FIPS 140-2 Certified TCG TPM Certified products list: http://www.trustedcomputinggroup.org/certification/tpm-certified-products/
UHCI	Universal Host Controller Interface Design Guide, Revision 1.1
USB	Universal Serial Bus Revision 1.1 Specification Universal Serial Bus Revision 2.0 Specification Universal Serial Bus Revision 3.1 G1 Specification Universal Serial Bus Revision 3.1 G2 Specification
SMBIOS	System Management BIOS Reference Specification, Version 2.8 External BIOS simulator found at: http://h20464.www2.hp.com/index.html

Social and Environmental Responsibility

Eco-Label Certifications & Declarations

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

- ENERGY STAR® (energy-saving features available on selected configurations-Windows only)
- US Federal Energy Management Program (FEMP)
- China Energy Conservation Program
- The ECO declaration (TED)
- TCO Certified configurations available*

*TCO Certified configurations available when ENERGY STAR configurations are selected with a USB Type-C® connector. ENERGY STAR available with a combination of high-performance CPU's, high-performance GPU's and select memory configurations.

The Z4 G4 is registered EPEAT® Silver in the US and Canada. EPEAT® registration varies by country. See http://www.epeat.net for registration status by country. Search keyword generator on HP's 3rd party option store for solar generator accessories at http://www.hp.com/go/options

Batteries

The battery in this product complies with EU Directive 2006/66/EC
Battery mass: 3g
Battery type: Lithium Metal

The battery in this product does not contain:

- Mercury greater than 5ppm by weight
- Cadmium greater than 10ppm by weight
- Lead greater than 40ppm by weight

Restricted Material Usage

This product meets the material restrictions specified in HP's General Specification for the Environment.

HP Inc. is committed to compliance with all applicable environmental laws and regulations, including the European Union Restriction of Hazardous Substances (RoHS) Directive. HP's goal is to exceed compliance obligations by meeting the requirements of the RoHS Directive on a worldwide basis

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Low Halogen Statement

This product is low halogen except for power cords, external cables and peripherals. Service parts obtained after purchase may not be low halogen.
(Note: optional low halogen power cables are available for some countries in Europe)

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/recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner. This product is greater than 90% recyclable by weight when properly disposed of at end of life.

System Technical Specifications

HP Inc. Corporate Environmental Information	For more information about HP's commitment to the environment: Sustainability Report Eco-label certifications ISO 14001 certificates
Additional Information	• This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive - 2002/96/EC. Product Disassembly Instructions • Plastic parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.
Packaging	HP Workstation product packaging meets the HP's General Specification for the Environment • Does not contain restricted substances listed in HP Standard 011-1 General Specification for the Environment • Does not contain ozone-depleting substances (ODS) • Does not contain heavy metals (lead, mercury, cadmium or hexavalent chromium) in excess of 100 ppm sum total for all heavy metals listed • Maximizes the use of post-consumer recycled content materials in packaging materials • All packaging material is recyclable • All packaging material is designed for ease of disassembly • Reduced size and weight of packages to improve transportation fuel efficiency • Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards formatting • A multi-unit eco packaging option is available to institutional customers that uses less packaging material or has a lower volume footprint than conventional single-unit packaging. Please contact your sales representative for additional details.
Packaging Materials	
Internal	Cushions and plastic bags made of low density polyethylene (LDPE).
External	Outer carton, accessories carton, and insert made of corrugated paper board.

Manageability

	Intel® Xeon® W Processor Family	Intel® Core™ X-series Processors
Industry Standard Specifications	This product meets the following industry standard specifications for manageability functionality: • DASH 1.1 (via Intel® LAN on motherboard)	None apply
Intel Active Management Technology (AMT)	Intel® Active Management Technology (AMT) 11.1x An advanced set of remote management features and functionality providing IT administrators the latest and most effective tools to remotely discover, heal, and protect networked client systems regardless of the system's health or power state. AMT 11.1x includes the following advanced management functions: • Power Management (on, off, reset, graceful shutdown, sleep and hibernate) ○ Support in Max Power Savings (Shutdown and Hibernate Modes) • Hardware Inventory (includes BIOS and firmware revisions) • Hardware Alerting • Agent Presence • System Defense Filters • Serial Over LAN (SOL) • USB Redirect (Media Redirection) • ME Wake-on-LAN (WOL), even with Maximum Power Savings Enabled • DASH 1.1 compliance • IPv6 Support • Fast Call for Help - a client inside or outside the firewall may initiate a call for help via BIOS	

System Technical Specifications

	screen, periodic connections, or alert triggered connection • Remote Scheduled Maintenance - pre-schedule when the system connects to the IT or service provider console for maintenance. • Remote Alerts - automatically alert IT or service provider if issues arise • Access Monitor - Provides oversight into Intel® AMT actions to support security requirements • PC Alarm Clock • Microsoft NAP Support • Host Base set-up and configuration • Management Engine (ME) firmware roll back • Local Time Sync to UTC • Remote Memory Dump Command - Creates memory dump for debug	
Intel® vPro™ Technology	The HP Z4 G4 Workstation supports Intel® vPro™ technology when configured as outlined below: • Intel® Xeon® processor W-2100 product family featuring Intel® vPro™ Technology • Intel® C422 chipset • Intel® I219LM GbE LAN	Not supported
Remote Manageability Software Solutions	The HP Z4 G4 Workstation is supported on the following optional remote manageability software consoles: • LANDesk Management Suite (HP recommended solution) • Microsoft System Center Configuration Manager For questions or support for manageability needs, please visit http://www.hp.com/go/easydeploy	• Microsoft System Center Configuration Manager
System Software Manager	For easydeploy questions or support for SSM, please visit: http://www.hp.com/go/ssm	
Service, Support, and Warranty	On-site Warranty and Service (Note 1): Three-years, limited warranty and service offering delivers on-site, next business-day (Note 2) service for parts and labor and includes free telephone support (Note 3) 8am - 5pm. Global coverage (Note 2) ensures that any product purchased in one country and transferred to another, non-restricted country will remain fully covered under the original warranty and service offering. 24/7 operation will not void the HP warranty. **NOTE 1:** Terms and conditions may vary by country. Certain restrictions and exclusions apply. **NOTE 2:** On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country. **NOTE 3:** Technical telephone support applies only to HP-configured, HP and HP-qualified, third-party hardware and software. Toll-free calling and 24x7 support service may not be available in some countries. HP Care Pack Services extend service contracts beyond the standard warranties. Service starts from date of hardware purchase. To choose the right level of service for your HP product, use the HP Care Pack Services Lookup Tool at: http://www.hp.com/go/lookuptool. Service levels and response times for HP Care Packs may vary depending on your geographic location.	
Product Change Notification	• Program to proactively communicate Product Change Notifications (PCNs) and Customer Advisories by email to customers, based on a user-defined profile. • PCNs provide advance notification of hardware and software changes to be implemented in the factory providing time to plan for transition. • Customer Advisories provide concise, effective problem resolution, greatly reducing the need to call technical support.	

Stable & Consistent Offerings

As part of its commitment to hardware, software, and solution innovation, HP is proud to introduce this breakthrough platform configuration stability to HP Workstation customers. HP Stable & Consistent Offerings are built on the foundation of a carefully chosen set of hardware designed and tested to work with all HP Z Workstation platforms through their end of life. These components and their corresponding HP Workstation platform compatibility are outlined in this section.

HP Stable & Consistent Offerings are available worldwide to all HP Workstation customers-no special programs, no additional cost-no kidding. Simply select your hardware components when you customize your HP Workstation and be assured that you'll be able to buy that same configuration throughout the lifecycle of the product.

Processors	N/A
Hard Drives	1TB SATA 7200 RPM
Graphics	N/A

Intel® Xeon® W-Series CPU

Intel® Xeon® W-2295 3.0 2933 18C CPU
Intel® Xeon® W-2275 3.3 2933 14C CPU
Intel® Xeon® W-2265 3.5 2933 12C CPU
Intel® Xeon® W-2255 3.7 2933 10C CPU
Intel® Xeon® W-2245 3.9 2933 8C CPU
Intel® Xeon® W-2235 3.8 2933 6C CPU
Intel® Xeon® W-2225 4.1 2933 4C CPU
Intel® Xeon® W-2223 3.6 2933 4C CPU
Intel® Xeon® W-2145 3.7 2666 8C CPU
Intel® Xeon® W-2133 3.6 2666 6C CPU
Intel® Xeon® W-2125 4.0 2666 4C CPU
Intel® Xeon® W-2123 3.6 2666 4C CPU
Intel® Xeon® W-2104 3.2 2400 4C CPU
Intel® Xeon® W-2102 2.9 2400 4C CPU

Intel® Core™ X-Series CPU

Intel® Core™ i9-10980XE 3.0 2933 18C CPU
Intel® Core™ i9-10940X 3.3 2933 14C CPU
Intel® Core™ i9-10920X 3.5 293312C CPU
Intel® Core™ i9-10900X 3.7 2933 10C CPU
Intel® Core™ i7-9800X 3.8 2666 8C CPU

Note: This list is just to indicate support, not availability. The above processors have all been qualified with the HP Z4 G4, but may not be available to order.

Storage/Hard Drives

HP SAS (Serial Attached SCSI) Hard Drives for HP Workstations	**HP 300GB SAS 15K SFF HDD**	**Capacity**	300GB	
		Height	5.9 in; 15 cm	
		Width	**Media Diameter**	3.5 in; 8.9 cm
		Interface	12Gb/s SAS	
		Synchronous Transfer Rate (Maximum)	Up to 1200 MB/s (SAS single port)*	
		Buffer	128MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Average**	2.0ms *
		Rotational Speed	15K rpm	
		Operating Temperature	41° to 131° F (5° to 55° C)	
		*Actual performance may vary.		
SATA (Serial ATA) Hard Drives for HP Workstations	**500GB SATA 7200 rpm 6Gb/s 3.5" HDD**	**Capacity**	500GB	
		Height	1 in; 2.54 cm	
		Width	**Media Diameter**	3.5 in; 8.9 cm
			Physical Size	4 in; 10.17 cm
		Interface	Serial ATA (6.0Gb/s), NCQ enabled	
		Synchronous Transfer Rate (Maximum)	Up to 600MB/s*	
		Buffer	16MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2 ms*
			Average	11 ms*
			Full Stroke	21 ms*
		Rotational Speed	7,200 rpm	
		Logical Blocks	976,773,168	
		Operating Temperature	41° to 131° F (5° to 55° C)	
		*Actual performance may vary.		
	1TB SATA 7200 rpm 6Gb/s 3.5" HDD	**Capacity**	1TB	
		Height	1 in; 2.54 cm	
		Width	**Media Diameter**	3.5 in; 8.9 cm
			Physical Size	4 in; 10.17 cm
		Interface	Serial ATA (6.0Gb/s), NCQ enabled	
		Synchronous Transfer Rate (Maximum)	Up to 600 MB/s*	
		Buffer	64MB	
		Cache	Adaptive	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2 ms*
			Average	11 ms*
			Full Stroke	21 ms*

Technical Specifications - Hard Drives

	Rotational Speed	7,200 rpm	
	Operating Temperature	41° to 131° F (5° to 55° C)	
	*Actual performance may vary.		
2.0TB SATA 7200 rpm 6Gb/s 3.5" HDD CMR	**Capacity**	2.0TB	
	Height	1 in; 2.54 cm	
	Width	**Media Diameter**	3.5 in; 8.9 cm
		Physical Size	4 in; 10.17 cm
	Interface	Serial ATA (6.0 Gb/s), NCQ Enabled	
	Synchronous Transfer Rate (Maximum)	Up to 600 MB/s*	
	Buffer	64MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	1.0 ms*
		Average	11 ms*
		Full Stroke	18 ms*
	Rotational Speed	7,200 rpm	
	Logical Blocks	3,907,029,168	
	Operating Temperature	41° to 131° F (5° to 55° C)	
	*Actual performance may vary.		
2.0TB SATA 7200 rpm 6Gb/s 3.5" HDD SMR	**Capacity**	2.0TB	
	Height	1 in; 2.54 cm	
	Width	**Media Diameter**	3.5 in; 8.9 cm
		Physical Size	4 in; 10.17 cm
	Interface	Serial ATA (6.0 Gb/s), NCQ Enabled	
	Synchronous Transfer Rate (Maximum)	Up to 600 MB/s*	
	Buffer	64MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	1.2 ms*
		Average	12 ms*
		Full Stroke	21 ms*
	Rotational Speed	7,200 rpm	
	Logical Blocks	3,907,029,168	
	Operating Temperature	41° to 140° F (5° to 60° C)	
	*Actual performance may vary.		

Technical Specifications - Hard Drives

1TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	**Capacity**	1TB	
	Protocol	SATA	
	Form Factor	3.5"	
	Controller	AHCI	
	Reliability (MTBF)	2.0M hours	
	Rated Power On Hours	8760/yr	
	Annualized Failure Rate (based on Rated POH)	<0.62%	
	Rated for 24/7/365 operation	YES	
	Physical Size (Height)	1 in; 2.54 cm	
	Physical Size (Width)	4 in; 10.17 cm	
	Media Diameter	3.5 in; 8.9 cm	
	Interface	Serial ATA (6Gb/s), NCQ enabled	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s*	
	Buffer	128MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.32ms*
		Average	7.45ms*
		Full Stroke	14.2ms*
	Operating Temperature	41° to 140° F (5° to 60° C)	
	Performance	**Sequential Read**	up to 226MB/s*
		Sequential Write	up to 226MB/s*
	Enterprise Class Features	High Reliability	
	*Actual performance may vary.		
4TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	**Capacity**	4TB	
	Height	0.275 in; 0.7 cm	
	Width	**Media Diameter**	2.5 in; 6.36 cm
		Physical Size	2.75 in; 6.99 cm
	Interface	Serial ATA (6Gb/s), NCQ enabled	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s*	
	Buffer	128MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.7ms*
		Average	8.5ms*
		Full Stroke	15.7ms*
	Rotational Speed	7,200 rpm	
	Operating Temperature	32° to 140° F (0° to 60° C)	
	*Actual performance may vary.		

Technical Specifications - Hard Drives

	500GB SATA 7.2K SED SFF HDD	**Capacity**	500GB	
		Height	0.275 in; 0.7 cm	
		Width	**Media Diameter**	2.5 in; 6.36 cm
			Physical Size	2.75 in; 6.99 cm
		Interface	Serial ATA (6Gb/s)	
		Synchronous Transfer Rate (Maximum)	Up to 600MB/s*	
		Buffer	32MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	1ms*
			Average	4.2ms*
			Full Stroke	25ms (typical)*
		Rotational Speed	7,200 rpm	
		Operating Temperature	32° to 140° F (0° to 60° C)	
		*Actual performance may vary.		
SATA SSDs for HP Workstations	**HP 256GB SATA 6Gb/s SSD**	**Capacity**	256GB	
		Protocol	SATA	
		Form Factor	2.5"	
		Controller	AHCI	
		NAND Type	3D TLC	
		Endurance	192TBW (TB Written)	
		Reliability (MTTF)	1.5M hours	
		Physical Size (Height)	0.28 in; 0.7 cm	
		Physical Size (Width)	2.5 in; 6.36 cm	
		Interface	SATA 6Gb/s	
		Synchronous Transfer Rate (Maximum)	Up to 600MB/s*	
		Operating Temperature	32° to 158° F (0° to 70° C)	
		Performance	**Sequential Read**	530MB/s (max)*
			Sequential Write	500MB/s (max)*
			Random Read	55K IOPS (max)*
			Random Write	83K IOPS (max)*
		*Actual performance may vary.		

Technical Specifications - Hard Drives

HP 256GB SATA 6Gb/s SED Opal 2 SSD	**Capacity**	256GB	
	Protocol	SATA	
	Form Factor	2.5"	
	Controller	AHCI	
	NAND Type	3D TLC	
	Endurance	192TBW (TB Written)	
	Reliability (MTTF)	1.5M hours	
	Physical Size (Height)	0.28 in; 0.7 cm	
	Physical Size (Width)	2.5 in; 6.36 cm	
	Interface	6Gb/s SATA	
	Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)*	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	530MB/s*
		Sequential Write	500 MB/s*
		Random Read	55K IOPS*
		Random Write	83K IOPS*
	Self-Encrypting Drive Support	OPAL 2	
	*Actual performance may vary.		
HP 512GB SATA 6Gb/s SSD	**Capacity**	512GB	
	Protocol	SATA	
	Form Factor	2.5"	
	Controller	AHCI	
	NAND Type	3D TLC	
	Endurance	388TBW (TB Written)	
	Reliability (MTTF)	1.5M hours	
	Physical Size (Height)	0.28 in; 0.7 cm	
	Physical Size (Width)	2.5 in; 6.36 cm	
	Interface	SATA 6Gb/s	
	Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)*	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	530 MB/s*
		Sequential Write	500 MB/s*
		Random Read	95K IOPS*
		Random Write	83K IOPS*
	*Actual performance may vary.		

Technical Specifications - Hard Drives

HP 512GB SATA SED SSD	**Capacity**	512GB	
	Protocol	SATA	
	Form Factor	2.5"	
	Controller	AHCI	
	NAND Type	3D TLC	
	Endurance	388TBW (TB Written)	
	Reliability (MTTF)	1.5M hours	
	Physical Size (Height)	0.28 in; 0.7 cm	
	Physical Size (Width)	2.5 in; 6.36 cm	
	Interface	SATA 6Gb/s	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s*	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	530 MB/s*
		Sequential Write	500 MB/s*
		Random Read	95K IOPS*
		Random Write	83K IOPS*
	Self-Encrypting Drive Support	OPAL 1 and 2	
	*Actual performance may vary.		
HP 1TB SATA 6Gb/s SSD	**Capacity**	1TB	
	Protocol	SATA	
	Form Factor	2.5"	
	Controller	AHCI	
	NAND Type	3D TLC	
	Endurance	400TBW (TB Written)	
	Reliability (MTTF)	1.5M hours	
	Physical Size (Height)	0.28 in; 0.7 cm	
	Physical Size (Width)	2.5 in; 6.36 cm	
	Interface	SATA 6Gb/s	
	Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)*	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	530 MB/s*
		Sequential Write	500 MB/s*
		Random Read	95K IOPS*
		Random Write	83K IOPS*
	*Actual performance may vary.		

Technical Specifications - Hard Drives

HP 2TB SATA 6Gb/s SSD	**Capacity**	2TB	
	Protocol	SATA	
	Form Factor	2.5"	
	Controller	AHCI	
	NAND Type	3D TLC	
	Endurance	400TBW (TB Written)	
	Reliability (MTTF)	1.5M hours	
	Physical Size (Height)	0.28 in; 0.7 cm	
	Physical Size (Width)	2.5 in; 6.36 cm	
	Interface	SATA 6Gb/s	
	Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)*	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	530 MB/s*
		Sequential Write	500 MB/s *
		Random Read	95K IOPS*
		Random Write	83K IOPS*
	*Actual performance may vary.		
HP Enterprise Class 240GB SATA SSD	**Capacity**	240GB	
	Protocol	SATA	
	Form Factor	2.5"	
	Controller	AHCI	
	NAND Type	3D TLC	
	Endurance	2,200TBW (TB Written)	
	Reliability (MTTF)	2.0M hours	
	Physical Size (Height)	0.28 in; 0.7 cm	
	Physical Size (Width)	2.5 in; 6.36 cm	
	Interface	6Gb/s SATA	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s*	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	540 MB/s*
		Sequential Write	310 MB/s*
		Random Read	93K IOPS*
		Random Write	48K IOPS*
	Enterprise Class Features	High Endurance NAND Power Loss Protection End-to-End Data Protection	
	*Actual performance may vary.		

Technical Specifications - Hard Drives

	HP Enterprise Class 480GB SATA SSD	**Capacity**	480GB	
		Protocol	SATA	
		Form Factor	2.5"	
		Controller	AHCI	
		NAND Type	3D TLC	
		Endurance	4,400TBW (TB Written)	
		Reliability (MTTF)	2.0M hours	
		Physical Size (Height)	0.28 in; 0.7 cm	
		Physical Size (Width)	2.5 in; 6.36 cm	
		Interface	6Gb/s SATA	
		Synchronous Transfer Rate (Maximum)	Up to 600MB/s*	
		Operating Temperature	32° to 158° F (0° to 70° C)	
		Performance	**Sequential Read**	540 MB/s*
			Sequential Write	460 MB/s*
			Random Read	93K IOPS*
			Random Write	74K IOPS*
		Enterprise Class Features	High Endurance NAND Power Loss Protection End-to-End Data Protection	

*Actual performance may vary.

Performance PCIe SSDs for HP Workstations	**HP Z Turbo Drive 256GB M.2 2280 TLC SSD**	**Capacity**	256GB	
		Protocol	PCIe	
		Form Factor	M.2	
		Controller	NVMe	
		NAND Type	3D TLC	
		SED Support	Opal 2	
		Endurance	200TB	
		Reliability (MTBF)	1.5M hours	
		Interface	PCI Express 3.0 x4 electrical x4 physical	
		Operating Temperature	32° to 158° F (0° to 70° C)	
		Performance	**Sequential Read**	3500 MB/s *
			Sequential Write	2200 MB/s *
			Random Read	240K IOPS *
			Random Write	480K IOPS *

*Actual performance may vary.

Technical Specifications - Hard Drives

HP ZTurbo Drive 512GB M.2 2280 TLC SSD	**Capacity**	512GB	
	Protocol	PCIe	
	Form Factor	M.2	
	Controller	NVMe	
	NAND Type	3D TLC	
	SED Support	Opal 2	
	Endurance	300TB	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	3500 MB/s*
		Sequential Write	2900 MB/s*
		Random Read	460 K IOPS*
		Random Write	500K IOPS*
	*Actual performance may vary.		
HP ZTurbo Drive 1TB M.2 2280 TLC SSD	**Capacity**	1TB	
	Protocol	PCIe	
	Form Factor	M.2	
	Controller	NVMe	
	NAND Type	3D TLC	
	SED Support	Opal 2	
	Endurance	400TB	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	3500 MB/s*
		Sequential Write	3000 MB/s*
		Random Read	580K IOPS*
		Random Write	500K IOPS*
	*Actual performance may vary.		

Technical Specifications - Hard Drives

HP ZTurbo Drive 2TB M.2 2280 TLC SSD	**Capacity**	2TB	
	Protocol	PCIe	
	Form Factor	M.2	
	Controller	NVMe	
	NAND Type	3D TLC	
	SED Support	Opal 2	
	Endurance	500TB	
	Reliability (MTTF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	3300 MB/s*
		Sequential Write	2400 MB/s*
		Random Read	500K IOPS*
		Random Write	440K IOPS*
	*Actual performance may vary.		
HP Z Turbo Drive Quad Pro 2x256GB PCIe TLC SSD	**Capacity**	512GB	
	Protocol	PCIe	
	Form Factor	PCIe Card, Full Height PCIe Slot	
	Controller	NVMe	
	NAND Type	3D TLC	
	SED Support	Opal 2	
	Endurance	200TB	
	Reliability (MTBF)	1.5M hours	
	Interface	PCIe Gen3 x4 architecture	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	3500 MB/s*
		Sequential Write	2200 MB/s*
		Random Read	240K IOPS*
		Random Write	480K IOPS*
	*Actual performance may vary.		

Technical Specifications - Hard Drives

HP Z Turbo Drive Quad Pro 2x512GB PCIe TLC SSD	**Capacity**	1TB	
	Protocol	PCIe	
	Form Factor	PCIe Card, Full Height PCIe Slot	
	Controller	NVMe	
	NAND Type	3D TLC	
	SED Support	Opal 2	
	Endurance	300TB	
	Reliability (MTBF)	1.5M hours	
	Interface	PCIe Gen3 x4 architecture	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	3500 MB/s*
		Sequential Write	2900 MB/s*
		Random Read	460 K IOPS*
		Random Write	500K IOPS*

*Actual performance may vary.

HP Z Turbo Drive Quad Pro 2x1TB PCIe TLC SSD	**Capacity**	2TB	
	Protocol	PCIe	
	Form Factor	PCIe Card, Full Height PCIe Slot	
	Controller	NVMe	
	NAND Type	3D TLC	
	SED Support	Opal 2	
	Endurance	400TB	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	3500 MB/s*
		Sequential Write	3000 MB/s*
		Random Read	580K IOPS*
		Random Write	500K IOPS*

*Actual performance may vary.

HP Z Turbo Drive Dual Pro 256GB SSD	**Capacity**	256GB	
	Protocol	PCIe	
	Form Factor	M.2 in Half-height, half-length card	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	200TBW (TB Written)	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	3500 MB/s*
		Sequential Write	2200 MB/s*
		Random Read	240K IOPS*
		Random Write	480K IOPS*

*Actual performance may vary.

Technical Specifications - Hard Drives

	HP Z Turbo Drive Dual Pro 512GB SSD	**Capacity**	512GB
		Protocol	PCIe
		Form Factor	M.2 in Half-height, half-length card
		Controller	NVMe
		NAND Type	3D TLC
		Endurance	300TBW (TB Written)
		Reliability (MTBF)	1.5M hours
		Interface	PCI Express 3.0 x4 electrical x4 physical
		Operating Temperature	32° to 158° F (0° to 70° C)
		Performance	**Sequential Read** 3500 MB/s*
			Sequential Write 2900 MB/s*
			Random Read 460 K IOPS*
			Random Write 500K IOPS*
		*Actual performance may vary.	
	HP Z Turbo Drive Dual Pro 1TB SSD	**Capacity**	1TB
		Protocol	PCIe
		Form Factor	M.2 in Half-height, half-length card
		Controller	NVMe
		NAND Type	3D TLC
		Endurance	400TBW (TB Written)
		Reliability (MTBF)	1.5M hours
		Interface	PCI Express 3.0 x4 electrical x4 physical
		Operating Temperature	32° to 158° F (0° to 70° C)
		Performance	**Sequential Read** 3500 MB/s*
			Sequential Write 3000 MB/s*
			Random Read 580K IOPS*
			Random Write 500K IOPS*
		*Actual performance may vary.	
	HP Z Turbo Drive Dual Pro 2TB SSD	**Capacity**	2TB
		Protocol	PCIe
		Form Factor	M.2 in Half-height, half-length card
		Controller	NVMe
		NAND Type	3D TLC
		Endurance	500TBW (TB Written)
		Reliability (MTBF)	1.5M hours
		Interface	PCI Express 3.0 x4 electrical x4 physical
		Operating Temperature	32° to 158° F (0° to 70° C)
		Performance	**Sequential Read** 3500 MB/s*
			Sequential Write 3000 MB/s *
			Random Read 600K IOPS*
			Random Write 500K IOPS*
		*Actual performance may vary.	
Mainstream PCIe SSDs for HP Workstations	**HP 256GB M.2 2280 TLC SSD**	**Capacity**	256GB
		Protocol	PCIe

	Form Factor	M.2	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	200TB	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	3100 MB/s *
		Sequential Write	1400 MB/s *
		Random Read	200 K IOPS *
		Random Write	320 K IOPS *
	*Actual performance may vary.		
HP 512GB M.2 2280 TLC SSD	**Capacity**	512GB	
	Protocol	PCIe	
	Form Factor	M.2	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	300TB	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	3300 MB/s*
		Sequential Write	2500 MB/s*
		Random Read	225 K IOPS*
		Random Write	430 K IOPS*
	*Actual performance may vary.		
HP 1TB M.2 2280 TLC SSD	**Capacity**	1TB	
	Protocol	PCIe	
	Form Factor	M.2	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	400TB	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	3300 MB/s*
		Sequential Write	2500 MB/s*
		Random Read	400 K IOPS*
		Random Write	440 K IOPS*
	*Actual performance may vary.		

Technical Specifications - Hard Drives

	HP 2TB M.2 2280 TLC SSD	**Capacity**	2TB	
		Protocol	PCIe	
		Form Factor	M.2	
		Controller	NVMe	
		NAND Type	3D TLC	
		Endurance	500TB	
		Reliability (MTBF)	1.5M hours	
		Interface	PCI Express 3.0 x4 electrical x4 physical	
		Operating Temperature	32° to 158° F (0° to 70° C)	
		Performance	**Sequential Read**	3300 MB/s*
			Sequential Write	2700 MB/s*
			Random Read	430 K IOPS*
			Random Write	500 K IOPS*
		*Actual performance may vary.		
Intel® 905p Series AIC PCIe SSD	**Intel® 905p Series AIC 280GB PCIe SSD**	**Capacity**	280GB	
		Protocol	PCIe	
		Form Factor	PCIe Card, Half Height	
		Controller	NVMe	
		NVM Type	3DXPoint	
		Endurance	5.11 PBW (PB Written)	
		Reliability (MTBF)	1.6M hours	
		Operating Temperature	32° to 185° F (0° to 85° C)	
		Performance	**Sequential Read**	2730 MB/s*
			Sequential Write	2280 MB/s*
			Random Read	587K IOPS*
			Random Write	559K IOPS*
		*Actual performance may vary.		
	Intel® 905p Series AIC 480GB PCIe SSD	**Capacity**	480GB	
		Protocol	PCIe	
		Form Factor	PCIe Card, Half Height	
		Controller	NVMe	
		NVM Type	3DXPoint	
		Endurance	8.76 PBW (PB Written)	
		Reliability (MTBF)	1.6M hours	
		Operating Temperature	32° to 185° F (0° to 85° C)	
		Performance	**Sequential Read**	2710 MB/s*
			Sequential Write	2280 MB/s*
			Random Read	582K IOPS*
			Random Write	561K IOPS*
		*Actual performance may vary.		

Hard Drive Controllers

MicroSemi 2100-4i4e 8-port SAS 12Gb/s RAID Card	**PCI Bus**	8 lanes, PCI Express 3.0	
	RAID Levels	Offers Integrated RAID (0, 1, and 10)	
	PCI Data Burst Transfer Rate	Half Duplex x8, PCIe, 8000 MB/s	
	SAS Bandwidth	**Half Duplex**	1200 MB/s per lane
	PCI Card Type	3.3V Add-in Card	
	PCI Voltage	12 V ± 10%	
	PCI Power	9.8W typical, Airflow min 200 LFM	
	Bracket	Full height and low profile	
	Certification Level	PCI Express 3.0 compliant	
	SAS Processor	MicroSemi Series 8 SAS Controller	
	Internal Connectors	One x4 internal mini-SASHD (SFF-8643)	
	External Connectors	One x4 external mini-SASHD (SFF-8644)	
	Maximum Number of SCSI Devices	256 Non-RAID SAS/SATA devices	
	LED Indicators	Connector for Drive Activity Light **NOTE:** RAID 5 is not supported on MicroSemi 2100-4i4e 8-port SAS 12Gb/s RAID Card	

Graphics

NVIDIA® Quadro® P620 2GB Graphics	**Form Factor**	Dimensions: 2.713"? H x 5.7"? L Single Slot, Low Profile Weight: 129 grams
	Graphics Controller	NVIDIA® Quadro® P620 Graphics Card GPU: 512 CUDA cores Power: 40 Watts Cooling: Active
	Bus Type	PCI Express 3.0 x16
	Memory	Size: 2 GB GDDR5, 2000 MHz Memory Interface: 128-bit Memory Bandwidth: 64 GB/s
	Connectors	4mDP Outputs *
	Maximum Resolution	DisplayPort™ 1.4: - up to 4x 5120 x 2880 x 24 bpp @ 60Hz - supports Multi-Stream Transport (MST)
	Image Quality Features	10-bit internal display processing pipeline 10-bit scan-out support
	Display Output	4 mDP Connectors
	Shading Architecture	Full Microsoft DirectX 12 Shader Model 5.1
	Supported Graphics APIs	OpenGL 4.5 DirectX 12 Vulkan 1.0 API support includes: CUDA C, CUDA C++, DirectCompute , OpenCL
	Available Graphics Drivers	Windows 11 Windows 10 Windows 8.1 Windows 7 Linux HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	*P620 only have mini-DisplayPort™ (mDP) video ports. Factory Configured (Z4 G4/ Z6 G4/ Z8 G4 Workstations): No adapters included After market option kit:Two mDP-to-DP Adapters included Additional mDP-to-DP Adapters are available as Factory Configuration or Option Kit accessories: - 2MY05AA - HP miniDP-to-DP Adapter Cables - 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables

Technical Specifications - Graphics

NVIDIA® T400 2GB Graphics	**Form Factor**	Dimensions: 2.713"? H x 6.137"? L Single Slot, Low Profile Weight: 124g
	Graphics Controller	NVIDIA® T400 Graphics Card GPU: 384 CUDA cores Power: 30 Watts Cooling: Active
	Bus Type	PCI Express 3.0 x16
	Memory	Size: 2 GB GDDR6 Memory Interface: 64-bit Memory Bandwidth: 80 GB/s
	Connectors	3x mDP
	Maximum Resolution	3x 5120 x 2880 x 24 bpp @ 60Hz
	Supported Graphics APIs	OpenGL 4.5 DirectX 12 Vulkan 1.0 API support includes: CUDA, OpenCL 1.x
	Available Graphics Drivers	Windows 11 Windows 10 Linux HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html

NVIDIA® T400 4GB Graphics	**Form Factor**	Dimensions: 2.713"? H x 6.137"? L Single Slot, Low Profile Weight: 124g
	Graphics Controller	NVIDIA® T400 Graphics Card GPU: 384 CUDA cores Power: 30 Watts Cooling: Active
	Bus Type	PCI Express 3.0 x16
	Memory	Size: 4 GB GDDR6 Memory Interface: 64-bit Memory Bandwidth: 80 GB/s
	Connectors	3x mDP
	Maximum Resolution	3x 5120 x 2880 x 24 bpp @ 60Hz
	Supported Graphics APIs	OpenGL 4.5 DirectX 12 Vulkan 1.0 API support includes: CUDA, OpenCL 1.x
	Available Graphics Drivers	Windows 11 Windows 10 Linux HP qualified drivers may be preloaded or available from the HP support Web site:

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

NVIDIA® T600 4GB Graphics	**Form Factor**	Dimensions: 2.713"? H x 6.137"? L Single Slot, Low Profile Weight: 130 grams
	Graphics Controller	NVIDIA® T600 Graphics Card GPU: 640 CUDA cores Power: 40 Watts Cooling: Active
	Bus Type	PCI Express 3.0 x16
	Memory	Size: 4 GB GDDR6 Memory Interface: 128-bit Memory Bandwidth: 160 GB/s
	Connectors	4x mDP
	Maximum Resolution	4x 5120 x 2880 x 24 bpp @ 60Hz
	Supported Graphics APIs	OpenGL 4.5 DirectX 12 Vulkan 1.0 API support includes: CUDA C, CUDA C++, DirectCompute , OpenCL
	Available Graphics Drivers	Windows 10 Linux HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html

NVIDIA® Quadro® P1000 4GB Graphics	**Form Factor**	Dimensions:2.713"? H x 5.7"? L Single Slot, Low Profile Weight: 129 grams
	Graphics Controller	NVIDIA® Quadro® P1000 Graphics Card GPU: 640 CUDA cores Power: 47 WattsCooling: Active Cooling: Active
	Bus Type	PCI Express 3.0 x16
	Memory	Size: 4 GB GDDR5, 2500 MHz Memory Interface: 128-bit memory interface Memory Bandwidth: 80 GB/s memory bandwidth
	Connectors	4mDP Outputs*
	Maximum Resolution	DisplayPort 1.4: - up to 4x 5120 x 2880 x 24 bpp @ 60Hz - supports Multi-Stream Transport (MST)
	Image Quality Features	10-bit internal display processing pipeline 10-bit scan-out support
	Display Output	4 mDP Connectors
	Shading Architecture	Full Microsoft DirectX 12 Shader Model 5.1

Technical Specifications - Graphics

	Supported Graphics APIs	OpenGL 4.5 DirectX 12 Vulkan 1.0 API support includes: CUDA C, CUDA C++, DirectCompute , OpenCL
	Available Graphics Drivers	Windows 11 Windows 10 Windows 8.1 Windows 7 Linux HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	*P400, P600 and P1000 only have mini-DisplayPort™ (mDP) video ports. Factory Configured (Z4 G4/ Z6 G4/ Z8 G4 Workstations): No adapters included After market option kit:Two mDP-to-DP Adapters included Additional mDP-to-DP Adapters are available as Factory Configuration or Option Kit accessories: - 2MY05AA - HP miniDP-to-DP Adapter Cables - 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables
AMD Radeon ™ Pro W6600 8GB Graphics	**Form Factor**	Full height, Single Slot, 241mm length
	Graphics Controller	AMD Radeon™ PR W6600 XT Graphics GPU: AMD RDNA 2 Memory: 8GB GDDR6 Power: 130 Watts, 6-pin Power Cable Cooling: Active, Dual Axial fan
	Bus Type	PCI Express 4.0 x16
	Connectors	4x DisplayPort 1.4 with DSC
	Maximum Resolution	DisplayPort™ 1.4 with DSC: - up to 4x @ 3840x2160px (4K) - up to 4x @ 5120x2880px (5K) - up to 1x @ 7680x4320px (8K)
	Display Outputs	4x DP
	Shading Architecture	Microsoft DirectX 12 Shader Model 6.1
	Supported Graphics APIs	OpenGL 4.6 DirectX 12 Feature Level 12_1 Vulkan 1.1 OpenCL 2.2
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit (selected distributions) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html

Technical Specifications - Graphics

AMD Radeon™ RX 6700 XT 12GB Graphics	**Form Factor**	Dual slot, Full Length (254mm L x 38mm W x 108.65mm H)
	Graphics Controller	AMD Radeon™ RX 6700 XT Graphics GPU: 2560 Navi2 Stream Processors Memory: 12GB GDDR6 Power: 230 Watts, Standard graphics 8pin + 6pin auxiliary power Cooling: Active, Dual Axial fan
	Bus Type	PCI Express 4.0 x16
	Connectors	3DP 1.4 + HDMI 2.1 Outputs
	Maximum Resolution	DisplayPort™ 1.4 with DSC: - up to 4x 5210 x 3200 x 24 bpp @ 60Hz, uncompressed - up to 7680 x 4320, compressed
	Display Outputs	3 DP + 1 HMDI
	Shading Architecture	Microsoft DirectX 12 Shader Model 6.1
	Supported Graphics APIs	OpenGL 4.6 DirectX 12 Feature Level 12_1 Vulkan 1.1 OpenCL 2.2
	Available Graphics Drivers	Windows 11 Linux® 64-bit (selected distributions) Typically, latest drivers will be available from amd.com
	Notes	This is a Prosumer or Consumer graphics card, and not a Professional graphics card. As such, it does not have formal professional application validation, but is intended per AMD to function properly for game development, real-time engine, and many prosumer application workloads. Customers using Prosumer or Consumer graphic cards are likely to experience higher acoustics in comparison with Professional graphic cards. The higher acoustics observed with non-professional graphics is expected, as HP Workstations' designs do not have control in this area.

Radeon™ Pro WX 3100 4GB Graphics	**Form Factor**	Low-Profile Single Slot (6.6"? Length)
	Graphics Controller	Radeon™ Pro WX 3100 Graphics Card GPU: 512 Stream Processors organized into 8 Compute Units Power: 50 Watts Cooling: Active
	Memory	4GB GDDR5 memory Memory Bandwidth: 6 Gbps / 96 GB/s Memory Width: 128 bit
	Connectors	2x Mini DisplayPort™ 1.4 plus 1x DisplayPort™ 1.4 - HDR ready connectors with HBR3 and MST support. Factory Configured: No adapters included After market option kit: One mDP-to-DP cable adapters included Additional Mini DisplayPort™-to-DisplayPort™, DisplayPort™-to-VGA or DisplayPort™-to-DVI adapters are available as Factory Configuration or Option Kit accessories.
	Maximum Resolution	5K support @ 60Hz • 1x single-cable 5K monitor, or 2x dual-cable 5K monitors 3x 4K support @ 60Hz
	Image Quality Features	Advanced support for 8-bit and 10-bit per RGB color component. High bandwidth scaler for high quality up and downscaling

Technical Specifications - Graphics

	Display Output	3 full physical DP1.3 HBR3 / DP1.4 HDR outputs FreeSync support
	GPU Architecture	Polaris
	Supported Graphics APIs	DirectX® 12 OpenGL® 4.5 OpenCL™ 2.0 Vulkan™ 1.0
	Available Graphics Drivers	Windows 11 Windows 10 (Windows 7 64-bit available from AMD) Linux® 64-bit (selected Enterprise distributions) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	1. HDR content requires that the system be configured with a fully HDR-ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support. 2. AMD PowerTune and AMD ZeroCore Power are technologies offered by certain FirePro™ and Radeon™ Pro products, which are designed to intelligently manage GPU power consumption in response to certain GPU load conditions. 3. As of September 2016, certified for DisplayPort™ 1.4 HBR3 and ready for DisplayPort™ 1.4 HDR based on independent verification by DisplayPort™ testing authority. HDR content requires that the system be configured with a fully HDR- ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support.
Radeon™ Pro WX 3200 4GB Graphics	**Form Factor**	Low-Profile Single Slot (2.75 "H x 6.6"? L)
	Graphics Controller	Radeon™ Pro WX 3200 Graphics Card GPU: 640 Stream Processors organized into 8 Compute Units Power: 56 Watts Cooling: Active
	Memory	4GB GDDR5 memory Memory Bandwidth: 96 GB/s Memory Width: 128 bit
	Connectors	4x Mini DisplayPort™ 1.4 - HDR ready connectors with HBR3 and MST support. Factory Configured: No adapters included After market option kit: One mDP-to-DP cable adapters included Additional Mini DisplayPort™-to-DisplayPort™, DisplayPort™-to-VGA or DisplayPort™-to-DVI adapters are available as Factory Configuration or Option Kit accessories.
	Maximum Resolution	5K support @ 60Hz • 1x single-cable 5K monitor, or 2x dual-cable 5K monitors 4x 4K support @ 60Hz
	Image Quality Features	Advanced support for 8-bit and 10-bit per RGB color component. High bandwidth scaler for high quality up and downscaling

Technical Specifications - Graphics

	Display Output	4 full physical DP1.3 HBR3 / DP1.4 HDR outputs FreeSync support
	GPU Architecture	Polaris
	Supported Graphics APIs	DirectX® 12 OpenGL® 4.6 OpenCL™ 2.0 Vulkan™ 1.0
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit (selected Enterprise distributions) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	4. HDR content requires that the system be configured with a fully HDR-ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support. 5. AMD PowerTune and AMD ZeroCore Power are technologies offered by certain FirePro™ and Radeon™ Pro products, which are designed to intelligently manage GPU power consumption in response to certain GPU load conditions. 6. As of September 2016, certified for DisplayPort™ 1.4 HBR3 and ready for DisplayPort™ 1.4 HDR based on independent verification by DisplayPort™ testing authority. HDR content requires that the system be configured with a fully HDR- ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support.
Radeon™ Pro WX 4100 4GB Graphics	**Form Factor**	Low-Profile Single Slot (6.6"? Length)
	Graphics Controller	Radeon™ Pro WX 4100 Graphics card GPU: 1024 Stream Processors organized into 16 Compute Units Power: 50 Watts Cooling: Active
	Memory	4GB GDDR5 memory Memory Bandwidth: 6 Gbps / 96 GB/s Memory Width: 128 bit
	Connectors	4x Mini DisplayPort™ 1.4 - HDR ready connectors with HBR3 and MST support. Factory Configured: Four mDP-to-DP cable adapters included After market option kit: Four mDP-to-DP cable adapters included Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.
	Maximum Resolution	5K support @ 60Hz • 1x single-cable 5K monitor, or 2x dual-cable 5K monitors 4x 4K support @ 60Hz
	Image Quality Features	Advanced support for 8-bit and 10-bit per RGB color component. High bandwidth scaler for high quality up and downscaling
	Display Output	4 full physical DP1.3 HBR3 / DP1.4 HDR outputs FreeSync support

Technical Specifications - Graphics

GPU Architecture	GCN 4th Generation
Supported Graphics APIs	DirectX®12 OpenGL® 4.5 OpenCL™ 2.0 Vulkan™ 1.0
Available Graphics Drivers	Windows 11 Windows 10 Windows® 7 64-bit Linux® 64-bit (selected Enterprise distributions) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html

Notes

7. HDR content requires that the system be configured with a fully HDR-ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support.

8. AMD PowerTune and AMD ZeroCore Power are technologies offered by certain FirePro™ and Radeon™ Pro products, which are designed to intelligently manage GPU power consumption in response to certain GPU load conditions.

9. As of September 2016, certified for DisplayPort™ 1.4 HBR3 and ready for DisplayPort™ 1.4 HDR based on independent verification by DisplayPort™ testing authority. HDR content requires that the system be configured with a fully HDR- ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windows mode content requires operating system support.

Factory Configured (Z4 G4/ Z6 G4/ Z8 G4 Workstations): No adapters included
After market option kit: Four mDP-to-DP Adapters included

Additional mDP-to-DP Adapters are available as Factory Configuration or Option Kit accessories:

10. 2MY05AA - HP miniDP-to-DP Adapter Cables

11. 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables

Technical Specifications - Graphics

NVIDIA® T1000 4GB Graphics	**Form Factor**	Dimensions: 2.713"? H x 6.137"? L Single Slot
	Graphics Controller	NVIDIA® T1000 Graphics Card Power: 50W Cooling: Active
	Bus Type	PCI Express 3.0 x16
	Memory	Size: 4GB GDDR6 Memory Bandwidth: Up to 160 GB/s Memory Width: 128-bit
	Connectors	4x mini DisplayPort™ 1.4a
	Maximum Resolution	7680 x 4320 @ 120Hz
	Display Output	Maximum number of displays: 4 displays
	Architecture	NVIDIA® Turing™
	Supported Graphics APIs	xx
	Available Graphics Drivers	Windows 11 Windows 10 Windows 8.1 Microsoft Windows 7 Professional 64bit Linux® - Full OpenGL® implementation, complete with NVIDIA® Quadro® and ARB extensions HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html

NVIDIA® T1000 8GB Graphics	**Form Factor**	Dimensions: 2.713"? H x 6.137"? L Single Slot Weight: 132.6 grams
	Graphics Controller	NVIDIA® T1000 Graphics Card Power: 50W Cooling: Active
	Bus Type	PCI Express 3.0 x16
	Memory	Size: 8GB GDDR6 Memory Bandwidth: Up to 160 GB/s Memory Width: 128-bit
	Connectors	4x mini DisplayPort™ 1.4a
	Maximum Resolution	7680 x 4320 @ 120Hz
	Display Output	Maximum number of displays: 4 displays
	Architecture	NVIDIA® Turing™
	Available Graphics Drivers	Windows 11 Windows 10 Windows 8.1 Windows 7 Professional Linux® - Full OpenGL® implementation, complete with NVIDIA® Quadro® and ARB extensions HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html

Technical Specifications - Graphics

NVIDIA® RTX A2000 6GB Graphics	**Form Factor**	Dimensions: 2.713"? H x 6.6"? L Dual slot, half-height Weight: 295 grams (without extender)
	Graphics Controller	NVIDIA® RTX A2000 Graphics Card Power: 70W Cooling: Active
	Bus Type	PCI Express 4.0 x16
	Memory	Size: 6GB GDDR6 Memory Bandwidth: Up to 288 GB/s Memory Width: 192-bit
	Connectors	4x mini-DisplayPort™ 1.4a
	Maximum Resolution	Up to 4x 5120 x 2880 x 24bpp @ 60Hz
	Architecture	NVIDIA® Ampere™
	Supported Graphics APIs	CUDA, OpenCL™ 1.x
	Available Graphics Drivers	Microsoft Windows 11 Microsoft Windows 10 Linux® 64-bit (selected Enterprise distributions) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	1. RTX A2000 offered as Factory Configured Option does not include a video cable adapter. Video cable adapters must be ordered separately as AMO: a. 2MY05AA - HP Single miniDP-to-DP Adapter Cable b. 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables 2. Two mDP-to-DP adapters are included with the RTX A2000 when it is ordered as an AMO kit.

NVIDIA® RTX A2000 12GB Graphics	**Form Factor**	Dimensions: 2.713"? H x 6.6"? L Dual slot, half-height Weight: 295 grams (without extender)
	Graphics Controller	NVIDIA® RTX A2000 Graphics Card Power: 70W Cooling: Active
	Bus Type	PCI Express 4.0 x16
	Memory	Size: 12GB GDDR6 Memory Bandwidth: Up to 288 GB/s Memory Width: 192-bit
	Connectors	4x mini-DisplayPort™ 1.4a
	Maximum Resolution	Up to 4x 5120 x 2880 x 24bpp @ 60Hz
	Architecture	NVIDIA® Ampere™
	Supported Graphics APIs	CUDA, OpenCL™ 1.x
	Available Graphics Drivers	Microsoft Windows 11 Microsoft Windows 10 Linux® 64-bit (selected Enterprise distributions) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	1. RTX A2000 offered as Factory Configured Option does not include a video cable adapter. Video cable adapters must be ordered separately as AMO: a. 2MY05AA - HP Single miniDP-to-DP Adapter Cable

b. 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables

Two mDP-to-DP adapters are included with the RTX A2000 when it is ordered as an AMO kit.

NVIDIA® Quadro® P4000 8GB Graphics	**Form Factor**	Dimensions: 4.4"?H x 9.5"?L Single-slot, full-height Weight: 475 grams (without extender)
	Graphics Controller	NVIDIA® Quadro® P4000 Graphics Card GPU: 1792 CUDA cores Power: 120 Watts Cooling: Active
	Bus Type	PCI Express 3.0 x16
	Memory	Size: 8GB GDDR5 Memory Bandwidth: 243 GB/s Memory Width: 256-bit
	Connectors	4 x DisplayPort 1.4 3-pin mini-DIN connector via optional bracket 1 x 6-pin auxiliary power connector 4-pin header for stereo signal SYNC connector for Quadro® Sync II 2 x SLI connectors Factory Configured Option: No video cable adapter included After Market Option: No video cable adapter included Additional DisplayPort-to-VGA, DisplayPort-to-HDMI, or DisplayPort-to- DVI adapters are available as accessories
	Maximum Resolution	Dual-link internal TMDS (DVI 1.0): - up to 2560 x 1600 x 32 bpp @ 60 Hz Single-link internal TMDS (DVI 1.0): - up to 1920 x 1200 x 32 bpp @ 60 Hz HDMI™ 2.0b (requires DP to HDMI adapter): - up to 5120 x 2880 x 24 bpp @ 60Hz DisplayPort: - up to 4096 x 2160 x 30 bpp @ 60Hz - up to 2560 x 1600 x 30 bpp @ 120 Hz - supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST) Using two DP outputs, the P4000 can drive one dual DP input display with 5120 x 2880 x 30 bpp @ 60Hz resolution.
	Image Quality Features	Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component. HDCP 2.2 support over DisplayPort, DVI, and HDMI connectors NVIDIA 3D Vision™ and other 3D stereo technologies NVIDIA Mosaic and nView
	Display Output	Maximum number of displays - 4 direct attached monitors Maximum number of monitors across all available Quadro P4000 outputs is 4.

Technical Specifications - Graphics

	Shading Architecture	Shader Model 5.1
	Supported Graphics APIs	OpenGL 4.5 DirectX 12 Vulcan 1.0 API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran
	Available Graphics Drivers	Windows 11 Windows 10 Windows 7 Linux® - Full OpenGL implementation, complete with NVIDIA and ARB extensions HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	2. Quadro P4000 offered as Factory Configured Option does not include a video cable adapter. Video cable adapters must be ordered separately. 3. Quadro P4000 offered as an After Market Option does not include video cables. Video cable adapters must be ordered separately.
NVIDIA® Quadro® P5000 16GB Graphics	**Form Factor**	Full-Height Dual Slot (4.4"? Height x 10.5"? Length) Weight: 815 grams / 1.80 lbs
	Graphics Controller	NVIDIA® Quadro® P5000 graphics GPU: 2560 NVIDIA® CUDA® Parallel Processing Cores Power: 180 Watts Cooling: Active
	Memory	16GB GDDR5X memory Memory Bandwidth: Up to 288 GB/s Memory Width: 256 bit ECC Memory (disabled by default)
	Connectors	DP (x4) with HDR support DL-DVI(D) 3-pin mini-DIN connector SLI connector NVIDIA® Quadro® Sync connector (compatible with NVIDIA® Quadro® II Sync) One 8-pin auxiliary power connector Factory configured option: No video cable adapter included with card. After market option Kit: No video cable adaptor included with card. DVI to VGA, DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories.
	Maximum Resolution	5K support @ 60Hz 1x single-cable 5K monitor, or 2x dual-cable 5K monitors

Technical Specifications - Graphics

	Image Quality Features	Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component. HDCP 2.2 support over DisplayPort™, DVI, and HDMI connectors NVIDIA® 3D Vision™ and other 3D stereo technologies NVIDIA Mosaic and nView Desktop Management
	Display Outputs[1]	4x DP1.4 HDR outputs (up to 3840x2160 UHD @ 120Hz refresh, or up to 8K at 30Hz) 1x Dual-link DVI-D output (up to 2560 x 1600 @ 60 Hz and 1920x1200 @ 120 Hz)
	GPU Architecture	NVIDIA Pascal™
	Supported Graphics APIs	DirectX®12 , OpenGL® 4.5, OpenCL™ 1.0, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran
	Available Graphics Drivers	Windows 11 Windows 10 Windows 7 64-bit Linux® 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	1- Supports up to a total of 4 displays
NVIDIA® Quadro® P6000 24GB Graphics	**Form Factor**	Full-Height Dual Slot (4.4"? Height x 10.5"? Length) Weight: 967 grams / 2.14 lbs
	Graphics Controller	NVIDIA® Quadro® P6000 graphics GPU: 3840 NVIDIA® CUDA® Parallel Processing Cores Power: 250 Watts Cooling: Active
	Memory	24GB GDDR5X memory Memory Bandwidth: Up to 432 GB/s Memory Width: 384 bit ECC Memory (disabled by default)
	Connectors	DP (x4) with HDR support DL-DVI(D) 3-pin mini-DIN connector SLI connector Quadro Sync connector (compatible with Quadro II Sync) One 8-pin auxiliary power connector Factory configured option: No video cable adapter included with card. After market option Kit: No video cable adaptor included with card. DVI to VGA, DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories.
	Maximum Resolution	5K support @ 60Hz 1x single-cable 5K monitor, or 2x dual-cable 5K monitors

Technical Specifications - Graphics

	Image Quality Features	Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component. HDCP 2.2 support over DisplayPort, DVI, and HDMI connectors NVIDIA 3D Vision™ and other 3D stereo technologies NVIDIA Mosaic and nView
	Display Outputs[1]	4x DP1.4 HDR outputs (up to 3840x2160 UHD @ 120Hz refresh, or up to 8K at 30Hz) 1x Dual-link DVI-D output (up to 2560 x 1600 @ 60 Hz and 1920x1200 @ 120 Hz)
	GPU Architecture	NVIDIA Pascal™
	Supported Graphics APIs	DirectX®12, OpenGL® 4.5, OpenCL™ 1.0, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran
	Available Graphics Drivers	Windows 11 Windows 10 64-bit Windows 7 64-bit Linux® 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	1- Supports up to a total of 4 displays
NVIDIA® Quadro® GP100 16GB Graphics	**Form Factor**	Dual Slot (4.4"? Height x 10.5"? Length) Weight: 989 grams +72 grams extender
	Graphics Controller	NVIDIA® QUADRO® GP100 GPU: 3584 NVIDIA CUDA® Parallel Processing Cores Power: 235 Watts Cooling: Active
	Memory	16GB HBM2 Memory Bandwidth: Up to 717 GB/s Memory Width: 4096-bit ECC Memory (disabled by default)
	Connectors	DP (x4) with HDR support DL-DVI(D) 3-pin mini-DIN connector via optional bracket 4-pin header for stereo signal Quadro Sync connector (compatible with Quadro II Sync) One 8-pin auxiliary power connector (2x) NVLink connectors Factory configured option: 8-pin power adapter included with card. After market option Kit: 8-pin power adapter included with card. DVI to VGA, DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories.
	Maximum Resolution	5K support @ 60Hz 1x single-cable 5K monitor, or 2x dual-cable 5K monitors
	Image Quality Features	HDR support over DisplayPort™ 1.4 (SMPTE 2084/2086, BT. 2020) (4K @ 60 Hz 10b/12b HEVC Decode, 4K @ 60 Hz 10b HEVC Encode)

Technical Specifications - Graphics

		HDCP 2.2 support over DisplayPort™, DVI, and HDMI connectors NVIDIA 3D Vision™ technology NVIDIA Mosaic and nView Desktop Management
	Display Outputs	4x DP1.4 MST & HDR2 outputs (up to 5120 x 2880 @ 60Hz) 1x Dual-link DVI-D output (up to 2560 x 1600 @ 60 Hz) 1x Single-link DVI-D output (up to 1920 x 1200 @ 60 Hz) HDMI™ 2.0b (up to 5120 x 2880 @ 60Hz)* *requires DP to HDMI adapter
	GPU Architecture	NVIDIA Pascal™
	Supported Graphics APIs	DirectX®12 , OpenGL® 4.5, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran
	Available Graphics Drivers	Windows 11 Windows 10 Windows 7 Professional 64-bit Linux® HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html Factory Configured (Z4 G4/ Z6 G4/ Z8 G4 Workstations): No adapters included After market option kit: No adapters included
NVIDIA® Quadro® GV100 32GB Graphics	**Form Factor**	Dual Slot (4.4"? Height x 10.5"? Length) Weight: 980 grams + 72 grams extender
	Graphics Controller	NVIDIA® QUADRO® GV100 GPU: 5120 NVIDIA® CUDA® Parallel Processing Cores Power: 250 Watts Cooling: Active
	Memory	32GB HBM2 memory Memory Bandwidth: Up to 870 GB/s Memory Width: 5120-bit ECC Memory (disabled by default)
	Connectors	DP (x4) with HDR support 3-pin mini-DIN connector via optional bracket 4-pin header for stereo signal Quadro Sync connector (compatible with Quadro II Sync) One 8-pin auxiliary power connector (2x) NVLink for GV100 connectors (via optional kit) After market option Kit: no power adapter included with card. DisplayPort™ to VGA, DisplayPort™ to DVI (single-link and dual-link), and DisplayPort™ to HDMI adapters available as accessories.

Technical Specifications - Graphics

	Maximum Resolution	5K support @ 60Hz 1x single-cable 5K monitor, or 2x dual-cable 5K monitors
	Image Quality Features	HDR support over DisplayPort™ 1.4 (SMPTE 2084/2086, BT. 2020) (4K @ 60 Hz 10b/12b HEVC Decode, 4K @ 60 Hz 10b HEVC Encode) HDCP 2.2 support over DisplayPort™ and HDMI connectors NVIDIA 3D Vision™ technology NVIDIA Mosaic and nView Desktop Management
	Display Outputs	4x DP1.4 HDR2 outputs (up to 5120 x 2880 @ 60Hz)
	GPU Architecture	NVIDIA® Volta™
	Supported Graphics APIs	DirectX®12, OpenGL® 4.5 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran
	Available Graphics Drivers	Windows 11 Windows 8 & 8.1 64-bit Windows 7 64-bit Linux® 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html Factory Configured (Z4/Z8 G4 Workstation): No adapters included After market option kit: No adapters included
NVIDIA® Quadro® RTX 4000 8GB Graphics	**Form Factor**	Full-Height Single Slot (4.4"? Height x 9.5"? Length) Weight: 550 grams / 1.21 lbs
	Graphics Controller	NVIDIA® Quadro® RTX 4000 Graphics lGPU: 2304 NVIDIA® CUDA® Parallel Processing Cores Power: 160 Watts Cooling: Active
	Memory	8GB GDDR6 memory Memory Bandwidth: Up to 416 GB/s Memory Width: 384 bit
	Connectors	3x DP 1.4a and VirtualLink Quadro Sync connector (compatible with Quadro II Sync) One 8-pin auxiliary power connector Factory configured option: No video cable adapter included with card. After market option Kit: No video cable adaptor included with card. DVI to VGA, DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories.
	Maximum Resolution	7680x4320 @ 60Hz

Technical Specifications - Graphics

	Image Quality Features	Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component. HDCP 2.2 support over DisplayPort™, DVI, and HDMI connectors NVIDIA® 3D Vision™ and other 3D stereo technologies NVIDIA® Mosaic and nView
	Display Outputs[1]	3x DP 1.4a and VirtualLink[2] (7680x4320 @ 60Hz)
	Supported Graphics APIs	DirectX®12, OpenGL® 4.5, OpenCL™ 1.0, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	1- Supports up to a total of 4 displays 2- VirtualLink's USB-C™ (data) cannot be disabled at a hardware level
NVIDIA® RTX A4000 16GB Graphics	**Form Factor**	Full-Height Single Slot (4.4"? Height x 9.5"? Length)
	Graphics Controller	NVIDIA® RTX A4000 Graphics GPU: 6144 NVIDIA® CUDA® Parallel Processing Cores Power: 140 Watts Cooling: Active
	Memory	16GB GDDR6 memory Memory Bandwidth: Up to 448 GB/s Memory Width: 256 bit
	Connectors	4x DP One 6-pin auxiliary power connector Factory configured option: No video cable adapter included with card. After market option Kit: No video cable adaptor included with card. DVI to VGA, DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories.
	Maximum Resolution	7680x4320 @ 60Hz
	Display Outputs[1]	4x DP
	Supported Graphics APIs	DirectX®12, OpenGL® 4.5, OpenCL™ 1.0, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html

Technical Specifications - Graphics

NVIDIA® RTX A4500 20GB Graphics	**Form Factor**	Full-Height Dual Slot (4.4"? Height x 10.5"? Length)
	Graphics Controller	NVIDIA® RTX A4500 Graphics GPU: 7168 NVIDIA® CUDA® Parallel Processing Cores Power: 200 Watts Cooling: Active
	Memory	20GB GDDR6 memory Memory Bandwidth: Up to 640 GB/s Memory Width: 320 bit
	Connectors	4x DP One 8-pin auxiliary power connector Factory configured option: No video cable adapter included with card. After market option Kit: No video cable adaptor included with card. DVI to VGA, DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories.
	Maximum Resolution	7680x4320 @ 60Hz
	Display Outputs[1]	4x DP
	Supported Graphics APIs	DirectX®12, OpenGL® 4.5, OpenCL™ 1.0, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html

NVIDIA® Quadro® RTX 5000 16GB Graphics	**Form Factor**	Full-Height Dual Slot (4.4"? Height x 10.5"? Length) Weight: 975 grams + 75 grams extender
	Graphics Controller	NVIDIA® QUADRO® RTX 5000 GPU: 3072 CUDA cores Power: 265 Watts Cooling: Active
	Memory	16GB HBM2 memory Memory Bandwidth: Up to 448 GB/s ECC Memory (disabled by default)
	Connectors	DP (x4) with HDR support 3-pin mini-DIN connector via optional bracket 4-pin header for stereo signal Quadro Sync connector (compatible with Quadro II Sync) One 8-pin auxiliary power connector (2x) NVLink for RTX 5000 connectors (via optional kit) After market option Kit: no power adapter included with card.

Technical Specifications - Graphics

		DisplayPort™ to VGA, DisplayPort™ to DVI (single-link and dual-link), and DisplayPort™ to HDMI adapters available as accessories.
	Maximum Resolution	DisplayPort™ 1.4: 7680x4320 @ 60Hz
	Image Quality Features	HDR support over DisplayPort™ 1.4 (SMPTE 2084/2086, BT. 2020) (4K @ 60 Hz 10b/12b HEVC Decode, 4K @ 60 Hz 10b HEVC Encode) HDCP 2.2 support over DisplayPort™ and HDMI connectors NVIDIA 3D Vision™ technology NVIDIA Mosaic and nView Desktop Management
	Display Outputs	4x DP1.4 HDR2 outputs (up to 7680x4320 @ 60Hz)
	GPU Architecture	NVIDIA® Volta™
	Supported Graphics APIs	DirectX®12, OpenGL® 4.5 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran
	Available Graphics Drivers	Windows 11 Windows 10 Windows 8 & 8.1 64-bit Windows 7 64-bit Linux® 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
		Factory Configured (Z4/Z6/Z8 G4 Workstation): No adapters included After market option kit: No adapters included
		*VirtualLink's USB-C™ (data) cannot be disabled at a hardware level
NVIDIA® Quadro® RTX 6000 24GB Graphics	**Form Factor**	Full-Height Dual Slot (4.4"? Height x 10.5"? Length) Weight: 995 grams + 75 grams extender
	Graphics Controller	NVIDIA® QUADRO® RTX 6000 GPU: 4608 CUDA cores Power: 295 Watts Cooling: Active
	Memory	24GB HBM2 memory Memory Bandwidth: Up to 672 GB/s ECC Memory (disabled by default)
	Connectors	DP (x4) with HDR support 3-pin mini-DIN connector via optional bracket 4-pin header for stereo signal Quadro Sync connector (compatible with Quadro II Sync) One 8-pin auxiliary power connector (2x) NVLink for RTX 5000 connectors (via optional kit)

	After market option Kit: no power adapter included with card. DisplayPort™ to VGA, DisplayPort™ to DVI (single-link and dual-link), and DisplayPort™ to HDMI adapters available as accessories.
Maximum Resolution	DisplayPort™ 1.4: 7680x4320 @ 60Hz
Image Quality Features	HDR support over DisplayPort™ 1.4 (SMPTE 2084/2086, BT. 2020) (4K @ 60 Hz 10b/12b HEVC Decode, 4K @ 60 Hz 10b HEVC Encode) HDCP 2.2 support over DisplayPort™ and HDMI connectors NVIDIA 3D Vision™ technology NVIDIA Mosaic and nView Desktop Management
Display Outputs	4x DP1.4 HDR2 outputs (up to 7680x4320 @ 60Hz)
GPU Architecture	NVIDIA® Volta™
Supported Graphics APIs	DirectX®12, OpenGL® 4.5 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran
Available Graphics Drivers	Windows 11 Windows 10 Windows 8 & 8.1 64-bit Windows 7 64-bit Linux® 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Factory Configured (Z4/Z6/Z8 G4 Workstation): No adapters included After market option kit: No adapters included
	*VirtualLink's USB-C™ (data) cannot be disabled at a hardware level

Technical Specifications - Graphics

NVIDIA® RTX A5000 24GB Graphics	**Form Factor**	Full-Height Dual Slot (4.4"? Height x 10.5"? Length) Weight: 1049 grams + 80 grams extender
	Graphics Controller	NVIDIA® RTX A5000 GPU: 8192 CUDA Cores Power: 230W Cooling: Active
	Memory	24GB GDDR6 Memory Bandwidth: Up to 768GB/s ECC Memory (disabled by default)
	Connectors	DP (x4) with HDR support One 8-pin auxiliary power connector After market option Kit: no power adapter included with card. DisplayPort™ to VGA, DisplayPort™ to DVI (single-link and dual-link), and DisplayPort™ to HDMI adapters available as accessories.
	Maximum Resolution	DisplayPort™ 1.4a: 7680x4320 @ 120Hz
	Display Outputs	4x DP1.4a HDR2 outputs (up to 7680x4320 @ 120Hz)
	GPU Architecture	NVIDIA® Ampere™
	Supported Graphics APIs	DirectX®12, OpenGL® 4.5 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran
	Available Graphics Drivers	Windows 11 Windows 10 Windows 7 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html Factory Configured (Z4/Z6/Z8 G4 Workstation): No adapters included After market option kit: No adapters included

Technical Specifications - Graphics

NVIDIA® RTX™ A6000 48GB Graphics	**Form Factor**	Full-Height Dual Slot (4.4"? Height x 10.5"? Length) Weight: 1230 grams / 2.71 lbs (with extender)
	Graphics Controller	NVIDIA® RTX™ A6000 Graphics GPU: 10752 NVIDIA® CUDA® Parallel Processing Cores Power: 300 Watts Cooling: Active
	Memory	48GB GDDR6 memory ECC optional Memory Bandwidth: Up to 768 GB/s Memory Width: 384 bit
	Connectors	4x DP 1.4a Quadro Sync II connector Ampere NVLink® Stereo Sync Requires 8-pin CPU auxiliary power
	Maximum Resolution	5120x2880 @ 60Hz (up to 4 displays)
	Display Outputs	4x DP 1.4 (7680x4320 @ 60Hz)
	Supported Graphics APIs	DirectX®12, OpenGL® 4.6, OpenCL™ 1.0, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran™
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html

NVIDIA® Quadro® RTX 8000 48GB Graphics	**Form Factor**	Full-Height Dual Slot (4.4"? Height x 10.5"? Length) Weight: 1070 grams / 2.35 lbs
	Graphics Controller	NVIDIA® Quadro® RTX 8000 Graphics GPU: 4608 NVIDIA® CUDA® Parallel Processing Cores Power: 295 Watts Cooling: Active
	Memory	48GB GDDR6 memory Memory Bandwidth: Up to 672 GB/s Memory Width: 384 bit
	Connectors	4x DP 1.4a and VirtualLink Quadro Sync connector (compatible with Quadro II Sync) One 8-pin + 6-pin auxiliary power connector Factory configured option: No video cable adapter included with card. After market option Kit: No video cable adaptor included with card. DVI to VGA, DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories.
	Maximum Resolution	7680x4320 @ 60Hz

Technical Specifications - Graphics

	Image Quality Features	Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component. HDCP 2.2 support over DisplayPort™, DVI, and HDMI connectors NVIDIA® 3D Vision™ and other 3D stereo technologies NVIDIA® Mosaic and nView
	Display Outputs[1]	4x DP 1.4a and VirtualLink (7680x4320 @ 60Hz)
	Supported Graphics APIs	DirectX®12, OpenGL® 4.5, OpenCL™ 1.0, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran
	Available Graphics Drivers	Windows® 10 64-bit Linux® 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	1- Supports up to a total of 4 displays 2- VirtualLink's USB-C™ (data) cannot be disabled at a hardware level

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AMD Radeon™ Pro W6800 32GB Graphics	**Form Factor**	Dual slot, Full-height (4.4"? H x 10.5"? L)
	Graphics Controller	Radeon™ Pro W6800 graphics GPU: 3840 cores Power: 261 Watts Cooling: Active fan heatsink
	Memory	32GB GDDR6 memory Memory Bandwidth: Up to 512 GB/s Memory Width: 256 bit
	Connectors	6 mDP (miniDisplayPort™) 1.4 Connectors with DSC
	Maximum Resolution	Up to 6x 5120 x 2880 x 24 bpp @ 60Hz • Supports Multi-Stream Transport (MST)
	GPU Architecture	RDNA™ 2
	Supported Graphics APIs	OpenGL® 4.6 DirectX® 12 Ultimate (HW RayTracing) Vulkan™ 1.2 API support includes OpenCL™ 2.1
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	W6800 only has mini-DisplayPort™ (mDP) video ports • Configure-to-order must specify AV options to add any required mDP-to-DP Adapters Two mDP-to-DP Adapters are included in the RTX A2000 AMO kits. If more mDP-to-DP Adapters are needed, Adapters can be ordered separately as AMO: • 2MY05AA - HP Single miniDP-to-DP Adapter Cable • 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables

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Radeon™ Pro WX 7100 8GB	**Form Factor**	Full-Height Single Slot (9.5"? Length)

Technical Specifications - Graphics

Graphics

Graphics Controller	Radeon™ Pro WX 7100 graphics GPU: 2304 Stream Processors organized into 36 Compute Units Power: 130 Watts Cooling: Active
Memory	8GB GDDR5 memory Memory Bandwidth: 7 Gbps / 224 GB/s Memory Width: 256 bit
Connectors	4x Display Port 1.4 - HDR ready connectors with HBR3 and MST support. Factory Configured: No video cable adapter included After market option kit: No video cable adapter included Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.
Maximum Resolution	5K support @ 60Hz • 1x single-cable 5K monitor, or 2x dual-cable 5K monitors
Image Quality Features	Advanced support for 8-bit, 10-bit, and 16-bit per RGB color component. High bandwidth scaler for high quality up and downscaling
Display Output	4 full physical DP1.3 HBR3 / DP1.4 HDR outputs FreeSync support
GPU Architecture	GCN 4th Generation
Supported Graphics APIs	DirectX®12 OpenGL® 4.5 OpenCL™ 2.0 Vulkan™ 1.0
Available Graphics Drivers	Windows 11 Windows 10 Windows 7 64-bit Linux® 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
Notes	12. HDR content requires that the system be configured with a fully HDR-ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support. 13. Radeon VR Ready Creator Products are select Radeon Pro and AMD FirePro™ GPUs that meet or exceed the Oculus Rift or HTC Vive recommended specifications for video cards/GPUs. Other hardware (including CPU) and system requirements recommended by Oculus Rift or HTC Vive should also be met in order to operate the applicable HMDs as intended. As VR technology, HMDs and other VR hardware and software evolve and/or become available, these criteria may change without notice. 14. AMD PowerTune and AMD ZeroCore Power are technologies offered by certain FirePro™ and Radeon™ Pro products, which are designed to intelligently manage GPU power consumption in response to certain GPU load conditions. 15. As of September 2016, certified for DisplayPort™ 1.4 HBR3 and ready for DisplayPort™ 1.4 HDR based on independent verification by DisplayPort™ testing authority. HDR content requires that the system be configured with a fully HDR-ready

content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support.

Radeon™ Pro WX 9100 16GB Graphics	**Form Factor**	Dual Slot (4.4"? Height x 10.5"? Length)
	Graphics Controller	Radeon™ Pro WX 9100 graphics GPU: 4096 Stream Processors Power: 250 Watts Cooling: Active
	Memory	16GB HBM2 memory Memory Bandwidth: Up to 483 GB/s Memory Width: 2048 bit
	Connectors	6x Mini DisplayPort 1.4 - HDR ready connectors with HBR3 and MST support. Factory Configured: No video cable adapter included After market option kit: No video cable adapter included Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.
	Maximum Resolution	8K support @ 60Hz Single monitor, single or dual-cable
	Image Quality Features	Advanced support for 8-bit, 10-bit, and 16-bit per RGB color component. High bandwidth scaler for high quality up and downscaling
	Display Output	6 full physical mDP 1.4 HDR Ready outputs FreeSync support
	GPU Architecture	Vega™
	Supported Graphics APIs	DirectX® 12.1 OpenGL® 4.5 OpenCL™ 2.0 Vulkan™ 1.0
	Available Graphics Drivers	Windows 11 Windows 10 Windows 7 available from AMD Linux® 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	1. HDR content requires that the system be configured with a fully HDR-ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support. 2. Radeon VR Ready Creator Products are select Radeon Pro and AMD FirePro™ GPUs that meet or exceed the Oculus Rift or HTC Vive recommended specifications for video cards/GPUs. Other hardware (including CPU) and system requirements recommended by Oculus Rift or HTC Vive should also be met in order to operate the applicable HMDs as intended. As VR technology, HMDs and

other VR hardware and software evolve and/or become available, these criteria may change without notice.

3. AMD PowerTune and AMD ZeroCore Power are technologies offered by certain FirePro™ and Radeon™ Pro products, which are designed to intelligently manage GPU power consumption in response to certain GPU load conditions.
4. As of September 2016, certified for DisplayPort™ 1.4 HBR3 and ready for DisplayPort™ 1.4 HDR based on independent verification by DisplayPort™ testing authority. HDR content requires that the system be configured with a fully HDR-ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support.

Factory Configured (Z4 G4/ Z6 G4/ Z8 G4 Workstations): No adapters included
After market option kit:Two mDP-to-DP Adapters included

Additional mDP-to-DP Adapters are available as Factory Configuration or Option Kit accessories:

- 2MY05AA - HP miniDP-to-DP Adapter Cables
- 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables

NVIDIA® Quadro® Sync II	**Part number**	1WT20AA
	Dimensions (HxD)	6.0 inches ? 4.2 inches
	Devices Supported	NVIDIA® Quadro® P4000 NVIDIA® Quadro® P5000 NVIDIA® Quadro® P6000 NVIDIA® RTX™ A6000 NVIDIA® RTX™ A5000 NVIDIA® RTX™ A4000
	Bus Type	Requires one free mechanical PCIe bus slot. 6-pin PCI or SATA power connector
	PCI Form Factor	Full Height, half length, single slot
	Ports	2 RJ45 connectors for carrying frame lock signals over CAT5 cables. BNC Connector for external house synchronization.
	Internal Connectors	6 NVIDIA SLI® style edge fingers for connection to compatible GPUs • Included with the board are 4 12-Inch Short Sync Cables to connect to GPU's • Included with the board are 2 24-Inch Long Sync Cables to connect to GPU's
	System Requirements	Requires one free mechanical PCIe bus slot. 6-pin PCI or SATA power connector Must be used with NVIDIA Quadro P4000, P5000 or P6000 graphics cards. Requires Quadro driver version R375 or later.
	Temperature - Operating	0° to 55° C
	Temperature - Storage	-40° to 60° C
	Relative Humidity - Operating	10% to 80%
	Power Requirements	Board power dissipation: <15W

Technical Specifications - Graphics

Operating Systems Supported	Windows 11 Windows 10 Windows 7 64-bit Linux® 64-bit
Kit Contents	Contains: • Quadro Sync II Card • 4 x 12-Inch Short Sync Cables • 2 x 24-Inch Long Sync Cables (Two) • Quick Start Guide

Optical and Removable Storage

HP 9.5mm Slim DVD Writer	**Description**	9.5mm height, tray-load	
	Mounting Orientation	Either horizontal or vertical	
	Interface Type	SATA/ATAPI	
	Dimensions (WxHxD)	128 x 9.5 x 127mm	
	Supported Media Types	DVD+R DVD+RW DVD+R DL DVD-R DL DVD-R DVD-RW CD-R CD-RW	
	Disc Capacity	DVD-ROM	8.5 GB DL or 4.7 GB standard
		Full Stroke DVD	< 200 ms (seek)
		Full Stroke CD	< 200 ms (seek)
	Maximum Data Transfer Rates	CD ROM Read	CD-ROM, CD-R Up to 24X CD-RW Up to 24X
		DVD ROM Read	DVD+RW Up to 8X DVD-RW Up to 8X DVD+R DL Up to 8X DVD-R DL Up to 8X DVD-ROM Up to 8X DVD-ROM DL Up to 8X DVD+R Up to 8X DVD-R Up to 8X
	Power	Source	SATA DC power receptacle
		DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p
		DC Current	5 VDC -< 800 mA typical, <1600 mA maximum
	Operating Environmental (all conditions non-condensing)	Temperature	41° to 122° F (5° to 50° C)
		Relative Humidity	10% to 80%
		Maximum Wet Bulb Temperature	84° F (29° C)
	Kit Contents	HP SATA DVD Writer drive, installation guide.	

Technical Specifications – Optical and Removable Storage

HP 9.5mm Slim DVD-ROM Drive	**Description**	9.5mm height, tray-load	
	Mounting Orientation	Either horizontal or vertical	
	Interface Type	SATA / ATAPI	
	Dimensions (WxHxD)	128 x 9.5 x 127mm	
	Disc Capacity	DVD-ROM	Single layer: Up to 4.7 GB Double layer: Up to 8.5 GB
	Access Times	DVD-ROM Single Layer	< 110 ms (typical)
		CD-ROM Mode 1	< 110 ms (typical)
		Full Stroke DVD	< 230 ms (typical)
		Full Stroke CD	< 220 ms (typical)
	Power	Source	SATA DC power receptacle
		DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p
		DC Current	5 VDC - <800mA typical, < 1600 mA maximum
	Operating Environmental (all conditions non-condensing)	Temperature	41° to 122° F (5° to 50° C)
		Relative Humidity	10% to 80%
		Maximum Wet Bulb Temperature	84° F (29° C)
	Kit Contents	9.5mm Slim DVD-ROM Drive, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide	

HP HH DVD Writer (16X RW DVD-R)	**Description**	HP Half Height DVD Writer	
	Mounting Orientation	Either Horizontal or vertical	
	Interface Type	SATA	
	Dimensions (WxHxD)	146x42x165mm	
	Supported Media Types	DVD+R DVD+RW DVD+R DL DVD-R DL DVD-R DVD-RW CD-R CD-RW	
	Disc Capacity	DVD-ROM	8.5 GB DL or 4.7 GB standard
		Full Stroke DVD	145ms (seek)
		Full Stroke CD	120ms (seek)
	Maximum Data Transfer Rates	CD ROM Read	CD-ROM, CD-R Up to 24X CD-RW Up to 24X
		DVD ROM Read	DVD+RW Up to 13X DVD-RW Up to 13X DVD+R DL Up to 12X DVD-R DL Up to 12X DVD-ROM Up to 12X DVD-ROM DL Up to 12X DVD+R Up to 16X DVD-R Up to 16X
	Power	Source	SATA DC power receptacle
		DC Power Requirements	5 VDC ± 5% -100 mV ripple p-p 12 VDC ± 10% -200 mV ripple p-p
		DC Current	5 VDC -<1500mA typical, <2000 mA maximum.

Technical Specifications – Optical and Removable Storage

	Operating Environmental (all conditions non-condensing)	Temperature	41° to 122° F (5° to 50° C)
		Relative Humidity	10% to 90% (Non-Condensing)
	Operating Systems Supported	Windows 11, Windows 10, Windows 7 Professional 64-bit. Red Hat Enterprise Linux WS4**,5,6 Desktop/Workstation. No driver is required for this device, Native support is provided by operating system.	
	Kit Contents	HP SATA DVD Writer drive, Installation guide.	
HP 9.5mm Slim BDXL Blu-Ray Writer	**Description**	9.5mm height, tray-load	
	Mounting Orientation	Either horizontal or vertical	
	Interface Type	SATA/ATAPI	
	Dimensions (WxHxD)	128 x 9.5 x 127mm	
	Supported Media Types	BD-ROM BD-R BD-RE DVD+R DVD+RW DVD+R DL DVD-R DL DVD-R DVD-RW CD-R CD-RW	
	Disc Capacity	DVD-ROM	8.5 GB DL or 4.7 GB standard
		Blu-ray	25 GB (single-layer) 50 GB (dual-layer) 100/128 GB (BDXL)
		Full Stroke DVD	< 230 ms (seek)
		Full Stroke CD	< 220 ms (seek)
		Blu-ray	< 230 ms (seek) (Full Stroke Blu-ray)
		Startup Time	(Time to drive ready from tray loading) BD-ROM (SL/DL) 25S / 28S BD-R (SL/DL) 25S / 28S BD-RE (SL/DL) 25S / 28S DVD-ROM (SL/DL) 18S / 18S DVD-R (SL/DL) 25S / 25S DVD-RW 25S DVD+R (SL/DL) 25S / 25S DVD+RW 25S CD-ROM 15S
	Maximum Data Transfer Rates	CD ROM Read	CD-ROM, CD-R Up to 24X CD-RW Up to 24X
		DVD ROM Read	DVD+RW Up to 8X DVD-RW Up to 8X DVD+R DL Up to 8X DVD-R DL Up to 8X DVD-ROM Up to 8X DVD-ROM DL Up to 8X DVD+R Up to 8X DVD-R Up to 8X

Technical Specifications – Optical and Removable Storage

		Blu-ray	BD-ROM Up to 6X BD-ROM DL Up to 6X BD-R Up to 6X BD-R DL Up to 6X BD-R Up to 6X BD-RE SL/DL Up to 6X
	Power	Source	SATA DC power receptacle
		DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p
		DC Current	5 VDC -900 mA typical, 2000mA maximum
	Operating Environmental (all conditions non-condensing)	Temperature	41° to 122° F (5° to 50° C)
		Relative Humidity	10% to 80%
		Maximum Wet Bulb Temperature	84° F (29° C)
	Kit Contents	9.5mm Slim BDXL Blu-Ray Writer, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide	
		As Blu-ray is a new format containing new technologies, certain disc, digital connection, compatibility and/or performance issues may arise, and do not constitute defects in the product. Flawless playback on all systems is not guaranteed. In order for some Blu-ray titles to play, they may require a DVI or HDMI digital connection and your display may require HDCP support. HD-DVD movies cannot be played on this workstation.	

HP SD Card Reader	**Description**	Supports hardware ECC (Error Correction Code) function Supports hardware CRC (Cyclic Redundancy Check) function Supports SD 4-bit parallel transfer mode
	Interface Type	USB 3.1 G1 High-speed interface
	Dimensions (WxHxD)	1.15 x .9 x .15 in (29.00 x 23.6 x 3.15 mm) Fits conveniently in the Front IO Bay
	Supported Media Types	Secure Digital Card (SD) Secure Digital High Capacity (SDHC) SD Extended Capacity Memory Card (SDXC) SD Ultra High Speed II(SD UHSII) These additional media types are supported with a card adapter. miniSD miniSD High Capacity Micro SD Memory Card (MicroSD) Micro SD High Capacity Memory Card (MicroSDHC) Test Parameters/Conditions - Power applied, unit operating on system ±5%
	Kit Contents	SD card reader
	Approvals	USB-IF, WHQL, Compliant with USB Mass Storage Class Bulk only Transport Specification Rev. 1.0, Compliant Intel Front Panel I/O Connectivity Design Guide V. 1.3, FCC, CE, BSMI, C-Tick, VCCI, MIC, cUL, TUVT
	Weight	0.35 lbs. (0.16 kg)

Controller Cards

HP Thunderbolt-3 Dual Port2 PCIe 1-port I/O Card	**Data Transfer Rate**	Supports up to 40 Gb/s (40,000 Mb/s)
	Devices Supported	Thunderbolt™, Thunderbolt™ 2 and Thunderbolt™ 3 certified for Windows devices
	Bus Type	PCIe Slot. Slot 4 only
	Ports	Two Thunderbolt™ 3 external USB type-C output connectors (Rear) Two full size DisplayPort input connectors (Rear)
	Internal Connectors	One 2x5-Pin header connector
	System Requirements	Genuine Windows 10 Professional, slot 4 PCH PCIe slot.
	Temperature - Operating	50° to 131° F (10° to 55° C)
	Temperature - Storage	-22° to 140° F (-30° to 60° C)
	Relative Humidity - Operating	20% to 80%
	Compliances	FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC
	Operating Systems Supported	Genuine Windows 10 Professional.
	Kit Contents	HP Thunderbolt™ 3 Dual Port PCIe I/O Card, 2- DisplayPort cables, GPIO (General-Purpose Input/Output) cables, Installation documentation and warranty card.

*Maximum speed requires DisplayPort™ and PCIe aggregation.

Networking and Communications

Integrated Intel I219 PCIe GbE Controller	**Connector**	RJ-45
	Controller	Intel I219 GbE platform LAN connect networking controller
	Data Rates Supported	10/100/1000 Mbps
	Boot ROM Support	PXE, UEFI
	Connect Speed LED Indicators	Link/Activity LED • Off = No link • Blinking = Activity Speed LED • Off = 10Mbps • Amber = 100Mbps • Green = 1000Mbps
	Management Capabilities	Wake-On-LAN, Intel ® Active Management Technology™ (AMT) 11.1x **NOTE:** Intel ® AMT™ is not available on Intel Core X configs.

Integrated Intel I210 (not available on Intel Core X configs)	**Connector**	RJ-45
	Controller	Intel® I210
	Data Rates Supported	10/100/1000 Mbps
	Boot ROM Support	PXE, UEFI
	Connect Speed LED Indicators	Link/Activity LED • Off = No link • Blinking = Activity Speed LED • Off = 10Mbps • Amber = 100Mbps • Green = 1000Mbps
	Management Capabilities	Wake-On-LAN

Technical Specifications - Networking and Communications

Intel® I210-T1	**Networking Interface**	RJ-45
	System Interface	PCI Express 2.1 x1
	Networking Speeds Supported	10Mbps, 100Mbps, 1Gbps
	Cabling (up to 100m)	Cat3 (or higher) for 10Mbps Cat5 (or higher) for 100Mbps Cat5e (or higher) for 1Gbps
	Power Consumption (active-typical)	0.81W
	Physical Dimensions	Length: 6.7cm (2.64 inches) (Bracket) Width: 1.8cm (0.709 inches) Full-height end bracket: 12.07cm (4.755 inches) Low-profile end bracket: 8cm (3.15 inches)
	Connect Speed LED Indicators	Link/Activity LED • Off = No link • Blinking = Activity Speed LED • Off = 10Mbps • Green = 100Mbps • Amber = 1Gbps
	Operating Temperature	0 °C to 55 °C (32 °F to 131 °F)
	Hardware Certifications	USA: FCC B, EU: UL CE, Japan: VCCI, Taiwan: BSMI, Australia/New Zealand: CTICK, Korea: KCC, Canada: ICES-003/NMB-003

Intel® I350-T2	**Networking Interface**	2 x RJ-45
	System Interface	PCI Express 2.1 x4
	Networking Speeds Supported	10Mbps, 100Mbps, 1Gbps
	Cabling (up to 100m)	Cat3 (or higher) for 10Mbps Cat5 (or higher) for 100Mbps Cat5e (or higher) for 1Gbps
	Power Consumption (active-typical)	4.4W
	Physical Dimensions	Length: 13.54cm (5.33 inches) Width: 6.89 (2.71 inches) Full-height end bracket: 12.0cm (4.725 inches) Low-profile end bracket: 7.92cm (3.117 inches)
	Connect Speed LED Indicators	Link/Activity LED • Off = No link • Blinking = Activity Speed LED • Off = 10Mbps • Green = 100Mbps

- Amber = 1Gbps

	Operating Temperature	0 °C to 55 °C (32 °F to 131 °F)
	Hardware Certifications	USA: FCC B, EU: UL CE, Japan: VCCI, Taiwan: BSMI, Australia/New Zealand: CTICK, Korea: KCC, Canada: ICES-003/NMB-003

Intel® I350-T4	**Networking Interface**	4 x RJ-45
	System Interface	PCI Express 2.1 x4
	Networking Speeds Supported	10Mbps, 100Mbps, 1Gbps
	Cabling (up to 100m)	Cat3 (or higher) for 10Mbps Cat5 (or higher) for 100Mbps Cat5e (or higher) for 1Gbps
	Power Consumption (active-typical)	5W
	Physical Dimensions	Length: 13.54cm (5.33 inches) Width: 6.89 (2.71 inches) Full-height end bracket: 12.0cm (4.725 inches) Low-profile end bracket: 7.92cm (3.117 inches)
	Connect Speed LED Indicators	Link/Activity LED • Off = No link • Blinking = Activity Speed LED • Off = 10Mbps • Green = 100Mbps • Amber = 1Gbps
	Operating Temperature	0 °C to 55 °C (32 °F to 131 °F)
	Hardware Certifications	USA: FCC B, EU: UL CE, Japan: VCCI, Taiwan: BSMI, Australia/New Zealand: CTICK, Korea: KCC, Canada: ICES-003/NMB-003

Technical Specifications - Networking and Communications

Intel® X550-T2	**Networking Interface**	2 x RJ-45
	System Interface	PCI Express 3 x4
	Networking Speeds Supported	100Mbps, 1Gbps, 2.5Gbps, 5Gbps, 10Gbps
	Cabling (up to 100m)	Cat5 (or higher) for 100Mbps Cat5e (or higher) for 1Gbps, 2.5Gbps, or 5Gbps Cat6a (or higher) for 10Gbps
	Power Consumption (active-typical)	3.9W at 100Mbps 5.5W at 1Gbps 11.2W at 10Gbps
	Physical Dimensions	5.2 in x 2.7 in (without bracket)
	Connect Speed LED Indicators	Link/Activity LED • Off = No link • Blinking = Activity Speed LED • Off = No link • Amber = <10Gbps • Green = 10Gbps
	Operating Temperature	0 °C to 55 °C (32 °F to 131 °F)
	Hardware Certifications	USA: FCC B, EU: UL CE, Japan: VCCI, Taiwan: BSMI, Australia/New Zealand: CTICK, Korea: KCC, Canada: ICES-003/NMB-003

Allied Telesis AT-2914SX/LC-901 1GB LC Fiber NIC	**Network Interface**	1Gb LC Fiber 850 nm
	System Interface	PCIeG2 x1, Half Height, Half Length
	Networking Speeds Supported	1000Base-X (1Gbps)
	Cabling	50/125 µm (core/cladding) multimode fiber optic cable up to 500m 62.5/125 µm (core/cladding) multimode fiber optic cable up to 220m
	Power Consumption (active- typical)	1.5 Watts
	Physical Dimensions	8.8 cm x 6.9 cm (3.5 in x 2.7 in)
	Connect Speed LED Indicators	ON: 1Gbps Link OFF: Link down
	Operating Temperature	-25°C to 70°C (-13°F to 158°F)
	Hardware Certifications	IEEE 802.1p (Quality of Service), IEEE 802.1Q (VLANs), IEEE 802.2 (LLC), IEEE 802.3ac (MAC), IEEE 802.3x (Flow control auto-negotiation), IEEE 802.3z (1000 Base-X), IEEE 802.3ad (Link aggregation) RoHS, UL, FCC/EN55022 Class A, TUV, EN55024, CE, C-TICK, VCCI

Technical Specifications - Networking and Communications

Allied Telesis AT-2911T/2-901	**Networking Interface**	2 RJ-45
	System Interface	PCI Express 3 x1
	Networking Speeds Supported	10Mbps, 100Mbps, 1Gbps
	Cabling (up to 100m)	Cat3 (or higher) for 10Mbps Cat5 (or higher) for 100Mbps Cat5e (or higher) for 1Gbps
	Power Consumption (active-typical)	2.4W
	Physical Dimensions	Length: 8.8cm (3.5 inches) Width: 6.89 (2.71 inches) Full-height end bracket: 12.0cm (4.725 inches) Low-profile end bracket: 7.92cm (3.117 inches)
	Connect Speed LED Indicators	Link/Activity LED • Off = No link Blinking = Activity
	Operating Temperature	0 °C to 40 °C (32 °F to 104 °F)
	Hardware Certifications	USA: FCC B, EU: UL CE, UKCA Japan: VCCI, Taiwan: BSMI, Australia/New Zealand: CTICK, Korea: KCC, Canada: ICES-003/NMB-003

Intel® X710-DA2 10GBASE-SR Converged Network Adapter	**Networking Interface**	2 SFP+ Ports for LC SFP+ Transceivers
	System Interface	PCI Express 3.0 x8
	Networking Speeds Supported	1Gbps (with a 3rd party transceiver), 10Gbps
	Cabling	LC fiber optic cabling with LC SFP+ Transceivers
	Power Consumption (active-typical)	4.3W
	Physical Dimensions	6.578 in x 2.703 in
	Connect Speed LED Indicators	Link/Activity LED • Off = No link • Blinking = Activity Speed LED • Off = 10Mbps • Green = 100Mbps • Amber = 1Gbps
	Operating Temperature	0 °C to 55 °C (32 °F to 131 °F)
	Hardware Certifications	USA: FCC B, EU: UL CE, Japan: VCCI, Taiwan: BSMI, Australia/New Zealand: CTICK, Korea: KCC, Canada: ICES-003/NMB-003

Technical Specifications - Networking and Communications

Note: Windows 7 is NOT supported

10GbE SFP+ SR Transceiver	**Connector Type**	LC
	Cable Type	62.5/125um or 50/125um (core/cladding), graded-index, low metal content, multimode fiber optic, complying with ITU-T G.651 and ISO/IEC 793-2 Type A1b or A1a, respectively.
	Cable Length	2-300m
	Wavelength	850nm
	Form Factor	SFP+
	Physical Dimensions	0.47(h) x 0.54(w) x 2.19(d) inches (1.19 x 1.38 x 5.57 cm)
	Operating Temperature	0C to 45C (32F to 113F)
	Operating Humidity	0% to 85%, noncondensing
Intel® 8265 WLAN	**Networking Speeds**	802.11ac MU-MIMO (up to 867 Mbps) Bluetooth 4.2
	IEEE WLAN Standard	IEEE 802.11a/b/g/n/ac, 802.11d, 802.11e, 802.11h, 802.11i, 802.11w; 802.11r, 802.11k, 802.11v pending
	Bluetooth	4.2
	System Interface	PCI Express 2.1 x1
	Antenna	2x2

Summary of Changes

Summary of Changes

Date of change:	Version History:		Description of change:
November 1, 2017	From v1 to v2	Added	HP DisplayPort to HDMI Adapter, NVIDIA SLI 2-slot Graphics Connector and NVIDIA Quadro Sync II to Graphics section
		Changed	Graphics, Storage / Hard Drives and Memory sections, changed Front and internal view info on the Overview section, changed Operating Systems section, changed System Board section, changed System Configuration, DECLARED NOISE EMISSIONS and Physical Security and Serviceability sections
November 29, 2017	From v2 to v3	Added	Processors, hard drives and graphics to offerings, added Intel Xeon W-2195 to Processors section
		Changed	Wattage links on power supply section updated and Voltage links on efficientcy section updated
February 5, 2018	From v3 to v4	Added	Features and Supported Configurations for Intel® Core™ X- Series Processor Family
		Changed	Formatting
February 27, 2018	From v4 to v5	Added	Intel Core i9-X processors footnotes added to processors pre-installed section
March 27, 2018	From v5 to v6	Added	NVIDIA Quadro GP100 16GB Graphics, NVIDIA Quadro GV100 32GB Graphics and AMD Radeon Pro WX 9100 16GB Graphics as High End 3D in Graphics section
August 13, 2018	From v6 to v7	Added	Footnote to Networking and Communications section
		Changed	Operating Systems section
August 24, 2018	From v7 to v8	Changed	Format
September 21, 2018	From v8 to v9	Added	Intel Optane SSD 905p AiC 280GB & 480GB
September 26, 2018	From v9 to v10	Changed	NVIDIA Quadro P6000 Graphics specs
February 11, 2019	From v10 to v11	Added	NVIDIA Quadro RTX 5000 16GB and NVIDIA Quadro RTX 6000 24GB Graphics, added Intel Core i9-9980XE, Intel Core i9-9920X, Intel Core i9-9820X and Intel Core i7-9800X processors
		Changed	Storage section and Format changes
May 8, 2019	From v11 to v12	Changed	Storage and Graphics sections
June 12, 2019	From v12 to v13	Changed	Storage section
June 24, 2019	From v13 to v14	Changed	RAID Support
July 15, 2019	From v14 to v15	Changed	Corrected Intel 905p Series AIC 480GB PCIe SSD
July 18, 2019	From v15 to v16	Changed	HP SD 4 Card Reader part number
July 23, 2019	From v16 to v17	Changed	Windows 10 Pro High End added to Processors and under Intel Core X-series Processors Preinstalled Power supply-high end section re-arranged
September 1, 2019	From v17 to v18	Added	Footnote to Memory section, Added HP Z Turbo Drive 1TB SED TLC Z4/Z6 G4 SSD Kit & module to Storage section, Added Intel® Wi-Fi 6 AX200 & BT PCIe to Networking section
October 26, 2019	From v18 to v19	Changed	Graphics section
November 1, 2019	From v19 to v20	Added	HP QX310 Removable NVMe Frame/Carrier w/PCIe card to Optical and Removable Storage section
December 5, 2019	From v20 to v21	Added	Intel Xeon W-2200, Intel Core i9-10900X X-series processors and added new HP Z4 G4 Memory Cooling Solution on Other Hardware section
		Changed	Storage / Hard Drives, Memory and System Board sections
January 2, 2020	From v21 to v22	Changed	Front I/O and Rear I/O Overview subsections and changed Storage section
February 6, 2020	From v22 to v23	Changed	Storage / Hard Drives, Optical and Removable Storage and Physical Security and Serviceability
June 5, 2020	From v23 to v24	Added	AMD Radeon Pro W5500 and AMD Radeon Pro W5700 to Graphics section
		Changed	HARD DRIVE CONTROLLERS section
January 5, 2021	From v24 to v25	Changed	Processors, Memory, Graphics, Racking and Physical Security, Operating Systems and Hard Drives sections
January 7, 2021	From v25 to v26	Changed	Hard Drives section
February 1, 2021	From v26 to v27	Changed	NETWORKING AND COMMUNICATIONS section
March 1, 2021	From v27 to v28	Changed	Overview and Memory sections
April 13, 2021	From v28 to v29	Changed	Graphics, Social and Environmental Responsibility sections

Summary of Changes

April 21, 2021	From v29 to v30	Changed	Memory section
May 1, 2021	From v30 to v31	Changed	Graphics and Software sections
June 1, 2021	From v31 to v32	Changed	Memory section
July 1, 2021	From v32 to v33	Changed	Graphics section
July 16, 2021	From v33 to v34	Changed	Racking and Physical Security section
August 1, 2021	From v34 to v35	Changed	Graphics section
September 1, 2021	From v35 to v36	Changed	Input Devices, Graphics and Memory sections
October 1, 2021	From v36 to v37	Changed	Processor Matrix, Graphics and System Board sections
December 1, 2021	From v37 to v38	Changed	Operating Systems, Graphics, Networking and Communications and Input Devices sections
December 15, 2021	From v38 to v39	Changed	OPERATING SYSTEM and Social and Environmental Responsibility sections
January 1, 2022	From v39 to v40	Changed	Graphics, OPERATING SYSTEM and Application Software sections
February 1, 2022	From v40 to v41	Changed	Input Devices section
March 1, 2022	From v41 to v42	Changed	Graphics, Social and Environmental Responsibility sections
April 1, 2022	From v42 to v43	Changed	Processors, Graphics and Stable & Consistent Offerings sections
May 2, 2022	From v43 to v44	Changed	Graphics section
June 1, 2022	From v44 to v45	Changed	Graphics, Networking and Communications sections
July 1, 2022	From v45 to v46	Changed	SATA Hard Drives, Graphics, NETWORKING AND COMMUNICATIONS sections
September 1, 2022	From v46 to v47	Changed	Format page 18

title

Technical Specifications

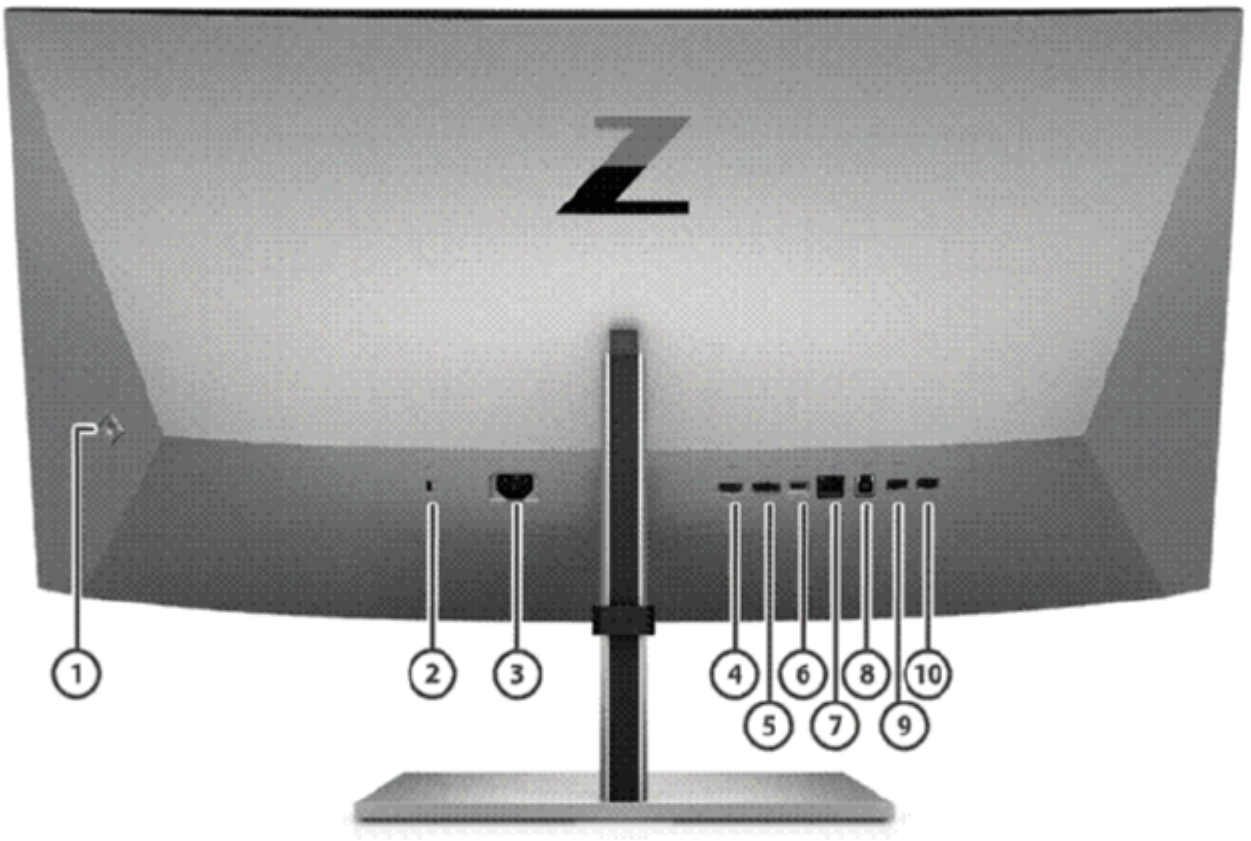
HP Z34c G3 WQHD Curved Display

Front

1. **Tilt levers**
2. **Microphones (2)**
3. **Camera Light**
4. **Camera RGB Lens**
5. **Camera IR Lens**
6. **Camera IR Light**
7. **Speakers**
8. **USB Ports (2)**
9. **Power Button**
10. **Power LED**

Technical Specifications

HP Z34c G3 WQHD Curved Display



Back

1. **OSD Button**
2. **Security Cable Slot**
3. **Power Connector**
4. **HDMI Port**
5. **DisplayPort™ connector**
6. **USB Type-C®?**
7. **RJ-45 (Network) Port**
8. **USB-B Port (Upstream)**
9. **USB Port (Includes KVM connection)**
10. **USB Port**

Model: 30A19AA		
Panel Specifications	**Display Size (Diagonal)**	34 inches
	Panel Technology	IPS
	Curved	1900R
	Max Refresh Rate	60Hz
	Panel Bit Depth	1.07B colors / 10 bit (8bit + FRC)
	Aspect Ratio	21:9
	Brightness (Typical)	350 nits
	Contrast Ratio (Static)	1,000: 1
	Dynamic Contrast Ratio	10M:1
	Flicker Free	Yes
	Pixel Pitch	0.2325 x 0.2325 mm
	Pixels Per Inch (PPI)	110 PPI
	Backlight Lamp Life Minimum (To Half Brightness - In Hours)	30000k

Technical Specifications

	Backlight Type	Edge-lit
	Screen Treatment	Anti-glare
	Hardness	3H
	Haze	25
	Response Time (Typical)	6ms GtG (with overdrive)
	Horizontal Viewing Angle (Typical CR>10)	178°
	Vertical Viewing Angle (Typical CR>10)	178°
	Panel Active Area Metric (W x H)	799.8 x 334.8 mm
	Panel Active Area Imperial (W x H)	31.49 x 13.18 in
	NOTE: Performance specifications represent the typical specifications provided by HP's component manufacturers; actual performance may vary either higher or lower.	
Color	**sRGB**	99%
	BT.709	99%
	DCI-P3	85%
Color Management	**Factory Color Calibrated**	Yes
	Calibrated Color Presets	sRGB, (D65), P3 (D65), BT.709 (D65), Warm, Neutral, Cool, Native, HP Enhance+
	Color Space/ Subsampling Support	RGB 4:4:4
	RGB Channel Adjust	Yes, Gain, downstream from color preset
	Default Color Temperature	6500K
Monitor Specifications	**Bezel Type**	3-sided borderless
	Color Of Stand	Black/ Silver
	Color Of Head	Black/ Silver
	Tilt	-5° to +10°
	Swivel	Yes, -30° to +30°
	Height Adjust Range	150mm
	Vesa Mounting	VESA Mount adapter 100 x 100 mm
	Security Lock	Standard Security Lock Slot
	Detachable Stand	Yes
	Warranty	3/3/0 for LA, NA, EMEA, APJ; (3/3/3 in select APJ Countries)
	Low Blue Light	Yes, HP Eye Ease (TUV Low Blue Light Hardware Solution certified)
	Zero Bright Dot Warranty	Yes
	Webcam	5 MP
	Webcam Features	Tilt/IR Sensor/Pop-up privacy
	Windows Hello Compatible	Yes
	Microphone	Yes (noise cancelling)
	Speaker Output Power	2 x 5W
	Certified Collaboration Software	Zoom
	Display Software	HP Display Center, HP Display Manager*
		*(GUIDE USERS TO SOFTWARE URL. HP DISPLAY CENTER: https://www.microsoft.com/en-us/p/hp-display-center/9nt6fq9kqf90#activetab=pivot:overviewtab)
On Screen Display (OSD)	**On Screen Display**	Brightness+, Color, Image, Input, Power, Menu, Management, Information, Exit
	Native Resolution	3440 x 1440

		NOTE: DisplayPort 1.2 or HDMI 1.4 required to drive panel at its native resolution. The video card of the connected PC must be capable of supporting 3440 x 1440 at 60 Hz with 10-bit color using one DP, HDMI, or USB-C (DP alt mode).
	Maximum Resolution	3440 x 1440 @ 60 Hz
	Preset Graphic Modes/Supported Resolutions	640 x 480 @ 60Hz 720 x 400 @ 70 Hz 800 x 600 @ 60 Hz 1024 x 768 @ 60 Hz 1280 x 720 @ 60 Hz 1280 x 800 @ 60 Hz 1280 x 1024 @ 60 Hz 1440 x 900 @ 60 Hz 1600 x 900 @ 60 Hz 1680 x 1050 @ 60 Hz 1920 x 1080 @ 60 Hz 1920 x 1200 @ 60 Hz 2560 x 1080 @ 60 Hz 2560 x 1440 @ 60 Hz 3440 x 1440 @ 60 Hz 3440 x 1440 @ 50 Hz (HDMI only)
	Minimum Vertical Scan Rate	59 Hz
	Maximum Vertical Scan Rate	61 Hz
	Minimum Horizontal Scan Rate	87.9 kHz
	Maximum Horizontal Scan Rate	89.8 kHz
	Maximum Pixel Clock	323.3 MHz
	User Programmable Modes	Yes, 16
	User-Assignable Function Buttons	Yes, 4 (7 Options)
	Audio	Built-in speakers
	Languages	10(German, Simplified Chinese, Traditional Chinese, English, Spanish, EU French, Italian, Japanese, Dutch (Nederlands), Brazilian Portuguese)
Connector Types	**DisplayPort™**	1 DisplayPort™ 1.4
	HDMI	1 HDMI 2.0
	HDCP	DisplayPort™ and HDMI
	USB Type-C® Video Input	100W USB Power Delivery, Alt Mode DisplayPort™? 1.4)
	USB Type-C® Data	1 SuperSpeed USB Type-C®? 5Gbps signaling rate (Up to 100W USB Power Delivery)
	USB- A	4 SuperSpeed USB Type-A 5Gbps signaling rate
	USB-B (Hub enablement)	1 USB-B
	ETHERNET	Yes
	KVM Keyboard Port	Yes
Special Features	**Picture-in-Picture, Picture-by-Picture**	Yes
	SWITCH	OSD buttons (up/down/left/right/enter)
	User Presets	SRGB
	User Updateable Firmware	Yes
	Manageability	PXE, WOL (In-band), MAPT (In-band)
Power & Operating Specs	**Power Supply**	Internal
	Power Source	90 - 265 VAC 47/63
	Power Consumption- Max	250 W
	Energy Saving/Stand By Mode	0.5 W
	Power Consumption- Typical	60 W
Energy Star Data	**Operational Mode at 100 VAC**	29.44 W

Technical Specifications

	Operational Mode at 115 VAC	29.37 W	
	Operational Mode at 230 VAC	29.41 W	
EU Energy Efficiency Class (ErP LOT-5)	**On-mode Power Consumption**	40.12 W	
	Energy Efficiency Class		
Operating Conditions	**Operating Temperature - Celsius**	5° - 35°C	
	Operating Temperature - Fahrenheit	41° - 95°F	
	Non-Operating Temperature - Celsius	-40° - 65°C	
	Non-Operating Temperature - Fahrenheit	-40° - 149°F	
	Operating Humidity	20 - 80% Relative Humidity (non-condensing)	
	Non-Operating Humidity	5 - 95%	
	Operating Altitude	0 - 5,000 m (16,400 ft.)	
	Non-operating Altitude	0 - 12,192 m (40,000 ft.)	
Certifications and Compliances	**Agency Approvals and Certifications**	WW application CE/ CB/ KC/ KCC/ NOM/ PSB/ ICE/ TUV-S/ ISO 9241-307/ EAC/ UL/ CSA/ PSB/ ISC/ CCC/ CEL/ CECP/ SEPA/ TCO/ TCO Certified Edge/ Energy Star/ Erp lot 5/ Ergo/ HW low blue light / ISC/ VCCI/ FCC/ BSMI/ WEEE/ Zoom Certified/ Window Hello	
	Microsoft WHQL Certification	Win 10	
	SmartWay Transport Partnership - NA only	Yes (NA sku)	
		Metric	**Imperial**
Unit Product/Package Specifications	**Product Dimensions** (Unpacked with stand) (W x D x H)	81.38 x 27.25 x 58.52 cm	32.04 x 10.73 x 23.04 in
	Product Dimensions (Packed) (W x D x H)	95.2 x 22.6 x 50.4 cm	37.48 x 8.9 x 19.84 in
	Display Head Dimensions (Unpacked without stand) (W x D x H)	81.38 x 10.5 x 38.92 cm	32.04 x 4.13 x 15.32 in
	Base Area Footprint (w x d mm)	300 x 250 mm	11.81 x 9.84 in
	Bezel Measurements (Unpacked with stand) (W x D x H)	top 1.6 mm side 1.6 mm bottom 42 mm	top 0.06 in side 0.06 in bottom 1.65 in
	Product Weight (Unpacked with stand)	11.1 kg	24.47 lb
	Product Weight (Packed)	16.2 kg	35.7 lb
	Product Weight (Head Only)	8.6 kg	19 lb
Pallet Information	**Pallet Dimensions** (L x W x H mm)	Slip Sheet: 1130 x 952 x 2016 mm (20' ft & 40' ft & 40HQ) Pallet: 1130 x 952 x 2144 mm (20' ft & 40' ft & 40HQ)	Slip Sheet: 44.49 x 37.48 x 79.37 inch (20' ft & 40' ft & 40HQ) Pallet: 44.49 x 37.48 x 84.41 inch (20' ft & 40' ft & 40HQ)
	Pallet Total Weight	Slip Sheet: 328.9 kg (20' ft & 40' ft & 40HQ) Pallet: 342.7 kg (20' ft & 40' ft & 40HQ)	Slip Sheet:725.1 lb (20' ft & 40' ft & 40HQ) Pallet: 755.52 lb (20' ft & 40' ft & 40HQ)"
	Pallet Layers	4 layers per pallet	

Technical Specifications

	Pallet Product per Layer	5 per layer (slip sheet & pallet)
	Total Products per Pallet	20 sets per pallet (slip sheet & pallet)
	Container Load, 20-Foot	240 sets (slip sheet and pallet)
	Container Load, 40-Foot	480 sets (slip sheet and pallet)
	Container Load, 40-Foot HighQ	480 sets (slip sheet and pallet)
What's in the box?	AC power cord (1.8m) 6.2 ft DP cable (1.8m) 6.2 ft USB-A-B (1.8m) 6.2 ft HDMI cable (1.8m) 6.2 ft USB-C-C (1.8m) 6.2 ft Warranty Card QSP Color calibration report VESA Adapter	
User Guide and Warranty Languages	**User Guide Languages**	Arabic, Bahasa Indonesia, Bulgarian, Chinese-S, Chinese-T, Czech, Danish, Dutch, English, Estonian, Finnish, French, German, Greek, Hebrew, Hungarian, Italian, Japanese, Kazakh, Korean, Latvian, Lithuanian, Norwegian, Polish, Portuguese (Brazilian), Portuguese (Iberian), Romanian, Russian, Serbian, Slovak, Slovenian, Spanish, Swedish, Thai, Turkey, Ukrainian
	Warranty Languages	Arabic, Bahasa Indonesia, Bulgarian, Chinese-S, Chinese-T, Czech, Danish, Dutch, English, Estonian, Finnish, French, German, Greek, Hebrew, Hungarian, Italian, Japanese, Kazakh, Korean, Latvian, Lithuanian, Norwegian, Polish, Portuguese (Brazilian), Portuguese (Iberian), Romanian, Russian, Serbian, Slovak, Slovenian, Spanish, Swedish, Thai, Turkey, Ukrainian

ENVIRONMENTAL DATA

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: • 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	• Ocean-bound plastic in (Webcam, Holder Deco, Joystick) • 80% post-consumer recycled plastic • Low halogen • Outside Box and corrugated cushions are 100% sustainably sourced and recyclable • Molded Paper Pulp Cushion inside box is 100% sustainably sourced and recyclable • Recycled Plastic cushions
System Configuration	The configuration used for the Energy Consumption and Declared Noise Emissions data for the Notebook model is based on a "Typically Configured Notebook"?.

Technical Specifications

Energy Consumption (in accordance with US ENERGY STAR® test method)	**115VAC, 60Hz**	**230VAC, 50Hz**	**100VAC, 50Hz**
Normal Operation (Short idle)	29.37 W	29.44 W	29.41 W
Sleep	0.27 W	0.27 W	0.25 W
Off	0.13 W	0.13 W	0.13 W
	Note: Energy efficiency data listed is for an ENERGY STAR® compliant product if offered within the model family. HP computers marked with the ENERGY STAR® Logo are compliant with the applicable U.S. Environmental Protection Agency (EPA) ENERGY STAR® specifications for computers. If a model family does not offer ENERGY STAR® compliant configurations, then energy efficiency data listed is for a typically configured PC featuring a hard disk drive, a high efficiency power supply, and a Microsoft Windows® operating system.		
Heat Dissipation*	**115VAC, 60Hz**	**230VAC, 50Hz**	**100VAC, 50Hz**
Normal Operation (Short idle)	100.45 BTU/hr	100.68 BTU/hr	100.58 BTU/hr
Sleep	0.92 BTU/hr	0.92 BTU/hr	0.86 BTU/hr
Off	0.44 BTU/hr	0.44 BTU/hr	0.44 BTU/hr
	*NOTE: Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.		
Longevity and Upgrading	This product can be upgraded, possibly extending its useful life by several years. Upgradeable features and/or components contained in the spare parts are available throughout the warranty period and or for up to "5"? years after the end of production.		
Additional Information	• This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC. • This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive - 2002/96/EC. • This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986). • This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold 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 97.9% recycle-able when properly disposed of at end of life.		
Packaging Materials	**External:**	PAPER/Corrugated	2936 g
		PAPER/Paperboard	950 g
	Internal:	PLASTIC/Polyethylene Expanded - EPE	210 g
	The plastic packaging material contains at least 12.6% recycled content.		
	The corrugated paper packaging materials contains at least 100% recycled content.		
RoHS Compliance	HP Inc. complies fully with materials regulations. We were among the first companies to extend the restrictions in the European Union (EU) Restriction of Hazardous Substances (RoHS) Directive to our products worldwide through the HP GSE. HP has contributed to the development of related legislation in Europe, as well as China, India, and Vietnam. We believe the RoHS directive and similar laws play an important role in promoting industry-wide elimination of substances of concern. We have supported the inclusion of additional substances-including PVC, BFRs, and certain phthalates-in future RoHS legislation that pertains to electrical and electronics products. We met our voluntary objective to achieve worldwide compliance with the new EU RoHS requirements for virtually all relevant products by July 2013, and we will continue to extend the scope of the commitment to include further restricted substances as regulations continue to evolve.		

Technical Specifications

	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: • Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials. • Eliminate the use of ozone-depleting substances (ODS) in packaging materials. • Design packaging materials for ease of disassembly. • Maximize the use of post-consumer recycled content materials in packaging materials. • Use readily recyclable packaging materials such as paper and corrugated materials. • Reduce size and weight of packages to improve transportation fuel efficiency. • Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.
End-of-life Management and Recycling	HP offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/go/reuse-recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner. The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the 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.

Technical Specifications

HP, Inc. Corporate Environmental Information	For more information about HP's commitment to the environment: Global Citizenship Report http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html Eco-label certifications http://www8.hp.com/us/en/hp-information/environment/ecolabels.html ISO 14001 certificates: http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842 and http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf
footnotes	• Percentage of ocean-bound plastic contained in each component varies by product • Recycled plastic content percentage is based on the definition set in the IEEE 1680.1-2018 standard. • External power supplies, WWAN modules, power cords, cables and peripherals excluded. • 100% outer box packaging and corrugated cushions made from sustainably sourced certified and recycled fibers. • Plastic cushions are made from >90% recycled plastic.

Summary

Change Log			
November 2, 2021	V1 to V2	Update	Native Resolution section
November 11, 2021	V2 to V3	Add	Environmental Data
	V3 to V4		

Technical Specifications

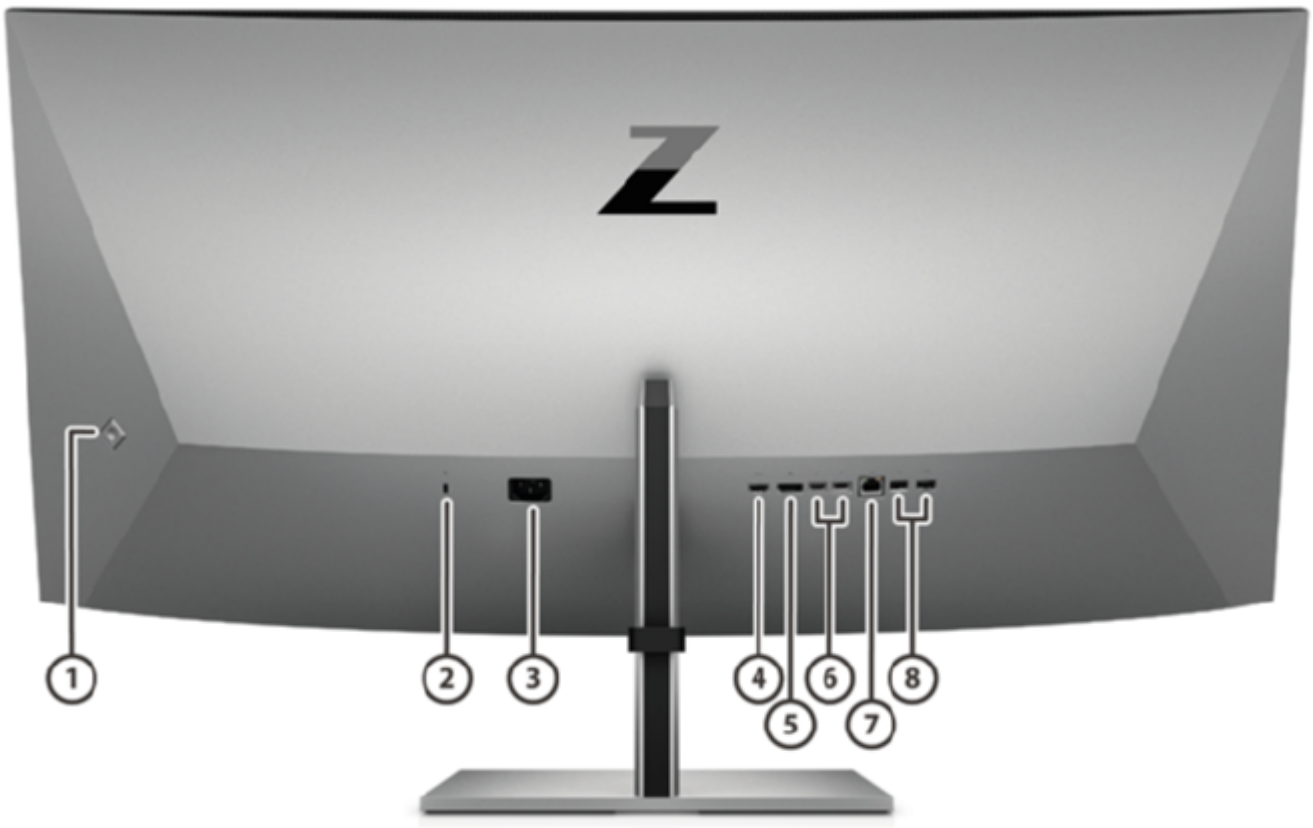
HP Z40c G3 WUHD Curved Display

Front

1. **Tilt levers**
2. **Microphones (2)**
3. **Camera Light**
4. **Camera RGB Lens**
5. **Camera IR Lens**
6. **Camera IR Light**
7. **Speakers**
8. **USB Ports (2)**
9. **PbP or Brightness buttons**
10. **Power Button**
11. **Power LED**

Technical Specifications

HP Z40c G3 WUHD Curved Display



Back

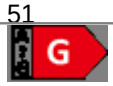
1. **OSD Button**
2. **Security Cable Slot**
3. **Power Connector**
4. **HDMI Port**
5. **DisplayPort™ connector**
6. **Thunderbolt ports (2)**
7. **RJ-45 (Network) Port**
8. **USB Ports (2)**

Model: 3A6F7AA		
Panel Specifications	**Display Size (Diagonal)**	39.7 inches
	Panel Technology	IPS
	Curved	2500R
	Max Refresh Rate	60HZ
	Native Resolution	WUHD (5120 x 2160)
	Panel Bit Depth	10 bit (8bit +FRC)
	Aspect Ratio	21:9
	Brightness (Typical)	300 nits
	Contrast Ratio (Static)	1,000: 1
	Dynamic Contrast Ratio	10M:1
	Flicker Free	Yes
	Pixel Pitch	0.18 x 0.18mm
	Pixels Per Inch (PPI)	139 PPI
	Backlight Lamp Life Minimum (To Half Brightness - In Hours)	30k
	Backlight Type	Edge-lit
	Screen Treatment	Anti-glare
	Hardness	3H

Technical Specifications

	Haze	25%
	Response Time (Typical)	14ms GtG
	Horizontal Viewing Angle (Typical CR>10)	178°
	Vertical Viewing Angle (Typical CR>10)	178°
	Panel Active Area Metric (W x H)	92.928 x 39.204 cm
	Panel Active Area Imperial (W x H)	36.59 x 15.43 in
	NOTE: Performance specifications represent the typical specifications provided by HP's component manufacturers; actual performance may vary either higher or lower.	
Color	**sRGB**	100%
	DCI-P3	98%
	BT.709	100%
Color Management	**Factory Color Calibrated**	Yes
	Calibrated Color Presets	DCI P3 D65, BT.709, sRGB D65
	Color Space/ Subsampling Support	RGB 4:4:4, YCBCR 4:4:4, YCBCR 4:2:2
	RGB Channel Adjust	Yes, Gain
	Default Color Temperature	DCI P3 (D65)
Monitor Specifications	**Bezel Type**	3-sided borderless
	Color Of Stand	Black/ Silver
	Color Of Head	Black/ Silver
	Tilt	-5° to +20°
	Swivel	±30°
	Height Adjust Range	150 mm
	VESA Mounting	100 mm x 100 mm (bracket included)
	Security Lock	Standard Security Lock Slot
	Detachable Stand	Yes
	Warranty	3/3/0 for LA, NA, EMEA, APJ; (3/3/3 in select APJ Countries)
	Low Blue Light	Yes, HP Eye Ease (TUV Low Blue Light Hardware Solution certified)
	Zero Bright Dot Warranty	Yes
	Webcam	13 MP
	Webcam Features	Independent tilt -20° to 5°; Windows Hello support (IR Sensor); Pop-up privacy
	Windows Hello Compatible	Yes
	Microphone	Yes (noise cancelling)
	Speaker Output Power	2 x 5W
	Certified Collaboration Software	Zoom
	Display Software	HP Display Center, HP Display Manager*
		*Host PC requires Windows 10. HP Display Center is available on the Microsoft store.
On Screen Display (OSD)	**On Screen Display**	Brightness+, Color, Image, Input, PbP, Power, Menu, Management, Exit
	Native Resolution	WUHD (5120 x 2160)
		NOTE: DisplayPort 1.4 or HDMI 2.0 required to drive panel at its native resolution. The video card of the connected PC must be capable of supporting 5120 ? 2160 at 60 Hz with 10-bit color using one DP, HDMI, or USB-C (DP alt mode).
	Maximum Resolution	5120?2160 @60Hz
	Preset Graphic Modes/Supported Resolutions	640 x 480 @ 60 Hz 720 x 400 @ 70 Hz 800 x 600 @ 60 Hz 1024 x 768 @ 60 Hz 1280 x 800 @ 60 Hz

Technical Specifications

		1280 x 1024 @ 60 Hz 1440 x 900 @ 60 Hz 1600 x 900 @ 60 Hz 1600 x 1200 @ 60 Hz 1680 x 1050 @ 60 Hz 1920 x 1080 @ 60 Hz 1920 x 1200 @ 60 Hz 2560 x 1440 @ 60 Hz 2560 x 1600 @ 60 Hz 2560 x 2160 @ 60 Hz (PbP) 3840 x 2160 @ 30 Hz 3840 x 2160 @ 60 Hz 4096 x 2160 @ 30 Hz 4096 x 2160 @ 60 Hz 5120 x 2160 @ 30 Hz 5120 x 2160 @ 60 Hz (Except HDMI)
	Minimum Vertical Scan Rate	29 Hz
	Maximum Vertical Scan Rate	71 Hz
	Minimum Horizontal Scan Rate	15.0 kHz
	Maximum Horizontal Scan Rate	134.0 kHz
	Maximum Pixel Clock	710.0 MHz
	User-Assignable Function Buttons	Yes, 4 (8 options)
	Audio	Built-in speakers
	Languages	11 (English, Spanish, German, French, Italian, Netherlands, Portuguese, Japanese, T-Chinese and S-Chinese, Russian)
Connector Types	**DisplayPort™**	1 DisplayPort™ 1.4
	HDMI	1 HDMI 2.0
	HDCP	Yes, DisplayPort and HDMI
	USB Type-C® Video Input & Data Transfer	2 Thunderbolt 3.0 up to 40Gbps signaling rate (Up to 100W USB Power Delivery, Alt Mode DisplayPort™? 1.4, SuperSpeed USB 5Gbps signaling rate)
	USB- A	4 SuperSpeed USB Type-A 5Gbps signaling rate
	ETHERNET	Yes
Special Features	**Picture-in-Picture, Picture-by-Picture**	Yes, PBP only
	SWITCH	OSD buttons (up/down/left/right/enter) PbP or Brightness buttons (L/R when PbP on, Plus ("+")/Minus ("-") when PbP off.
	Remote Manageability	In-Band MAPT, In-Band WoL, PXE Boot
	Video legal limiting (64-960)	Yes
	User Updateable Firmware	Yes
	Device Bridge 2.0	Yes
Power & Operating Specs	**Power Supply**	Internal
	Power Source	100 - 240 VAC 50/60 Hz
	Power Consumption- Max	310 W
	Energy Saving/Stand By Mode	0.5 W
	Power Consumption- Typical	72 W
Energy Star Data	**Operational Mode at 100 VAC**	52.54 W
	Operational Mode at 115 VAC	52.51 W
	Operational Mode at 230 VAC	52.63 W
EU Energy Efficiency Class (ErP LOT-5)	**On-mode Power Consumption**	51
	Energy Efficiency Class	
Operating Conditions	**Operating Temperature - Celsius**	5° - 35°C
	Operating Temperature - Fahrenheit	41° - 95°F
	Non-Operating Temperature - Celsius	-20° - 60°C

Technical Specifications

	Non-Operating Temperature - Fahrenheit	-4° - 140°F	
	Operating Humidity	20 - 80% Relative Humidity (non-condensing)	
	Non-Operating Humidity	5 - 95%	
	Operating Altitude	0 - 5,000 m (16,400 ft.)	
	Non-operating Altitude	0 - 12,192 m (40,000 ft.)	
Certifications and Compliances	**Agency Approvals and Certifications**	WW application CE, CB,KC/KCC/NOM/PSB/ISC/EAC/GS/TUV-S/ISO 9241-307/ Low Blue Light/UAE/Ukraine/South Africa/BIS/cTUVus/ISC/CCC/CEL/CECP/SEPA/Energy Star/TCO/VCCI/FCC/BSMI/E-Standby/WEEE/Zoom/Microsoft Hello	
	Microsoft WHQL Certification	Win 10	
	SmartWay Transport Partnership - NA only	Yes (NA sku)	
		Metric	**Imperial**
Unit Product/Package Specifications	**Product Dimensions** (Unpacked with stand) (W x D x H)	94.74 x 29.25 x 64.48 cm	37.3 x 11.52 x 25.38 in
	Product Dimensions (Packed) (W x D x H)	107.0 x 22.6 x 55.8 cm	42.16 x 8.9 x 21.97 in
	Display Head Dimensions (Unpacked without stand) (W x D x H)	94.74 x 14.195 x 44.71 cm	37.3 x 5.59 x 17.6 in
	Base Area Footprint (w x d mm)	300 x 270 mm	11.81 x 10.63 in
	Bezel Measurements (Unpacked with stand) (W x D x H)	42.6 mm	1.68 in
	Product Weight (Unpacked with stand)	14.3 kg	31.53 lb
	Product Weight (Packed)	20.6 kg	45.42 lb
	Product Weight (Head Only)	11.62 kg	25.62 lb
Pallet Information	**Pallet Dimensions** (L x W x H mm)	1080 x 1150 x 1801 mm (Gma Pallet) 1080 x 1150 x 1811 mm (Block Pallet) 1080 x 1150 x 2246.2 mm (Paper Slip Sheet)	42.52 x 45.28 x 70.91 in (Gma Pallet) 42.52 x 45.28 x 71.3 in (Block Pallet) 42.52 x 45.28 x 88.43 in (Paper Slip Sheet)
	Pallet Total Weight	327.69Kg (GMA Pallet) 325.33Kg (Block Pallet) 420.26Kg (Paper Slip Sheet)	722.43 lb (GMA Pallet) 717.23 lb (Block Pallet) 926.51 lb (Paper Slip Sheet)
	Pallet Layers	4 or 3 layers per (slip sheet & pallet)	
	Pallet Product per Layer	5 per layer	
	Total Products per Pallet	20sets or 15sets (slip sheet & pallet)	
	Container Load, 20-Foot	150sets (Pallet)	
	Container Load, 40-Foot	330sets (Pallet)	
	Container Load, 40-Foot HighQ	440 sets (Slip Sheet)	
What's in the box?	AC power cord (1.9m) 6.2 ft HDMI cable (1.8m) 5.9 ft DP Cable (1.8m) 5.9 ft Thunderbolt cable(1m) 3.3 ft Warranty Card QSP Color calibration report VESA Adapter		

Technical Specifications

User Guide and Warranty Languages	**User Guide Languages**	Arabic, Bahasa Indonesia, Bulgarian, Chinese-S, Chinese-T, Czech, Danish, Dutch, English, Estonian, Finnish, French, German, Greek, Hebrew, Hungarian, Italian, Japanese, Kazakh, Korean, Latvian, Lithuanian, Norwegian, Polish, Portuguese (Brazilian), Portuguese (Iberian), Romanian, Russian, Serbian, Slovak, Slovenian, Spanish, Swedish, Thai, Turkey, Ukrainian
	Warranty Languages	Arabic, Bahasa Indonesia, Bulgarian, Chinese-S, Chinese-T, Czech, Danish, Dutch, English, Estonian, Finnish, French, German, Greek, Hebrew, Hungarian, Italian, Japanese, Kazakh, Korean, Latvian, Lithuanian, Norwegian, Polish, Portuguese (Brazilian), Portuguese (Iberian), Romanian, Russian, Serbian, Slovak, Slovenian, Spanish, Swedish, Thai, Turkey, Ukrainian

ENVIRONMENTAL DATA

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	• Ocean-bound plastic in Stand • 85% post-consumer recycled plastic • Low halogen • Outside Box and corrugated cushions are 100% sustainably sourced and recyclable • Molded Paper Pulp Cushion inside box is 100% sustainably sourced and recyclable • Recycled Plastic cushions		
System Configuration	The configuration used for the Energy Consumption and Declared Noise Emissions data for the Notebook model is based on a "Typically Configured Notebook"?.		
Energy Consumption (in accordance with US ENERGY STAR® test method)	**115VAC, 60Hz**	**230VAC, 50Hz**	**100VAC, 50Hz**
Normal Operation (Short idle)	52.33 W	52.63 W	5.43 W
Normal Operation (Long idle)	N/A	N/A	N/A
Sleep	0.32 W	0.37 W	0.32 W
Off	0.22 W	0.37 W	0.22 W
	Note: Energy efficiency data listed is for an ENERGY STAR® compliant product if offered within the model family. HP computers marked with the ENERGY STAR® Logo are compliant with the applicable U.S. Environmental Protection Agency (EPA) ENERGY STAR® specifications for computers. If a model family does not offer ENERGY STAR® compliant configurations, then energy efficiency data listed is for a typically configured PC featuring a hard disk drive, a high efficiency power supply, and a Microsoft Windows® operating system.		
Heat Dissipation*	**115VAC, 60Hz**	**230VAC, 50Hz**	**100VAC, 50Hz**
Normal Operation (Short idle)	179 BTU/hr	180 BTU/hr	18.6 BTU/hr
Normal Operation (Long idle)	N/A	N/A	N/A
Sleep	1.1 BTU/hr	1.3 BTU/hr	1.1 BTU/hr
Off	0.8 BTU/hr	1.3 BTU/hr	0.8 BTU/hr

	*NOTE: Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.		
Longevity and Upgrading	This product can be upgraded, possibly extending its useful life by several years. Upgradeable features and/or components contained in the spare parts are available throughout the warranty period and or for up to "5"? years after the end of production.		
Additional Information	• This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC. • This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive - 2002/96/EC. • This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986). • This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold 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 98.3% recycle-able when properly disposed of at end of life.		
Packaging Materials	**External:**	PAPER/Paperboard	5313 g
	Internal:	PLASTIC/Polyethylene Expanded - EPE	162 g
	The plastic packaging material contains at least 57% recycled content.		
	The corrugated paper packaging materials contains at least 90% recycled content.		
RoHS Compliance	HP Inc. complies fully with materials regulations. We were among the first companies to extend the restrictions in the European Union (EU) Restriction of Hazardous Substances (RoHS) Directive to our products worldwide through the HP GSE. HP has contributed to the development of related legislation in Europe, as well as China, India, and Vietnam. We believe the RoHS directive and similar laws play an important role in promoting industry-wide elimination of substances of concern. We have supported the inclusion of additional substances-including PVC, BFRs, and certain phthalates-in future RoHS legislation that pertains to electrical and electronics products. We met our voluntary objective to achieve worldwide compliance with the new EU RoHS requirements for virtually all relevant products by July 2013, and we will continue to extend the scope of the commitment to include further restricted substances as regulations continue to evolve. To obtain a copy of the HP RoHS Compliance Statement, see HP RoHS position statement.		
Material Usage	This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at 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: • Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials. • Eliminate the use of ozone-depleting substances (ODS) in packaging materials. • Design packaging materials for ease of disassembly. • Maximize the use of post-consumer recycled content materials in packaging materials. • Use readily recyclable packaging materials such as paper and corrugated materials. • Reduce size and weight of packages to improve transportation fuel efficiency. • Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.
End-of-life Management and Recycling	HP offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/go/reuse-recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner. The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the 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.
HP, Inc. Corporate Environmental Information	For more information about HP's commitment to the environment: Global Citizenship Report http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html Eco-label certifications http://www8.hp.com/us/en/hp-information/environment/ecolabels.html ISO 14001 certificates: http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842 and http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf
footnotes	• Percentage of ocean-bound plastic contained in each component varies by product • Recycled plastic content percentage is based on the definition set in the IEEE 1680.1-2018 standard. • External power supplies, WWAN modules, power cords, cables and peripherals excluded. • 100% outer box packaging and corrugated cushions made from sustainably sourced certified and recycled fibers. • Fiber cushions made from 100% recycled wood fiber and organic materials. • Plastic cushions are made from >90% recycled plastic.

Technical Specifications

Summary

Change Log			
January 6, 2022	V1 to V2	Add	Environmental Data
January 10, 2022	V2 to V3	Update	Color section
	V3 to V4		