

### Overview

### HP ZBook Firefly 16" G11 Mobile Workstation PC



1. Ambient Light Sensor (Optional)
2. Internal Microphones (2)
3. Webcam LED (Optional)
4. Webcam
5. Camera Shutter
6. IR Camera (Optional)
7. IR Camera LEDs (Optional)

#### Right

8. Glass Clickpad
9. Power Button Key
10. Audio Combo Jack
11. SuperSpeed USB Type-A 5Gbps signaling rate (Charging)
12. Nano Security Lock Slot (Lock sold separately)
13. Nano SIM Card Slot (Optional)
14. Touch Fingerprint Sensor (Select models)

### Overview

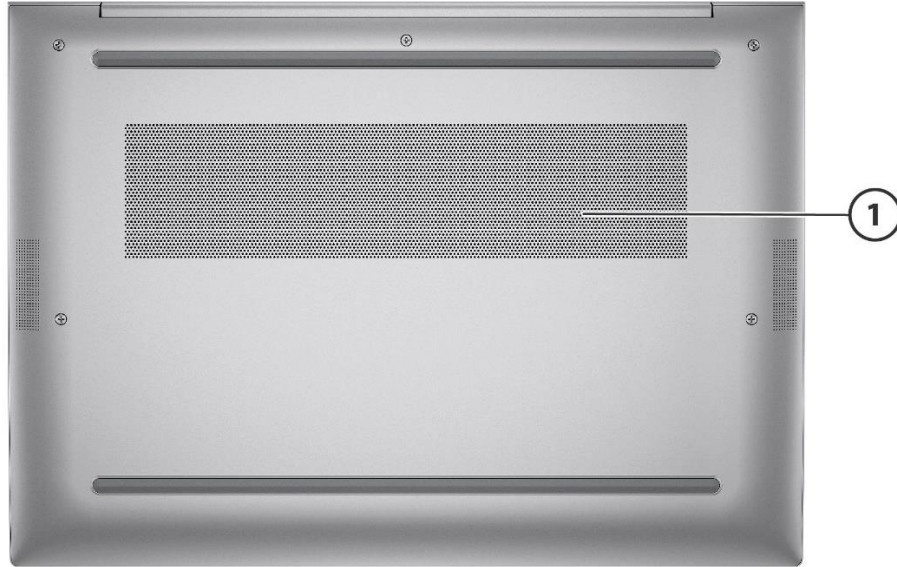


#### Left

1. HDMI 2.1 Port (Cable not included)
2. SuperSpeed USB Type-A 5Gbps signaling rate
3. Thunderbolt™ 4\* with USB4 Type-C® 40Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4)\*
4. Thunderbolt™ 4\* with USB4 Type-C® 40Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4)\*
5. LED Indicator
6. Smartcard Reader (Optional)

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

### Overview



### Bottom

#### 1. Fan Venting

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### Overview

#### At A Glance

- New premium ultraslim design with precision-crafted all-metal chassis for a premium look and feel
- Intel® Core™ Ultra5, Ultra7 U series and Intel Core Ultra5, Ultra7 H series Processors up to fourteen-core
- Preinstalled with Windows 11 versions or FreeDOS
- Now available paired with Intel Core Ultra5/Ultra7 H series processors and discrete graphics
- 16:10 ratio screen reduces the need to scroll by showing more vertical content than 16:9
- DDR5-5600 memory with up to 64GB capacity
- Choice of displays:
  - 40.6 cm (16") diagonal WUXGA IPS Anti-Glare LED-backlit non-touch, 300 nits, 45% NTSC
  - 40.6 cm (16") diagonal WUXGA IPS Anti-Glare On-Cell LED-backlit touch, 300 nits, 45% NTSC
  - 40.6 cm (16") diagonal WUXGA IPS Anti-Glare LED-backlit non-touch, 400 nits, 100% sRGB
  - 40.6 cm (16") diagonal, WUXGA (1920 x 1200), Bent, LCD, UWVA, anti-glare, + Low Blue Light, non-touch, 800 nits, sRGB 100%, HP Sure View 5 integrated privacy screen
- HP Auto Frame provides improved face tracking and more natural framing movement
- Optional NVIDIA RTX A500 pro graphics for improved performance for heavier graphics workloads.
- HP Wolf Security for Business creates a hardware-enforced, always-on, resilient defense.
- Connectivity with optional HP 5G/WWAN available world-wide, and Thunderbolt™ Docking (Dock sold separately)
- Undergoes MIL-STD 810H tests<sup>1</sup>
- 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

<sup>1</sup>MIL-STD 810H is not intended to demonstrate fitness of 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.**

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### Features

#### OPERATING SYSTEM

**Preinstalled OS**

- Windows 11 Home 64 - HP recommends Windows 11 Pro for business<sup>1</sup>
- Windows 11 Home Single Language 64 - HP recommends Windows 11 Pro for business<sup>1</sup>
- Windows 11 Pro 64 (Windows 11 Enterprise or Windows 10 Enterprise available with a Volume Licensing Agreement)<sup>1</sup>
- Windows 11 Pro<sup>1</sup>
- Windows 11 Pro Education<sup>1</sup>
- FreeDOS 3.0

<sup>1</sup> 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:** 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>

#### PROCESSOR

Name <sup>1,2,3,4,5,7</sup>	Cores	Number of P-cores	Number of E-cores	Number Of LP E-core	Threads	L3 Cache	Max Turbo Frequency		Intel SIPP/vPro® Enterprise
							P-cores	E-cores	
Intel® Core™ Ultra 7 processor 165H	16 cores	6	8	2	22	24 MB	5.00 GHz	3.80 GHz	X
Intel® Core™ Ultra 7 processor 155H	16 cores	6	8	2	22	24 MB	4.80 Ghz	3.80 GHz	
Intel® Core™ Ultra 5 processor 135H	14 cores	4	8	2	18	18 MB	4.60 GHz	3.60 GHz	X
Intel® Core™ Ultra 5 processor 125H	14 cores	4	8	2	18	18 MB	4.50 GHz	3.60 GHz	
Intel® Core™ Ultra 7 processor 165U	12 cores	2	8	2	14	12 MB	4.90 GHz	3.80 GHz	X
Intel® Core™ Ultra 7 processor 155U	12 cores	2	8	2	14	12 MB	4.80 GHz	3.80 GHz	
Intel® Core™ Ultra 5 processor 135U	12 cores	2	8	2	14	12 MB	4.40 Ghz	3.60 GHz	X
Intel® Core™ Ultra 5 processor 125U	12 cores	2	8	2	14	12 MB	4.30 Ghz	3.60 GHz	

### Features

- <sup>1</sup> 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.
- <sup>2</sup> Intel Turbo Boost performance varies depending on hardware, software and overall system configuration. See <http://www.intel.com/technology/turboboost> for more information.
- <sup>3</sup> Intel vPro<sup>®</sup> 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<sup>®</sup> Essentials and Enterprise vary. See <http://intel.com/vpro>
- <sup>4</sup> 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>.
- <sup>5</sup> Processor speed denotes maximum performance mode; processors will run at lower speeds in battery optimization mode.
- <sup>7</sup> Features and software that require a NPU may require software purchase, subscription or enablement by a software or platform provider, and third party software may have specific configuration or compatibility requirements. Performance varies by use, configuration, and other factors.

### CHIPSET

Chipset is integrated with processor

### GRAPHICS

#### Integrated

Intel<sup>®</sup> Arc™ Graphics (H Series processors)<sup>3</sup>

Intel<sup>®</sup> Graphics (U Series processors)

#### Discrete

NVIDIA RTX™ A500 Laptop GPU (4 GB GDDR6 dedicated)<sup>1,2</sup>

#### Supports

Support HD decode, DX12, HDMI 2.1, HDCP 2.3

<sup>1</sup> Both UMA & Discrete configurations support 4 independent displays when on the HP Thunderbolt Dock G4 (120W) (sold separately) - Max. resolution = 2.5K @60Hz (DP1) & 2.5K @60Hz (DP2) & FHD (VGA) OR 4K @60Hz (one DP Port) & 4K @60Hz (Type-C output port using a Type C-to-DP adapter).

<sup>2</sup> HDMI cable Sold Separately

<sup>3</sup> Intel<sup>®</sup> Arc™ graphics only available on select Intel<sup>®</sup> Core™ Ultra H-series processor-powered systems with at least 16GB of system memory in dual channel configuration.

### DISPLAY

Non-touch

### Features

- 40.6 cm (16") diagonal, WUXGA (1920 x 1200), Bent, LCD, UWVA, anti-glare, + Low Blue Light, 800 nits, sRGB 100%, HP Sure View 5 integrated privacy screen<sup>1,3,4,5</sup>
- 40.6 cm (16") diagonal, 2.8K (2880 x 1800), Bent, OLED, UWVA, BrightView, OLED + Low Blue Light, 400 nits, DCI-P3 100%<sup>1,3</sup>
- 40.6 cm (16") diagonal, WUXGA (1920 x 1200), Bent, LCD, UWVA, anti-glare, WLED + Low Blue Light, 400 nits, low power, sRGB 100%<sup>1,3</sup>
- 40.6 cm (16") diagonal, WUXGA (1920 x 1200), Bent, LCD, UWVA, anti-glare, WLED, 300 nits, NTSC 45%<sup>1,3</sup>

### Touch

- 40.6 cm (16") diagonal, WUXGA (1920 x 1200), Bent, LCD, touch, IPS, anti-glare, WLED, 300 nits, NTSC 45%<sup>1,3,4,5</sup>

### Displays support

Supports dual display through the dock

For more information, please reference the following ZBook docking whitepaper:

<https://h20195.www2.hp.com/v2/GetDocument.aspx?docname=4AA5-2657ENW>

### Display Size

16"

40.64 cm (16")

<sup>1</sup>HD content required to view HD images.

<sup>3</sup>Resolutions are dependent upon monitor capability, and resolution and color depth settings.

<sup>4</sup>HP Sure View 5 integrated privacy screen is an optional feature that must be configured at purchase and is designed to function in landscape orientation.

<sup>5</sup>Actual brightness will be lower with touchscreen or Sure View.

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### Features

#### DOCKING

<b>Docking station model #1</b>	HP Thunderbolt 120W G4 Dock
<b>Total number of supported displays (incl.the notebook display)</b>	4
<b>Max.resolutions supported</b>	Quad 4K @60Hz Dual 8K single cable@30 for TB hosts or USB-C hosts DP 1.4 with DSC in high res mode
<b>Dock Connectors</b>	2xDP, 1xVGA, 1xTB, 1xUSB-C alt-mode
<b>Technical limitations</b>	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.
<b>Docking station model #2</b>	HP USB-C Dock G5
<b>Total number of supported displays (incl.the notebook display)</b>	3
<b>Max.resolutions supported</b>	Dual 5K@ 30Hz + (1) 4K UHD (multi-function mode)
<b>Dock Connectors</b>	1xHDMI, 2xDP
<b>Technical limitations</b>	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 .
<b>Docking station model #3</b>	HP USB-C/A Universal Dock G2
<b>Total number of supported displays (incl.the notebook display)</b>	3
<b>Max.resolutions supported</b>	Triple 4K UHD@ 60Hz
<b>Dock Connectors</b>	1xHDMI, 2xDP
<b>Technical limitations</b>	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



### Features

#### STORAGE AND DRIVES\*

**PCIe® NVMe™ M.2 2280 Storage**

2 TB PCIe® Gen4x4 NVMe™ SSD Three Layer Cell

1 TB PCIe® Gen4x4 NVMe™ SSD Three Layer Cell

1 TB PCIe® NVMe™ SSD Value

512 GB PCIe® Gen4x4 NVMe™ Seld Encrypted OPAL2 SSD Three Layer Cell

512 GB PCIe® Gen4x4 NVMe™ SSD Three Layer Cell

512 GB PCIe® NVMe™ SSD Value

256 GB PCIe® NVMe™ Seld Encrypted OPAL2 SSD Value

256 GB PCIe® NVMe™ SSD Value

\* For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35GB of disk is reserved for system recovery software.

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#### MEMORY

**Maximum Memory**

64GB DDR5-5600

**Memory**

64GB DDR5-5600 (2x32GB)

32GB DDR5-5600 (2x16GB)

32GB DDR5-5600 (1x32GB)

16GB DDR5-5600 (2x8GB)

16GB DDR5-5600 (1x16GB)

8GB DDR5-5600 (1x8GB)

**Memory Slots**

2 SODIMM

DDR5 SODIMMS, system runs at 5600

Supports Dual Channel Memory

**NOTE:** 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.

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### Features

#### NETWORKING/COMMUNICATIONS

##### WLAN

Intel® AX211 Wi-Fi 6E Bluetooth® 5.3 wireless card vPro WLAN<sup>1,2</sup>

Intel® AX211 Wi-Fi 6E Bluetooth® 5.3 wireless card WLAN<sup>1</sup>

<sup>1</sup>Wi-Fi 6E requires a Wi-Fi 6E router, sold separately, and Windows 11 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.

<sup>2</sup> 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>

##### WWAN

HP 5G Sub-6 Cat 19 WWAN eSIM<sup>1,2</sup>

HP 4G LTE-A Pro Cat 16 WWAN eSIM<sup>1</sup>

<sup>1</sup>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.

<sup>2</sup>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.

##### LPWAN

Qualcomm® 9205

##### Near Field Communication (NFC) module

NFC NXP NPC300<sup>1</sup>

<sup>1</sup>Sold separately or as an optional feature.

##### Miracast

Native Miracast Support

**NOTE:** Miracast is a wireless technology your PC can use to project your screen to TVs, projectors, and streaming.

#### AUDIO/MULTIMEDIA

##### Audio

Audio Tuning by Poly Studio

2 Integrated stereo speakers

Discrete Amplifiers

2 Integrated dual array microphone

3.5mm Headset: CTIA only; Headphone-out

##### Speaker Power

1W/8ohm Per speaker

### Features

**Camera<sup>1</sup>**

5MP+Infrared camera

5MP camera

**Sensors**

ALS (ambient light sensor)

ACS (Adaptive Color Sensor)

Hall effect Sensor

Thermal Sensor

HP Tamper Lock<sup>2</sup>

<sup>1</sup> Sold separately or as an optional feature.

<sup>2</sup> HP Tamper Lock must be enabled by the customer or your administrator.

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### Features

#### KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS

##### Keyboard\*

HP Premium Keyboard, spill-resistant, Privacy, Backlit, Durakey keyboard.

HP Premium Keyboard, spill-resistant, Backlit, Durakey keyboard.

HP Premium Keyboard, spill-resistant, Durakey keyboard.

##### Pointing Devices

Clickpad with multi-touch gesture support

Microsoft Precision Touchpad Default Gestures Support

Multi-touch gesture 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

Print Screen

Power Button (with LED)

delete

home

end

pg up

pg dn

Microsoft Copilot key\*\*

##### Hidden Keys

Fn+R - Break

Fn+S - Sys Rq

Fn+C - Scroll Lock

\*Backlit keyboard is an optional feature.

\*\*Requires Windows 11 and an NPU. Timing of feature delivery and availability varies by market and device. Requires Microsoft account to log in. Where Copilot in Windows is not available, the Copilot key will lead to the Bing search engine. See <http://aka.ms/WindowsAIFeatures>

#### SOFTWARE AND SECURITY

##### Software

Bing Search for IE11

Buy Microsoft Office (Sold separately)

HP Connection Optimizer<sup>10</sup>

HP Easy Clean<sup>2</sup>

HP Easy Clean Keyboard Driver<sup>2</sup>

HP Hotkey Support

HP Mac Address Manager

HP Notifications

HP PC Hardware Diagnostics UEFI

### Features

HP PC Hardware Diagnostics Windows  
HP Privacy Settings  
HP Support Assistant<sup>1</sup>  
HSA Fusion for Commercial  
HPX for CMIT  
Battery Health Manager<sup>18</sup>

#### Manageability Features

HP Client Catalog (download)  
HP Client Management Script Library (download)  
HP Cloud Recovery<sup>28</sup>  
HP Connect for Microsoft Endpoint Manager<sup>26</sup>  
HP Driver Packs (download)  
HP Image Assistant Gen5 (download)  
HP Manageability Integration Kit (download)<sup>12</sup>  
HP Patch Assistant (download)<sup>27</sup>

#### Security Management

HP Client Security Manager<sup>3</sup>  
HP Sure Admin<sup>4</sup>  
HP Sure Click<sup>5</sup>  
HP Sure Recover Gen6<sup>8</sup>  
HP Sure Run Gen5<sup>9</sup>  
HP Sure Sense<sup>11</sup>  
HP Sure Start Gen7<sup>13</sup>  
HP Tamper Lock<sup>14</sup>  
HP Wolf Security for Business<sup>15</sup>  
Secured-Core PC Enable<sup>16</sup>  
Windows Hello Enhanced Sign-In Security (ESS)  
Wolf Pro Security<sup>25</sup>

#### Security- TPM

Model: Nuvoton NPCT760HABYX  
TCG TPM 2.0  
Version: 7.2.3.1  
FIPS 140-2 Compliant: Yes

Model: Infineon SLB9672VU2.0 FW15.23  
TCG TPM 2.0  
Version: 15.23  
FIPS 140-2 Compliant: Yes

#### BIOS

Absolute Persistence Module<sup>7</sup>  
BIOS Update via Network  
HP BIOSphere Gen6<sup>6</sup>  
HP DriveLock & Automatic DriveLock  
HP Fingerprint Sensor<sup>32</sup>  
HP Secure Erase<sup>17</sup>  
HP Wake on WLAN

#### Smartcard Reader

Model number: Alcorlink AK9563  
FIPS 201 Compliant: Yes

<sup>1</sup> HP Support Assistant - Requires Windows and Internet Access.

### Features

<sup>2</sup>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.

<sup>3</sup> HP Client Security Manager Gen7 requires Windows and is available on select HP Pro, Elite and ZBook PCs. See product specifications for details.

<sup>4</sup> HP Sure Admin requires Windows 10, HP BIOS, HP Manageability Integration Kit from <http://www.hp.com/go/clientmanagement> and HP Sure Admin Local Access Authenticator smartphone app from the Android or Apple store.

<sup>5</sup> HP Sure Click requires Windows 10 Pro or higher or Enterprise. See [https://bit.ly/2PrLT6A\\_SureClick](https://bit.ly/2PrLT6A_SureClick) for complete details.

<sup>6</sup> HP BIOSphere Gen6 is available on select HP Pro, Elite and ZBook PCs. See product specifications for details. Features may vary depending on the platform and configurations.

<sup>7</sup> Absolute agent is shipped turned off, and will be activated when customers activate a purchased subscription. Subscriptions can be purchased for terms ranging multiple years. Service is limited, check with Absolute for availability outside the U.S. The Absolute Recovery Guarantee is a limited warranty. Certain conditions apply. For full details visit:

<http://www.absolute.com/company/legal/agreements/computrace-agreement>. Data Delete is an optional service provided by Absolute Software. If utilized, the Recovery Guarantee is null and void. In order to use the Data Delete service, customers must first sign a Pre-Authorization Agreement and either obtain a PIN or purchase one or more RSA SecurID tokens from Absolute Software.

<sup>8</sup> HP Sure Recover Gen6 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

<sup>9</sup> HP Sure Run Gen5 is available on select HP PCs and requires Windows 10 and higher.

<sup>10</sup> HP Connection Optimizer requires Windows 10 and Windows 11.

<sup>11</sup> HP Sure Sense is available on select HP PCs with Windows 10 Pro, Windows 10 Enterprise, Windows 11 Pro, or Windows 11 Enterprise OS.

<sup>12</sup> HP Manageability Integration Kit can be downloaded from <https://ftp.ext.hp.com/pub/caps-softpaq/cmit/HPMIK.html>.

<sup>13</sup> HP Sure Start Gen7 is available on select HP PCs and requires Windows 10 and higher

<sup>14</sup> HP Tamper Lock must be enabled by the customer or your administrator.

<sup>15</sup> HP Wolf Security for Business requires Windows 10 Pro or higher, includes various HP security features and is available on HP Pro, Elite, RPOS and Workstation products. See product details for included security features and OS requirement.

<sup>16</sup> Secured-core PC requires an Intel® vPro® or AMD Ryzen™ Pro processor. Requires 8 GB or more system memory. Secured-core PC functionality can be enabled from the factory.

<sup>17</sup> 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™.

<sup>18</sup> Depending on the version available for your device and the setting you select, HP Battery Health Manager (BHM) will use a proprietary set of algorithms to optimize battery health during the life of the battery. New Commercial Notebooks come equipped with BHM set to "Let HP Manage My Battery Health" as the default. This setting will reduce charge capacity over time to optimize battery health and mitigate factors that can accelerate battery degradation. As a result of this reduction, battery runtime will decrease over time as available charge capacity is reduced. HP may, at any time, update HP Battery Health Manager to improve available settings, functionality, and performance. Refurbished products may have customized default settings to optimize user experience. For additional information on updating or modifying HP Battery Health Manager settings, please go to [HP.COM/SUPPORT/BATTERY](http://HP.COM/SUPPORT/BATTERY).

<sup>25</sup> HP Wolf Pro Security Edition is available preloaded on select SKUs, and, depending on the HP product purchased, includes a license with a term length communicated to you at purchase and in your order confirmation email. The HP Wolf Pro Security Edition software is licensed under the license terms of the HP Wolf Security Software - End-User license Agreement (EULA) that can be found at: [https://support.hp.com/us-en/document/ish\\_3875769-3873014-16](https://support.hp.com/us-en/document/ish_3875769-3873014-16) as that EULA is modified by the following: 7. Term. Unless otherwise terminated earlier pursuant to the terms contained in this EULA, the license for the HP Wolf Pro Security Edition is effective upon 4 months after the date the HP Product was shipped by HP and will continue for the term communicated to you at purchase and in your order confirmation email ("Initial Term"). At the end of the Initial Term you may either (a) purchase a renewal license for the HP Wolf Pro Security Edition from HP.com, HP Sales or an HP Channel Partner, or (b) continue using the standard versions of HP Sure Click and HP Sure Sense at no additional cost with no future software updates or HP Support. Notwithstanding the foregoing, the license shall expire no later than one year after the fixed term of the subject license ends.

<sup>26</sup> HP Connect for Microsoft Endpoint Manager is available from the Azure Market Place for HP Pro, Elite, Z and Point-of-Sale PCs managed with Microsoft Endpoint Manager. Subscription to Microsoft Endpoint Manager required and sold separately. Network connection required.

<sup>27</sup> HP Patch Assistant available on select HP PCs with the HP Manageability Kit that are managed through Microsoft System Center Configuration Manager. HP Manageability Integration Kit can be downloaded from <http://www8.hp.com/us/en/ads/clientmanagement/overview.html>.

<sup>28</sup> 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>.

<sup>32</sup> HP Fingerprint Reader is an optional feature that requires Windows 10 IoT and must be configured at purchase.

### Features

#### POWER

##### Power Supply

HP Standard 65W USB Type-C® adapter<sup>2</sup>  
HP Slim 65W USB Type-C® adapter<sup>2</sup>  
HP Slim 100W USB Type-C® AC adapter<sup>2,5</sup>

##### Battery

HP Long Life 3-cell, 56 Whr Polymer<sup>3,4</sup>  
HP Long Life 6-cell, 76 Wh Polymer<sup>3,4</sup>

##### Battery Recharge Time

Supports battery HP Fast Charge: approximately 50% in 30 minutes<sup>6</sup>

##### Power Cord

3-wire plug - 1m  
2-wire plug - 1m

##### Battery life

###### UMA<sup>1</sup>

Up to 19 hours and 15 minutes with 76whr battery (HP Long Life 3-Cell, 76 Whr Polymer, UMA graphic, Intel Ultra 7 U15 vPro, Display set to 250 nits display (on a 400-nit display), 2\*8G DDR5 memory, 256 GB SSD)

Up to 17 hours and 15 minutes with 76whr battery (HP Long Life 3-Cell, 76 Whr Polymer, UMA graphic, Intel Ultra 7 H28 vPro, Display set to 250 nits display (on a 400-nit display), 2\*8G DDR5 memory, 256 GB SSD)

###### Discrete<sup>1</sup>

Up to 9 hours and 15 minutes with 56whr battery (HP Long Life 3-Cell, 76 Whr Polymer, NVIDIA RTX A500 graphics, Intel Ultra 7 H28 vPro, Display set to 250 nits display (on a 400-nit display), 2\*8G DDR5 memory, 256 GB SSD)

Up to 13 hours and 15 minutes with 76whr battery (HP Long Life 3-Cell, 76 Whr Polymer, NVIDIA RTX A500 graphics, Intel Ultra 7 H28 vPro, Display set to 250 nits display (on a 400-nit display), 2\*8G DDR5 memory, 256 GB SSD)

<sup>1</sup> MM25 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](http://www.bapco.com) for additional details.

<sup>2</sup> Availability may vary by country.

<sup>3</sup> Battery is internal and not replaceable by customer. Serviceable by warranty.

<sup>4</sup> For new batteries, actual battery Watt-hours (Wh) may differ from the design capacity and may have a full charge capacity that differs by up to 10, which is typical for lithium-ion batteries. Battery capacity naturally decreases over time and with use, depending on several factors such as battery health management settings, shelf life, temperature, environment, loaded apps, features, system configuration, and power settings.

<sup>5</sup> The 100w AC adapter is required when discrete graphics are used.

<sup>6</sup> Recharges your battery up to 50% within 30 minutes when the system is off or in standby mode. Power adapter minimum of 65 watts required for battery capacities 56Whr or less. Power adapter minimum of 100 watts required for battery capacities greater than 56Whr and less than 83Whr. Power adapter minimum of 120 watts required for battery capacities greater than 83Whr and less than 100Whr. After charging has reached 50% capacity, charging will return to normal. Charging time may vary +/-10% due to System tolerance

### Features

#### WEIGHTS & DIMENSIONS

**Dimensions (w x d x h)**

14.12 x 9.88 x 0.76 in  
35.87 x 25.1 x 1.92 cm

**Weights\*****Product Weight- 56Whr**

Starting at 3.96 lb  
Starting at 1.797 kg

\*Weight will vary by configuration. Does not include power adapter.

#### PORTS/SLOTS

**Left side**

2 Thunderbolt™ 4 with USB4 Type-C® 40Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4) \*  
1 Super Speed USB Type-A 5Gbps Power charging  
1 HDMI 2.1\*\*  
1 Smartcard reader

**Right side**

1 Super Speed USB Type-A 5Gbps Power charging  
1 Nano SIM card slot  
1 Security Lock Slot

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

\*\*HDMI cable sold separately.

#### SERVICE AND SUPPORT

1-year warranty and 90 day software limited warranty options depending on country. Batteries have a default one year limited warranty.. 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>.

<sup>1</sup>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 to Customer at the time of purchase. Customer may have additional statutory rights according to applicable local laws, and such rights are not in any way affected by the HP terms and conditions of service or the HP Limited Warranty provided with your HP Product.

#### Certification and Compliance

CSA/UL 62368-1  
ENERGY STAR®  
FCC/ICES/CISPR/VCCI  
CE MARKING  
GS Mark  
China CCC/SRRC



### Features

Taiwan BSMI/NCC  
 Korea KCC/KC/KES  
 Ukraine NSoC/TEC  
 EAEU Compliance  
 Saudi Arabian Compliance  
 TCO  
 EPEAT® registered\*  
 Low Blue Light  
 WW RoHS

#### Sustainable Impact Specifications

Low Halogen\*\* aligned with HP GSE

\*Based on US EPEAT® registration according to IEEE 1680.1-2018 EPEAT®. EPEAT® status varies by country. Visit [www.epeat.net](http://www.epeat.net) for more information

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

### SYSTEM UNIT

<b>Stand-Alone Power Requirements (AC Power)</b>	<b>Nominal Operating Voltage</b>	AC 20V
	<b>Average Operating Power(idle)</b>	
	<b>Integrated graphics</b>	Yes
	<b>Discrete Graphics</b>	N/A
<b>Temperature</b>	<b>Max Operating Power</b>	65W
	<b>Operating</b>	32° to 95° F (0° to 35° C)
<b>Relative Humidity</b>	<b>Non-operating</b>	-4° to 140° F (-20° to 60° C)
	<b>Operating</b>	10% to 90%, non-condensing
<b>Shock</b>	<b>Non-operating</b>	5% to 95% (38.7° C (101.6° F) maximum wet bulb tempera-ture; non-condensing)
	<b>Operating</b>	40 G, 2 ms, half-sine
<b>Random Vibration</b>	<b>Non-operating</b>	240 G, 2 ms, half-sine
	<b>Operating</b>	1.043 grms
<b>Maximum Altitude (unpressurized)</b>	<b>Non-operating</b>	3.5 grms
	<b>Operating</b>	10,000 ft (3,048 m)
<b>Planned Industry Standard Certifications</b>	<b>Non-operating</b>	40,000 ft (12,192 m)
	<b>Regulatory Model Number</b>	HSN-I45C-4
	<b>CSA/UL 62368-1</b>	Yes
	<b>ENERGY STAR®<sup>1</sup></b>	Yes
	<b>FCC/ICES/CISPR/VCCI</b>	Yes
	<b>CE MARKING</b>	Yes
	<b>GS Mark</b>	Yes
	<b>China CCC/SRRC</b>	Yes
	<b>Taiwan BSMI/NCC</b>	Yes
	<b>Korea KCC/KC/KES</b>	Yes
<b>Ukraine NSoC/TEC</b>	Yes	

### Features

<b>EAEU Compliance</b>	Yes
<b>Saudi Arabian Compliance</b>	Yes
<b>TCO</b>	Yes
<b>EPEAT®</b>	EPEAT® Gold in the United States <sup>2</sup>
<b>Low Blue Light</b>	Yes
<b>WW RoHS</b>	Yes
<b>Saudi Arabian Compliance (ICCP)</b>	Yes
<b>SABS</b>	Yes

<sup>1</sup>Configurations of the HP ZBook Firefly 16" G11 Mobile Workstation PC that are ENERGY STAR® qualified are identified as HP ZBook Firefly 16" G11 Mobile Workstation PC ENERGY STAR on HP websites and on <http://www.energystar.gov>.

<sup>2</sup>Based on US EPEAT® registration according to IEEE 1680.1-2018 EPEAT®. Status varies by country. Visit [www.epeat.net](http://www.epeat.net) for more information.

### Technical Specifications – Displays

#### DISPLAYS

<b>16 in 2.8K (2880 x 1800) BrightView UWVA OLED+LBL DCI-P3 NBZ2 400 eDP 1.4+PSR 100 48H-120Hz (VRR) bent OLED Panel</b>	<b>Outline Dimensions (W x H)</b>	348.078 x 224.19 (max)		
	<b>Active Area</b>	344.448 x 215.280 (typ)		
	<b>Weight</b>	220 (max)		
	<b>Diagonal Size</b>	16		
	<b>Thickness</b>	1.070 / 3.052 (max)		
	<b>Interface</b>	eDP1.4		
	<b>Surface Treatment</b>	Bright View		
	<b>Touch enabled</b>	No		
	<b>Contrast Ratio</b>	100,000:1 (typ)		
	<b>Refresh Rate</b>	120 (typ)		
	<b>Brightness</b>	400 (typ)		
	<b>Pixel Resolution</b>	<b>Pitch</b>	2880 x 1800 (WQUXGA)	
		<b>Format</b>	RGB	
	<b>Backlight</b>	OLED		
	<b>Color Gamut Coverage</b>	DCI-P3 100%		
	<b>Color Depth</b>	8 bits + 2FRC		
	<b>Viewing Angle</b>	UWVA 89/89/89/89		
	<b>Low Blue Light</b>	Yes		
	<b>Power Consumption (W, EBL@ 150nits max/ 200nits max)</b>	N/A (max)/ 7.5 (max)		

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

<b>16.0 in WUXGA (1920 x 1200) Anti-Glare UWVA Low Blue Light sRGB 100 800 eDP 1.4+PSR+IOL Sure View 5 bent LCD Panel</b>	<b>Outline Dimensions (W x H)</b>	349.980 x 224.80 (max)		
	<b>Active Area</b>	344.680 x 215.420 (typ)		
	<b>Weight</b>	310 (max)		
	<b>Diagonal Size</b>	16		
	<b>Surface Treatment</b>	Anti-Glare		
	<b>Touch Enabled</b>	No		
	<b>Contrast Ratio</b>	1500:1(typ)		
	<b>Refresh Rate</b>	60 Hz		
	<b>Brightness</b>	800 nits		
	<b>Pixel Resolution</b>	<b>Pitch</b>	1920 x 1200 (WUXGA)	
		<b>Format</b>	RGB	
	<b>Backlight</b>	WLED		
	<b>Color Gamut Coverage</b>	sRGB 100%		
	<b>Color Depth</b>	8 bits		
	<b>Viewing Angle</b>	UWVA 89/89/89/89		
<b>Low Blue Light</b>	Yes			

### Technical Specifications – Displays

**Power Consumption (W, EBL@ 150nits max/ 200nits max)** 1.93(max)/2.38(max)

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

**16 in WUXGA (1920 x 1200) Anti-Glare UWVA WLED+LBL sRGB NB2Y 400 eDP 1.4+PSR2 Low-Power 100 bent LCD Panel**

<b>Outline Dimensions (W x H)</b>	350.680 x 226.470 (max)
<b>Active Area</b>	344.678 x 215.424 (typ)
<b>Weight</b>	330 (max)
<b>Diagonal Size</b>	16
<b>Thickness</b>	2.6 / 4.6 (max)
<b>Interface</b>	eDP1.4
<b>Surface Treatment</b>	Anti-Glare
<b>Touch enabled</b>	No
<b>Contrast Ratio</b>	1000:1 (typ)
<b>Refresh Rate</b>	60 (typ)
<b>Brightness</b>	400 (typ)
<b>Pixel Resolution</b>	<b>Pitch</b> 1920 x 1200 (WUXGA)
	<b>Format</b> RGB
<b>Backlight</b>	WLED
<b>Color Gamut Coverage</b>	sRGB 100%
<b>Color Depth</b>	8 bits
<b>Viewing Angle</b>	UWVA 89/89/89/89
<b>Low Blue Light</b>	Yes
<b>Power Consumption (W, EBL@ 150nits max/ 200nits max)</b>	1.60 (max)/ 1.95 (max)

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

**16 in WUXGA (1920 x 1200) Anti-Glare UWVA LED NTSC 45 NB2X 300 eDP 1.2 w/o PSR bent LCD Panel**

<b>Outline Dimensions (W x H)</b>	350.680 x 226.470 (max)
<b>Active Area</b>	344.6784x215.424 (typ)
<b>Weight</b>	390 (max)
<b>Diagonal Size</b>	16
<b>Thickness</b>	3.0 / 5.0 (max)
<b>Interface</b>	eDP 1.2
<b>Surface Treatment</b>	Anti-Glare
<b>Touch Enabled</b>	No
<b>Contrast Ratio</b>	1000:1(typ)
<b>Refresh Rate</b>	60 (typ)
<b>Brightness</b>	300 (typ)
<b>Pixel Resolution</b>	<b>Pitch</b> 1920 x 1200 (WUXGA)
	<b>Format</b> RGB

### Technical Specifications – Displays

<b>Backlight</b>	WLED
<b>Color Gamut Coverage</b>	NTSC 45%
<b>Color Depth</b>	6 bits + 2FRC
<b>Viewing Angle</b>	UWVA 89/89/89/89
<b>Low Blue Light</b>	No
<b>Power Consumption (W, EBL@ 150nits max/ 200nits max)</b>	2.7 (max)/3.4 (max)

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

**16 in WUXGA (1920 x 1200) Anti-Glare UWVA LED NTSC 45 NB2X 300 TOP eDP 1.2 w/o PSR bent LCD Panel**

<b>Outline Dimensions (W x H)</b>	350.680 x 226.470 (max)	
<b>Active Area</b>	344.6784x215.424 (typ)	
<b>Weight</b>	390 (max)	
<b>Diagonal Size</b>	16	
<b>Thickness</b>	3.0 / 5.0 (max)	
<b>Interface</b>	eDP 1.2	
<b>Surface Treatment</b>	Anti-Glare	
<b>Touch Enabled</b>	Yes	
<b>Contrast Ratio</b>	1000:1(typ)	
<b>Refresh Rate</b>	60 (typ)	
<b>Brightness</b>	300 (typ)	
<b>Pixel Resolution</b>	<b>Pitch</b>	1920 x 1280 (WUXGA)
	<b>Format</b>	RGB
<b>Backlight</b>	WLED	
<b>Color Gamut Coverage</b>	NTSC 45%	
<b>Color Depth</b>	6 bits + 2FRC	
<b>Viewing Angle</b>	UWVA 89/89/89/89	
<b>Low Blue Light</b>	No	
<b>Power Consumption (W, EBL@ 150nits max/ 200nits max)</b>	2.7 (max)/3.24 (max)	

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

### Technical Specifications – Storage

#### STORAGE AND DRIVES

<b>SSD 512GB 2280 PCIe-4x4 NVMe Three Layer Cell</b>	<b>Form Factor</b>	M.2 2280		
	<b>Capacity</b>	512GB		
	<b>NAND Type</b>	TLC		
	<b>Height</b>	0.09 in (2.3 mm)		
	<b>Width</b>	0.87 in (22 mm)		
	<b>Weight</b>	0.02 lb (10 g)		
	<b>Interface</b>	PCIe NVMe Gen4X4		
	<b>Performance</b>	<b>Minimum Sequential Read</b>	<b>Minimum Sequential Write</b>	
		6400 MB/s ±20%	3500 MB/s ±20%	
		<b>Logical Blocks</b>	1,000,215,215	
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]		
	<b>Features</b>	Pyrite 2.0; TRIM; L1.2		
		<b>NOTE:</b> For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35 GB (for Windows 11) is reserved for system recovery software.		
<b>SSD 1TB 2280 PCIe-4x4 NVMe Three Layer Cell</b>	<b>Form Factor</b>	M.2 2280		
	<b>Capacity</b>	1TB		
	<b>NAND Type</b>	TLC		
	<b>Height</b>	0.09 in (2.3 mm)		
	<b>Width</b>	0.87 in (22 mm)		
	<b>Weight</b>	0.02 lb (10 g)		
	<b>Interface</b>	PCIe NVMe Gen4X4		
	<b>Performance</b>	<b>Minimum Sequential Read</b>	<b>Minimum Sequential Write</b>	
		6400 MB/s ±20%	5000 MB/s ±20%	
		<b>Logical Blocks</b>	2,000,409,264	
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]		
	<b>Features</b>	Pyrite 2.0; TRIM; L1.2		
		<b>NOTE:</b> For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35 GB (for Windows 11) is reserved for system recovery software.		
<b>SSD 2TB 2280 PCIe-4x4 NVMe Three Layer Cell</b>	<b>Form Factor</b>	M.2 2280		
	<b>Capacity</b>	2TB		
	<b>NAND Type</b>	TLC		
	<b>Height</b>	0.09 in (2.3 mm)		
	<b>Width</b>	0.87 in (22 mm)		
	<b>Weight</b>	0.02 lb (10 g)		
	<b>Interface</b>	PCIe NVMe Gen4X4		
	<b>Performance</b>	<b>Minimum Sequential Read</b>	<b>Minimum Sequential Write</b>	
		6400 MB/s ±20%	5000 MB/s ±20%	
		<b>Logical Blocks</b>	4,000,797,360	
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]		
	<b>Features</b>	Pyrite 2.0; TRIM; L1.2		

### Technical Specifications – Storage

**NOTE:** For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35 GB (for Windows 11) is reserved for system recovery software.

#### 256GB PCIe 2280 NVMe Self Encrypted OPAL2 Value 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
<b>Performance</b>	<b>Minimum Sequential Read</b> <b>Minimum Sequential Write</b>
	2000 MB/s ±20%                      900 MB/s ±20%
<b>Logical Blocks</b>	500,118,192
<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]
<b>Features</b>	TCG Opal 2.0; TRIM; L1.2

**NOTE:** For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35 GB (for Windows 11) is reserved for system recovery software.

#### 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
<b>Performance</b>	<b>Minimum Sequential Read</b> <b>Minimum Sequential Write</b>
	6400 MB/s ±20%                      3500 MB/s ±20%
<b>Logical Blocks</b>	1,000,215,215
<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]
<b>Features</b>	TCG Opal 2.0; TRIM; L1.2

**NOTE:** For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35 GB (for Windows 11) is reserved for system recovery software.

#### SSD 1TB 2280 PCIe NVMe Value

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
<b>Performance</b>	<b>Minimum Sequential Read</b> <b>Minimum Sequential Write</b>
	2200 MB/s ±20%                      1600 MB/s ±20%
<b>Logical Blocks</b>	2,000,409,264
<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]
<b>Features</b>	Pyrite 2.0; TRIM; L1.2

### Technical Specifications – Storage

**NOTE:** For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35 GB (for Windows 11) is reserved for system recovery software.

<b>SSD 256GB 2280 PCIe NVMe Value</b>	<b>Form Factor</b>	M.2 2280	
	<b>Capacity</b>	256 GB	
	<b>NAND Type</b>	TLC	
	<b>Height</b>	0.09 in (2.3 mm)	
	<b>Width</b>	0.87 in (22 mm)	
	<b>Weight</b>	0.02 lb (10 g)	
	<b>Interface</b>	PCIe NVMe Gen4X4	
	<b>Performance</b>	<b>Minimum Sequential Read</b>	<b>Minimum Sequential Write</b>
		2000 MB/s ±20%	900 MB/s ±20%
	<b>Logical Blocks</b>	500,118,192	
<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]		
<b>Features</b>	Pyrite 2.0; TRIM; L1.2		

**NOTE:** For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35 GB (for Windows 11) is reserved for system recovery software.

<b>SSD 512GB 2280 PCIe NVMe Value</b>	<b>Form Factor</b>	M.2 2280	
	<b>Capacity</b>	512 GB	
	<b>NAND Type</b>	TLC	
	<b>Height</b>	0.09 in (2.3 mm)	
	<b>Width</b>	0.87 in (22 mm)	
	<b>Weight</b>	0.02 lb (10 g)	
	<b>Interface</b>	PCIe NVMe Gen4X4	
	<b>Performance</b>	<b>Minimum Sequential Read</b>	<b>Minimum Sequential Write</b>
		2200 MB/s ±20%	1000 MB/s ±20%
	<b>Logical Blocks</b>	1,000,215,215	
<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]		
<b>Features</b>	Pyrite 2.0; TRIM; L1.2		

**NOTE:** For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35 GB (for Windows 11) is reserved for system recovery software.



### Technical Specifications – Networking

#### NETWORKING/COMMUNICATION

**Intel® AX211 Wi-Fi 6E**    **Wireless LAN Standards**  
**+Bluetooth® 5.3 wireless**  
**card M.2 160MHz CNVi**  
**World-wide WLAN vPro®**  
**1**

**Interoperability**  
**Frequency Band**

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

Wi-Fi certified

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<sup>1</sup>**

- IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only

- AES-CCMP: 128 bit in hardware

- 802.1x authentication

- WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.

- WPA2 certification

- WPA3 certification

- IEEE 802.11i

- WAPI

**Network Architecture**  
**Models**

Ad-hoc (Peer to Peer)

Infrastructure (Access Point Required)

**Roaming**

IEEE 802.11 compliant roaming between access points

### Technical Specifications – Networking

<b>Output Power<sup>2</sup></b>	<ul style="list-style-type: none"><li>• 802.11b : +17dBm minimum</li><li>• 802.11g : +16dBm minimum</li><li>• 802.11a : +17dBm minimum</li><li>• 802.11n HT20(2.4GHz) : +14dBm minimum</li><li>• 802.11n HT40(2.4GHz) : +13dBm minimum</li><li>• 802.11n HT20(5GHz) : +14dBm minimum</li><li>• 802.11n HT40(5GHz) : +13dBm minimum</li><li>• 802.11ac VHT80(5GHz) : +10dBm minimum</li><li>• 802.11ac VHT160(5GHz) : +10dBm minimum</li><li>• 802.11ax HE40(2.4GHz) : +12dBm minimum</li><li>• 802.11ax HE80(5GHz) : +10dBm minimum</li><li>• 802.11ax HE160(5GHz) : +10dBm minimum</li></ul>
<b>Power Consumption</b>	<ul style="list-style-type: none"><li>• Transmit mode 2.0 W</li><li>• Receive mode 1.6 W</li><li>• Idle mode (PSP) 180 mW (WLAN Associated)</li><li>• Idle mode 50 mW (WLAN unassociated)</li><li>• Connected Standby 10mW</li><li>• Radio disabled 8 mW</li></ul>
<b>Power Management</b>	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
<b>Receiver Sensitivity<sup>3</sup></b>	<ul style="list-style-type: none"><li>• 802.11b, 1Mbps : -93.5dBm maximum</li><li>• 802.11b, 11Mbps : -84dBm maximum</li><li>• 802.11a/g, 6Mbps : -86dBm maximum</li><li>• 802.11a/g, 54Mbps : -72dBm maximum</li><li>• 802.11n, MCS07 : -67dBm maximum</li><li>• 802.11n, MCS15 : -64dBm maximum</li><li>• 802.11ac, MCS0(VHT80) : -84dBm maximum</li><li>• 802.11ac, MCS9(VHT80) : -59dBm maximum</li><li>• 802.11ac, MCS9(VHT160) : -58.5dBm maximum</li><li>• 802.11ax, MCS11(HE40) : -57dBm maximum</li><li>• 802.11ax, MCS11(HE80) : -54dBm maximum</li><li>• 802.11ax, MCS11(HE160) : -53.5dBm maximum</li></ul>
<b>Antenna Type</b>	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
<b>Form Factor</b>	PCI-Express M.2 MiniCard
<b>Dimensions</b>	1. Type 2230 : 2.3 x 22.0 x 30.0 mm 2. Type 1216: 1.67 x 12.0 x 16.0 mm
<b>Weight</b>	1. Type 2230 : 2.8g 2. Type 1216: 1.3g
<b>Operating Voltage</b>	3.3v +/- 9%
<b>Temperature</b>	Operating 14° to 158° F (-10° to 70° C) Non-operating -40° to 176° F (-40° to 80° C)
<b>Humidity</b>	Operating 10% to 90% (non-condensing) Non-operating 5% to 95% (non-condensing)
<b>Altitude</b>	Operating 0 to 10,000 ft (3,048 m) Non-operating 0 to 50,000 ft (15,240 m)
<b>LED Activity</b>	LED Amber – Radio Off; LED Off – Radio ON

### Technical Specifications – Networking

#### **HP Integrated Module with Bluetooth 4.0/4.1/4.2/5.0/5.1/5.2/5.3 Wireless Technology**

<b>Frequency Band</b>	2402 to 2480 MHz
<b>Number of Available Channels</b>	Legacy : 0~79 (1 MHz/CH) BLE : 0~39 (2 MHz/CH)
<b>Data Rates and Throughput</b>	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)
<b>Transmit Power</b>	The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 9.5 dBm for BR and EDR.
<b>Power Consumption</b>	Peak (Tx): 330 mW Peak (Rx): 230 mW Selective Suspend: 17 mW
<b>Bluetooth Software Supported</b>	Microsoft Windows Bluetooth Software
<b>Link Topology</b>	
<b>Power Management</b>	Microsoft Windows ACPI, and USB Bus Support
<b>Certifications</b>	FCC (47 CFR) Part 15C/E, Section 15.247, 15.249, 15.407
<b>Power Management Certifications</b>	ETSI 300 328, ETSI 301 893, ETSI 303 687 Low Voltage Directive IEC950 UL, CSA, and CE Mark
<b>Bluetooth Profiles Supported</b>	Bluetooth® 4.1-ESR 5/6/7 Compliance LE Link Layer Ping LE Dual Mode LE Link Layer LE Low Duty Cycle Directed Advertising LE L2CAP Connection Oriented Channels Train Nudging & Interlaced Scan Bluetooth® 4.2 ESR08 Compliance LE Secure Connection- Basic/Full LE Privacy 1.2 –Link Layer Privacy LE Privacy 1.2 –Extended Scanner Filter Policies LE Data Packet Length Extension FAX Profile (FAX) Basic Imaging Profile (BIP)2 Headset Profile (HSP) Hands Free Profile (HFP) Advanced Audio Distribution Profile (A2DP) Bluetooth® 5.2 ESR9/10 Compliance LE Advertisement Extensions Channel Selection Algo Limited High Duty Cycle Non-Connectable Advertising 2Mbps LE LE Long Range Bluetooth® 5.3 Host to Controller Encryption Key Control Enhancements Compliance to the latest Errata Section 12.3 of Bluetooth® 5.3 wireless card specification

### Technical Specifications – Networking

1. Wi-Fi 6E requires a Wi-Fi 6E router, sold separately, to function in the 6GHz band. Availability of public wireless access points limited. Wi-Fi 6E is backwards compatible with prior 802.11 specs. And available in countries where Wi-Fi 6E is supported. Wi-Fi 6E is designed to support gigabit data rate when transferring files between two devices connected to the same router. Requires a wireless router, sold separately, that supports 80MHz and higher channels.
2. Check latest software/driver release for updates on supported security features.
3. The FCC has declared as of September 1, 2014 products that utilize passive scanning on channel 12/13 and are capable of transmitting must fully comply with requirements of 15.247 or otherwise disable those channels.
4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).

<p><b>Intel® AX211 Wi-Fi 6E + Bluetooth® 5.3 wireless card M.2 160MHz CNVi World-wide WLAN nonvPro® Wireless Card</b></p>	<p><b>Wireless LAN Standards</b></p>	<ul style="list-style-type: none"> <li>IEEE 802.11a</li> <li>IEEE 802.11b</li> <li>IEEE 802.11g</li> <li>IEEE 802.11n</li> <li>IEEE 802.11ac</li> <li>IEEE 802.11ax</li> <li>IEEE 802.11d</li> <li>IEEE 802.11e</li> <li>IEEE 802.11h</li> <li>IEEE 802.11i</li> <li>IEEE 802.11k</li> <li>IEEE 802.11r</li> <li>IEEE 802.11v</li> </ul>
	<p><b>Interoperability</b></p>	<ul style="list-style-type: none"> <li>Wi-Fi certified</li> </ul>
	<p><b>Frequency Band</b></p>	<ul style="list-style-type: none"> <li>802.11b/g/n/ax                             <ul style="list-style-type: none"> <li>• 2.402 – 2.482 GHz</li> </ul> </li> <li>802.11a/n/ac/ax                             <ul style="list-style-type: none"> <li>• 4.9 – 4.95 GHz (Japan)</li> <li>• 5.15 – 5.25 GHz</li> <li>• 5.25 – 5.35 GHz</li> <li>• 5.47 – 5.725 GHz</li> <li>• 5.825 – 5.850 GHz</li> <li>• 5.955 – 6.415 GHz</li> <li>• 6.435 – 6.515 GHz</li> <li>• 6.535 – 6.875 GHz</li> <li>• 6.895 – 7.115 GHz</li> </ul> </li> </ul>
	<p><b>Data Rates</b></p>	<ul style="list-style-type: none"> <li>• 802.11b: 1, 2, 5.5, 11 Mbps</li> <li>• 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</li> <li>• 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</li> <li>• 802.11n: max 300Mbps</li> <li>• 802.11ac : 1733Mbps</li> <li>• 802.11ax : max 2.4Gbps</li> </ul>
	<p><b>Modulation</b></p>	<p>Direct Sequence Spread Spectrum</p>
	<p><b>Security<sup>1</sup></b></p>	<p>OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM</p> <ul style="list-style-type: none"> <li>• IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only</li> <li>• AES-CCMP: 128 bit in hardware</li> <li>• 802.1x authentication</li> <li>• WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.</li> </ul>

### Technical Specifications – Networking

<b>Network Architecture Models</b>	<ul style="list-style-type: none"><li>• WPA2 certification</li><li>• WPA3 certification</li><li>• IEEE 802.11i</li><li>• WAPI</li></ul> Ad-hoc (Peer to Peer)  Infrastructure (Access Point Required)
<b>Roaming</b>	IEEE 802.11 compliant roaming between access points
<b>Output Power<sup>2</sup></b>	<ul style="list-style-type: none"><li>• 802.11b : +17dBm minimum</li><li>• 802.11g : +16dBm minimum</li><li>• 802.11a : +17dBm minimum</li><li>• 802.11n HT20(2.4GHz) : +14dBm minimum</li><li>• 802.11n HT40(2.4GHz) : +13dBm minimum</li><li>• 802.11n HT20(5GHz) : +14dBm minimum</li><li>• 802.11n HT40(5GHz) : +13dBm minimum</li><li>• 802.11ac VHT80(5GHz) : +10dBm minimum</li><li>• 802.11ac VHT160(5GHz) : +10dBm minimum</li><li>• 802.11ax HE40(2.4GHz) : +12dBm minimum</li><li>• 802.11ax HE80(5GHz) : +10dBm minimum</li><li>• 802.11ax HE160(5GHz) : +10dBm minimum</li></ul>
<b>Power Consumption</b>	<ul style="list-style-type: none"><li>• Transmit mode 2.0 W</li><li>• Receive mode 1.6 W</li><li>• Idle mode (PSP) 180 mW (WLAN Associated)</li><li>• Idle mode 50 mW (WLAN unassociated)</li><li>• Connected Standby 10mW</li><li>• Radio disabled 8 mW</li></ul>
<b>Power Management</b>	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
<b>Receiver Sensitivity<sup>3</sup></b>	<ul style="list-style-type: none"><li>• 802.11b, 1Mbps : -93.5dBm maximum</li><li>• 802.11b, 11Mbps : -84dBm maximum</li><li>• 802.11a/g, 6Mbps : -86dBm maximum</li><li>• 802.11a/g, 54Mbps : -72dBm maximum</li><li>• 802.11n, MCS07 : -67dBm maximum</li><li>• 802.11n, MCS15 : -64dBm maximum</li><li>• 802.11ac, MCS0(VHT80) : -84dBm maximum</li><li>• 802.11ac, MCS9(VHT80) : -59dBm maximum</li><li>• 802.11ac, MCS9(VHT160) : -58.5dBm maximum</li><li>• 802.11ax, MCS11(HE40) : -57dBm maximum</li><li>• 802.11ax, MCS11(HE80) : -54dBm maximum</li><li>• 802.11ax, MCS11(HE160) : -53.5dBm maximum</li></ul>
<b>Antenna Type</b>	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
<b>Form Factor</b>	PCI-Express M.2 MiniCard
<b>Dimensions</b>	1. Type 2230 : 2.3 x 22.0 x 30.0 mm 2. Type 1216: 1.67 x 12.0 x 16.0 mm
<b>Weight</b>	1. Type 2230 : 2.8g 2. Type 1216: 1.3g
<b>Operating Voltage</b>	3.3v +/- 9%

### Technical Specifications – Networking

<b>Temperature</b>	Operating	14° to 158° F (-10° to 70° C)
	Non-operating	-40° to 176° F (-40° to 80° C)
<b>Humidity</b>	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 95% (non-condensing)
<b>Altitude</b>	Operating	0 to 10,000 ft (3,048 m)
	Non-operating	0 to 50,000 ft (15,240 m)
<b>LED Activity</b>	LED Amber – Radio OFF; LED White – Radio ON	
<b>HP Integrated Module with Bluetooth 4.0/4.1/4.2/5.0/5.1/5.2/5.3 Wireless Technology</b>		
<b>Frequency Band</b>	2402 to 2480 MHz	
<b>Number of Available Channels</b>	Legacy : 0~79 (1 MHz/CH) BLE : 0~39 (2 MHz/CH)	
<b>Data Rates and Throughput</b>	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)	
<b>Transmit Power</b>	The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 9.5 dBm for BR and EDR.	
<b>Power Consumption</b>	Peak (Tx): 330 mW Peak (Rx): 230 mW Selective Suspend: 17 mW	
<b>Bluetooth Software Supported</b>	Microsoft Windows Bluetooth Software	
<b>Link Topology</b>		
<b>Power Management</b>	Microsoft Windows ACPI, and USB Bus Support	
<b>Certifications</b>	FCC (47 CFR) Part 15C/E, Section 15.247, 15.249, 15.407	
<b>Power Management Certifications</b>	ETSI 300 328, ETSI 301 893, ETSI 303 687 Low Voltage Directive IEC950 UL, CSA, and CE Mark	
<b>Bluetooth Profiles Supported</b>	Bluetooth® 4.1-ESR 5/6/7 Compliance LE Link Layer Ping LE Dual Mode LE Link Layer LE Low Duty Cycle Directed Advertising LE L2CAP Connection Oriented Channels Train Nudging & Interlaced Scan Bluetooth® 4.2 ESR08 Compliance LE Secure Connection- Basic/Full LE Privacy 1.2 –Link Layer Privacy LE Privacy 1.2 –Extended Scanner Filter Policies LE Data Packet Length Extension FAX Profile (FAX) Basic Imaging Profile (BIP)2 Headset Profile (HSP) Hands Free Profile (HFP) Advanced Audio Distribution Profile (A2DP) Bluetooth® 5.2	

### Technical Specifications – Networking

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

1. Wi-Fi 6E requires a Wi-Fi 6E router, sold separately, to function in the 6GHz band. Availability of public wireless access points limited. Wi-Fi 6E is backwards compatible with prior 802.11 specs. And available in countries where Wi-Fi 6E is supported. Wi-Fi 6E is designed to support gigabit data rate when transferring files between two devices connected to the same router. Requires a wireless router, sold separately, that supports 80MHz and higher channels.
2. Check latest software/driver release for updates on supported security features.
3. The FCC has declared as of September 1, 2014 products that utilize passive scanning on channel 12/13 and are capable of transmitting must fully comply with requirements of 15.247 or otherwise disable those channels.
4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).

#### HP 5G Sub-6 Cat 19 WWAN eSIM

##### 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)

### Technical Specifications – Networking

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)  
5G NR 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)  
n30: 2305 to 2315 MHz (UL) 2350 to 2360 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)  
n79: 4400 to 5000 MHz (UL/DL)

#### Wireless protocol standards

NR Sub6G rel15  
200MHz 2 DLCA, 256 QAM  
200MHz 2 ULCA, 256 QAM  
15KHz/30KHz SCS for FDD/TDD  
LTE Rel15  
100MHz 5 DLCA, 256 QAM  
40MHz 2 ULCA, 256 QAM  
UMTS Rel8

#### GPS

#### GPS bands

GPS only support L1 C/A  
GPS: L1 (1575.42MHz)  
GLONASS: L1 (1602MHz)  
BeidouB1(1561.098MHz)  
Galileo E1 (1575.42)  
QZSS(1575.42 MHz)

#### Maximum data rates

Sub-6 SA Peak  
DL 4.67Gbps/UL 1.25Gbps  
Sub-6 NSA Peak  
DL 3.74Gbps/UL 835Mbps  
LTE Peak  
DL 1.6Gbps (CAT19)/UL 211Mbps (CAT18)  
UMTS/HSPA+  
DL DC-HSPA+: 42 Mbps (CAT24)/UL 11.5 Mbps (CAT7)

#### Maximum output power

NR :  
23 dBm in all band except (n30 = 22dBm & n48=21dBm & n77=25dBm & n41/n77/n78 = 26dBm)  
LTE:



### Technical Specifications – Networking

	23 dBm in all band except (B30 = 22dBm & B48=21dBm & B41=26dBm)
	UMTS: 23.5 dBm
<b>Maximum power consumption</b>	3500 mA (peak); 1674mA (average)
<b>Form Factor</b>	M.2, 3052-S3 Key B
<b>Weight</b>	8.7g
<b>Dimensions</b> (Length x Width x Thickness)	52 mm x 30 mm x 2.3 mm
<b>embedded eSIM</b>	Support

\*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.

#### HP 4G LTE-A Pro Cat16 WWAN eSIM

<b>Technology/Operating bands*</b>	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)
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### Technical Specifications – Networking

	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 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)
<b>Wireless protocol standards</b>	3GPP LTE Rel15 LTE Specification, 100MHz 5 DLCA, 256 QAM, DL 1.0Gbps (CAT16)/ 40MHz 2 ULCA, 256 QAM, UL 211Mbps (CAT18) WCDMA 3GPP Release 8 UMTS Specification, DL UMTS: 384 kbps/UL 384 kbp, DL DC-HSPA+: 42 Mbps (CAT24)/UL 11.5 Mbps (CAT7) WCDMA R99, 3GPP Release 5, 6, 7 and 8 UMTS Specification
<b>GPS</b>	Standalone, A-GPS (MS-A, MS-B)
<b>GPS Bands</b>	GPS: L1 (1575.42MHz) GLONASS: L1 (1602MHz) BeidouB1(1561.098MHz) Galileo E1 (1575.42) QZSS(1575.42 MHz)
<b>Maximum Data Rates</b>	LTE: ue-CategoryDL 16, (DL : 1 Gbps ) ue-CategoryUL 18 , (UL: 211Mbps) DC-HSPA+: 42 Mbps (Download), 11.5 Mbps (Upload)
<b>Maximum Output Power</b>	HPUE: Not supported LTE: 23 dBm in all band except (B30= 22dBm& B48= 21dBm ) UMTS: 23.5 dBm
<b>Maximum Power Consumption</b>	LTE: 1300 mA (peak); 1100 mA (average) HSPA+: 1,100 mA (peak); 800 mA (average)
<b>Form Factor</b>	M.2, 3052-S3 Key B
<b>Weight</b>	8 g
<b>Dimensions</b> (Length x Width x Thickness)	52 mm × 30 mm × 2.3 mm
<b>eSIM</b>	Support

\*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.

### NFC NXP NPC300

<b>Dimensions (L x W x H)</b>	17 x 10 x 2.0 mm
<b>Chipset</b>	NPC300
<b>System interface</b>	I2C
<b>NFC RF standards</b>	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
<b>NFC Forum Support</b>	Tag Type 1, Type 2, Type3 and Type 4, NFCIP-1 and NFCIP-2

### Technical Specifications – Networking

<b>Reader (PCD-VCD Mode(1))</b>	ISO/IEC 14443 A ISO/IEC 14443 B ISO/IEC 15693 MIFARE 1K MIFARE 4K MIFARE DESFire FeliCa Jewel and Topaz cards
<b>Card Emulation (PICC-VICC) Mode(1)</b>	ISO/IEC 14443 A ISO/IEC 14443 B and B' MIFARE FeliCa
<b>Frequency</b>	13.56 MHz
<b>NFC Modes Supported</b>	Reader/Writer, Peer-to-Peer
<b>Raw RF Data Rates</b>	106, 212, 424, 848 kbps
<b>Operating temperature</b>	0°C to 70°C
<b>Storage temperature</b>	-20°C to 125°C
<b>Humidity</b>	10-90% operating 5-95% non-operating
<b>Supply Operating voltage</b>	4.35 to 5.25 Volts
<b>I/O Voltage</b>	1.8V or 3.3V
<b>Power Consumption</b>	<b>Booster enable, VCC_BOOST = 5V) Mode Power Consumption, Typical</b>
	VBAT= 3.3V, <b>Polling</b> 7.3 mA
	<b>Detected Test Tag Type 1</b> Total 283.8 mA Net Module 236.8 mA
	<b>Detected Test Tag Type 2</b> Total 288.8 mA Net Module 241.8 mA
	<b>Detected Test Tag Type 3</b> Total 287.7 mA Net Module 240.7 mA
	<b>Detected Test Tag Type 4</b> Total 282.3 mA Net Module 235.3 mA

#### Qualcomm® 9205

#### Technology/Operating bands\*

FDD LTE: 2100 (Band 1), 1900 (Band 2), 1800 (Band 3), 1700/2100 (Band 4), 850 (Band 5), 900 (Band 8), 700 (Band 12 lower), 700 (Band 13 upper), 700 (Band 14 upper), 850 (Band 18 lower), 850 (Band 19 upper), 800 (Band 20), 1900 (Band 25), 850 (Band 26), 800 (Band 27), 700 (Band 28), 1700/2100 (Band 66), 700 (band 85) MHz.  
GSM/GPRS/EGPRS: 850, 900, 1800, 1900MHz.

#### Wireless protocol standards

- 3GPP TS 51.010-1 V10.5.0: Mobile Station (MS) conformance specification; Part 1: Conformance specification
- 3GPP TS 36.521-1 V14.3.0: User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Conformance testing
- 3GPP TS 21.111 V10.0.0: USIM and IC card requirements
- 3GPP TS 51.011 V4.15.0: Specification of the Subscriber Identity Module -Mobile Equipment (SIM-ME) interface
- 3GPP TS 31.102 V10.11.0: Characteristics of the Universal Subscriber Identity Module (USIM) application

### Technical Specifications – Networking

	<ul style="list-style-type: none"><li>• 3GPP TS 31.11 V10.16.0: Universal Subscriber Identity Module (USIM) Application Toolkit (USAT)</li><li>• 3GPP TS 36.124 V10.3.0: Electro Magnetic Compatibility (EMC) requirements for mobile terminals and ancillary equipment</li><li>• 3GPP TS 27.007 V10.0.8: AT command set for User Equipment (UE)</li><li>• 3GPP TS 27.005 V10.0.1: Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)</li></ul>
<b>GPS</b>	Standalone GPS/Beidou/Glonass, A-GPS (MS-A, MS-B)
<b>GPS Bands</b>	1575.42 MHz ± 1.023 MHz, GLONASS 1596-1607MHz, Beidou 1561.098 MHz
<b>Maximum Data Rates</b>	LTE FDD: 375 Kbps (Download), 1119 Kbps (Upload) GSM: - GPRS: 107 Kbps (Download), 85.6 Kbps (Upload) - EGPRS: 296 Kbps (Download), 236.8 Kbps (Upload)
<b>Maximum Output Power</b>	LTE: 21.5 dBm in all band GSM:34dBm
<b>Maximum Power Consumption</b>	LTE: 1,200 mA (peak); 900 mA (average) HSPA+: 1,100 mA (peak); 800 mA (average)
<b>Form Factor</b>	M.2, 2242-S3 Key
<b>Weight</b>	5.5 g
<b>Dimensions</b> (Length x Width x Thickness)	22 x 42 x 2.3 mm
<b>eSIM</b>	Support

1. LPWAN (also called Mobile Narrowband) does not support mobile broadband use.

### AUDIO

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

### FINGERPRINT READER

<b>Sensor vendor</b>	Synaptics
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### Technical Specifications – Networking

<b>Sensor type</b>	Capacitive
<b>DPI resolution</b>	363 DPI
<b>Scan area</b>	104 x 86 pixels
<b>False Rejection Rate</b>	FRR= $\leq$ 3%
<b>False Acceptance Rate</b>	FAR 1/100K
<b>Mobile Voltage Operation</b>	3.0V to 3.6V
<b>Operating Temperature</b>	0~60C
<b>Current Consumption Image</b>	100mA max
<b>Low Latency Wait For Finger</b>	260uA
<b>Capture Rate</b>	50 Frames/ sec
<b>ESD Resistance</b>	IEC 61000-4-2 4B (+15KV)
<b>Detection Matrix</b>	363 dpi / 7.4x6mm sensor area

<b>Sensor vendor</b>	Elan
<b>Sensor type</b>	Capacitive
<b>DPI resolution</b>	508 DPI
<b>Scan area</b>	80 x 80 pixels
<b>False Rejection Rate</b>	FRR= $\leq$ 3%
<b>False Acceptance Rate</b>	FAR 1/100K
<b>Mobile Voltage Operation</b>	2.7V to 3.6V
<b>Operating Temperature</b>	-20~80C
<b>Current Consumption Image</b>	35mA max
<b>Low Latency Wait For Finger</b>	300uA
<b>Capture Rate</b>	50 Frames/ sec
<b>ESD Resistance</b>	IEC 61000-4-2 4B (+15KV)
<b>Detection Matrix</b>	508 dpi / 4.0x1.0mm sensor area

### POWER

<b>AC Adapter 65 Watt nPFC Standard USB type C Straight 1.8m</b>	<b>Dimensions</b>	3.543 x 2.008 x 1.122 in (9.0x5.1x2.85cm)
	<b>Weight</b>	240g $\pm$ 10g
	<b>Input</b>	<b>Input Efficiency</b>
		81.50% min at 115 Vac/ 230 Vac @5.00V
		86.70% min at 115 Vac/ 230 Vac @9.00V
		88.00% min at 115 Vac/ 230 Vac @12.00V
		89.00% min at 115 Vac/ 230 Vac @15.00V
		89.00% min at 115 Vac/ 230 Vac @20.00V
		<b>Input frequency range</b>
		47 ~ 63 Hz
		<b>Input AC current</b>
		Max. 1.6 A at 90 Vac
	<b>Output</b>	<b>Output power</b>
		5V/15W
		9V/27W
		12V/60W
		15V/65W
		20V/65W

### Technical Specifications – Networking

<b>DC output</b>	5V/9V/12V/15V/20V
<b>Hold-up time</b>	100% load 5ms at 115 Vac input
<b>Output current limit</b>	<8.0A
<b>AC Inlet Type</b>	C6
<b>DC Cable Connector</b>	USB type C
<b>DC Cable Material</b>	PVC

#### Connector

#### Environmental Design

<b>Connector</b>	C6
<b>Operating temperature</b>	32° to 95° F (0° to 35° C)
<b>Non-operating (storage) temperature</b>	-4° to 185° F (-20° to 85° C)
<b>Altitude</b>	0 to 16,400 ft (0 to 5000m)
<b>Humidity</b>	20% to 95%
<b>Storage Humidity</b>	10% to 95%

#### EMI and Safety Certifications

CE Mark - full compliance with LVD and EMC directives  
 Worldwide safety standards - IEC60950-1 and IEC62368-1 : 2018, EN62368-1:2014+A11, UL 62368-1  
 Agency approvals - C-UL-US, TUV/GS, TUV/PSE, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC and CECP, CU(EAC), EAEU, KCC(Safety+EMC) and K-MEPS, NOM-001 and 029 NYCE, NRcan, NRCS, ISC, SEC, PSB, Argentina S-mark, Australia RCM, BIS, BSMI, UAE, UKCA DoC

#### HP 65W Slim USB-C Straight AC Power Adapter

#### Dimensions

#### Weight

#### Input

3.819 x 2.106 x 0.827 in (9.7x5.35x2.1cm)

220g ± 10g

#### Input Efficiency

81.50% min at 115 Vac/ 230 Vac @5.00V  
 86.70% min at 115 Vac/ 230 Vac @9.00V  
 88.00% min at 115 Vac/ 230 Vac @12.00V  
 89.00% min at 115 Vac/ 230 Vac @15.00V  
 89.00% min at 115 Vac/ 230 Vac @20.00V

#### 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/65W  
 20V/65W

**DC output** 5V/9V/12V/15V/20V

**Hold-up time** 100% load 5ms at 115 Vac input

**Output current limit** < 8.0A

**AC Inlet Type** C6

**DC Cable Connector** USB type C

**DC Cable Material** PVC

#### Connector

#### Environmental Design

<b>Connector</b>	C6
<b>Operating temperature</b>	32° to 95° F (0° to 35° C)
<b>Non-operating (storage) temperature</b>	-4° to 185° F (-20° to 85° C)
<b>Altitude</b>	0 to 16,400 ft (0 to 5000m)

### Technical Specifications – Networking

		<b>Humidity</b>	20% to 95%
		<b>Storage Humidity</b>	10% to 95%
	<b>EMI and Safety Certifications</b>	<p>CE Mark - full compliance with LVD and EMC directives                      Worldwide safety standards - IEC60950-1 and IEC62368-1 : 2018, EN62368-1:2014+A11, UL 62368-1                      Agency approvals - C-UL-US, TUV/GS, TUV/PSE, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC and CECP, CU(EAC), EAEU, KCC(Safety+EMC) and K-MEPS, NOM-001 and 029 NYCE, NRcan, NRCS, ISC, SEC, PSB, Argentina S-mark, Australia RCM, BIS, BSMI, UAE, UKCA DoC</p>	
<b>HP 100W Slim USB-C Straight AC Power Adapter</b>	<b>Dimensions</b>	5.354 x 2.362 x 0.866 in (13.6x6.0x2.2cm)	
	<b>Weight</b>	380g ± 10g	
	<b>Input</b>	<b>Input Efficiency</b>	81.50% min at 115 Vac/ 230 Vac @5.00V 86.70% min at 115 Vac/ 230 Vac @9.00V 88.00% min at 115 Vac/ 230 Vac @12.00V 89.00% min at 115 Vac/ 230 Vac @15.00V 89.00% min at 115 Vac/ 230 Vac @20.00V
		<b>Input frequency range</b>	47-63Hz
		<b>Input AC current</b>	Max. 1.6 A at 90 Vac
	<b>Output</b>	<b>Output power</b>	5V/15W 9V/27W 12V/60W 15V/75W 20V/100W
		<b>DC output</b>	5V/9V/12V/15V/20V
		<b>Hold-up time</b>	100% load 5ms at 115 Vac input/80% load 10ms at 115 Vac input
		<b>Output current limit</b>	5V/9V/12V/15V<125% max current, 20V<135% max current
		<b>AC Inlet Type</b>	C6
		<b>DC Cable Connector</b>	USB type C
		<b>DC Cable Material</b>	PVC
	<b>Connector</b>	C6	
	<b>Environmental Design</b>	<b>Operating temperature</b>	32° to 95° F (0° to 35° C)
		<b>Non-operating (storage) temperature</b>	-4° to 185° F (-20° to 85° C)
		<b>Altitude</b>	0 to 16,400 ft (0 to 5000m)
		<b>Humidity</b>	20% to 95%
		<b>Storage Humidity</b>	10% to 95%
	<b>EMI and Safety Certifications</b>	<p>CE Mark - full compliance with LVD and EMC directives                      Worldwide safety standards - IEC60950-1, IEC 62368-1:2014 and IEC62368-1 : 2018, EN62368-1:2020+A11, UL 62368-1                      Agency approvals - C-UL-US, TUV/GS, TUV/PSE, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC, CU(EAC), KCC(Safety+EMC), NOM-001 NYCE, NRcan, NRCS, ISC, SEC, PSB, Argentina S-mark, Australia RCM, BIS, BSMI, UAE, UKCA DoC, Ukraine(CoC+DoC+RoHS+ECO)</p>	
	<b>Dimensions (H x W x L)</b>	251.8*70.3*6.82mm (9.91*2.77*0.27 inch)	

### Technical Specifications – Networking

<b>HP 3-cell Long Life Li-Ion (56 WHr)</b>	<b>Weight</b>	0.205kg +/- 10g(0.474 lb)	
	<b>Cells/Type</b>	3cell Lithium-Ion Polymer cell / 586075	
	<b>Energy</b>	Voltage	11.58V
		Amp-hour capacity	4.84Ah
		Watt-hour capacity	56.04Wh
	<b>Temperature</b>	Operating (Charging)	32° to 113° F (0° to 45° C)
		Operating (Discharging)	14° to 140° F (-10° to 60° C)
	<b>Fuel Gauge LED</b>	NA	
	<b>Warranty</b>	Follow product spec	
	<b>Optional Travel Battery Available</b>	No	

\*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.

<b>HP 6-cell Long Life Li-Ion (76WHr)</b>	<b>Dimensions (H x W x L)</b>	303.2*90.1*6.82mm(11.94*3.55*0.27 inch)	
	<b>Weight</b>	0.357kg +/- 10g(0.787 lb)	
	<b>Cells/Type</b>	6cell Lithium-Ion Polymer cell / 564975	
	<b>Energy</b>	Voltage	11.58V
		Amp-hour capacity	6.565Ah
		Watt-hour capacity	76Wh
	<b>Temperature</b>	Operating (Charging)	32° to 113° F (0° to 45° C)
		Operating (Discharging)	14° to 140° F (-10° to 60° C)
	<b>Fuel Gauge LED</b>	NA	
	<b>Warranty</b>	Follow product spec	
<b>Optional Travel Battery Available</b>	No		

\*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 – Environmental

#### 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<sup>®</sup> Gold registered in the United States. See <http://www.epeat.net> for registration status in your country.
- TCO Certified
- China Energy Conservation Program (CECP)
- China State Environmental Protection Administration (SEPA)
- Taiwan Green Mark
- Korea Eco-label
- Japan PC Green label\*

##### Sustainable Impact Specifications

- Product Carbon Footprint (hp.com)
- Ocean-bound plastic in Speaker
- 60% post-consumer recycled plastic
- 65% recycled metal
- 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 (Short idle)	4.61 W	4.45 W	4.40 W
Normal Operation (Long idle)	1.96 W	2.79 W	2.68 W
Sleep	1.10 W	1.15 W	1.17 W
Off	0.37 W	0.39 W	0.38 W

##### NOTE:

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

##### Heat Dissipation\*

	115VAC, 60Hz	230VAC, 50Hz	100VAC, 50Hz
Normal Operation (Short idle)	16 BTU/hr	15 BTU/hr	15 BTU/hr
Normal Operation (Long idle)	7 BTU/hr	10 BTU/hr	9 BTU/hr
Sleep	4 BTU/hr	4 BTU/hr	4 BTU/hr
Off	1 BTU/hr	1 BTU/hr	1 BTU/hr

### Technical Specifications – Environmental

**\*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 <sub>Wad</sub> , bels)	Sound Pressure (L <sub>pAm</sub> , decibels)
Typically Configured – Idle	2.8	16.8
Fixed Disk – Random writes	3.1	21.1
Optical Drive – Sequential reads	3.9	29.8

#### 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](http://www.epeat.net)
- Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.
- This product is 94.6% recycle-able when properly disposed of at end of life.

#### Packaging Materials

<b>External:</b>	PAPER/Corrugated	358 g
	PAPER/Molded Pulp	162 g
	PAPER/Paper	4 g
<b>Internal:</b>	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 51.8% 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](#).

### Technical Specifications – Environmental

#### 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](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>.

### Technical Specifications – Environmental

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.
- Disclaimer: recycled metal is expressed as a percentage of the total weight of the metal according to ISO 14021 definitions for metal parts over 25 grams.

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

Type	Description	Part #
<b>Audio/Video</b>	HP USB G2 Stereo Headset	428H5AA
	HP USB G2 Stereo Headset	428K6AA
	HP 3.5mm G2 Stereo Headset	428H6AA
	HP 3.5mm G2 Stereo Headset	428K7AA
	HP 365 BT Speaker	567D3AA
	HP 325 FHD USB-A Webcam	53X27AA
	HP 965 4K Streaming Webcam	695J5AA
	HP 625 FHD Webcam	6Y7L1AA
<b>Cases</b>	HP Renew Business 17.3 Laptop Backpack	3E2U5AA
	HP Renew Business 17.3 Laptop Bag	3E2U6AA
	HP Renew Executive 16 Laptop Backpack	6B8Y1AA
	HP Renew Executive 16 Laptop Bag	6B8Y2AA
<b>Docking station</b>	HP USB-C Dock G5	26D32AA
	HP USB-C Dock G5	5TW10AA
	HP USB-C/A Universal Dock G2	5TW13AA
	HP Thunderbolt 120W G4 Dock	4JOA2AA
	HP Thunderbolt 280W G4 Dock w/Combo Cable	4JOG4AA
	HP USB-C G5 Essential Dock	72C71AA
<b>Dongle</b>	HP HDMI to VGA Adapter	H4F02AA
	HP USB-C to USB 3.0 Adapter	N2Z63AA
	HP USB-C to DisplayPort Adapter	N9K78AA
	HP USB-C to VGA Adapter	N9K76AA
	HP USB-C to VGA Adapter	P7Z54AA
	HP USB-C to HDMI 2.0 Adapter	1WC36AA
	HP USB-C to HDMI 2.0 Adapter	2PC54AA
	HP USB-C to RJ45 Adapter G2	4Z527AA
	HP USB-C to RJ45 Adapter G2	4Z534AA
	HP USB 3.0 to Gig RJ45 Adapter G2	4Z7Z7AA
	HP USB-C to DisplayPort Adapter G2	8Y8Y1AA
<b>Hub</b>	HP USB-C Travel Hub G2	7PJ38AA
	HP USB-C to USB-A Hub	Z6A00AA
	HP Universal USB-C Multiport Hub	50H55AA
	HP Universal USB-C Multiport Hub	50H98AA
	HP 4K USB-C Multiport Hub	6G842AA
	HP 4K USB-C Multiport Hub	6G843AA
	HP Universal USB-C Hub and Laptop Charger Combo	9H0H9AA
<b>Keyboard/Combo</b>	HP 320K Wired Keyboard	9SR37AA
	HP 975 USB+BT Dual-Mode Wireless Keyboard	3Z726AA

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

	HP 455 Programmable Wireless Keyboard	4R177AA
	HP 965 BLK Ergonomic Wireless Keyboard	7E756AA
	HP 475 Dual-Mode Wireless Keyboard	7N7B9AA
	HP 405 Multi-Device Backlit Wired Keyboard	7N7C1AA
	HP 435 Programmable Bluetooth Wireless Keypad	7N7C3AA
	HP Wireless Rechargeable 950MK Mouse and Keyboard	3M165AA
	HP Wired Desktop 320MK Mouse and Keyboard	9SR36AA
	HP 655 Wireless Keyboard and Mouse Combo	4R009AA
<b>Mouse</b>	HP Wired 320M Mouse	9VA80AA
	HP Premium Wireless Mouse	1JR31AA
	HP Travel Bluetooth Mouse	6SP30AA
	HP Multi-Device 635 Black Wireless Mouse	1D0K2AA
	HP Creator 935 Black Wireless Mouse	1D0K8AA
	HP 235 Slim Wireless Mouse	4E407AA
	HP 435 Multi-Device Wireless Mouse	3B4Q5AA
	HP 715 Rechargeable Multi-Device Bluetooth Mouse	6E6F0AA
	HP 925 Ergonomic Vertical Wireless Mouse	6H1A5AA
<b>Power</b>	HP 65W USB-C LC Power Adapter	1P3K6AA
	HP 65W USB-C LC Power Adapter	944V0AA
	HP 65W Gallium Nitride USB-C Laptop Charger	600Q7AA
	HP 65W Gallium Nitride USB-C Laptop Charger	600Q8AA
	HP 65W USB-C Laptop Charger	671R2AA
	HP 65W USB-C Laptop Charger	671R3AA
	HP 110W USB-C Laptop Charger	8B3Y2AA
<b>Commodity</b>	HP 2TB PCIe-4x4 NVMe TLC M.2 Solid State Drive	6D8L6AA
	HP USB External DVDRW Drive	F2B56AA
	HP USB External DVDRW Drive	Y3T76AA
<b>Security</b>	HP Nano Keyed Cable Lock	1AJ39AA
	HP Nano Master Keyed Cable Lock	1AJ40AA
	HP Sure Key Cable Lock	6UW42AA
	HP Nano Combination Cable Lock	63B28AA
	HP Essential Nano Combination Cable Lock	63B31AA
<b>Monitor</b>	HP Z27k G3 4K USB-C Display	1B9T0A7
	HP Z27k G3 4K USB-C Display	1B9T0AA
	HP Z27k G3 4K USB-C Display	1B9T0AT
	HP Z27u G3 QHD USB-C Display	1B9X2A7
	HP Z27u G3 QHD USB-C Display	1B9X2AA
	HP Z27u G3 QHD USB-C Display	1B9X2AT
	HP Z34c G3 WQHD Curved Display	30A19A7

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

HP Z34c G3 WQHD Curved Display	30A19AA
HP Z34c G3 WQHD Curved Display	30A19AT
HP Z34c G3 WQHD Curved Display	30A19E9
HP Z24q G3 QHD Display	4Q8N4A7
HP Z24q G3 QHD Display	4Q8N4AA
HP Z24q G3 QHD Display	4Q8N4AT
HP Z24q G3 QHD Display	4Q8N4E9
HP Z24m G3 QHD Conferencing Display	4Q8N9A7
HP Z24m G3 QHD Conferencing Display	4Q8N9AA
HP Z24m G3 QHD Conferencing Display	4Q8N9AT
HP Z24m G3 QHD Conferencing Display	4Q8N9E9
HP Series 7 Pro 34 inch WQHD Conferencing Monitor - 734pm	8K157A5
HP Series 7 Pro 34 inch WQHD Conferencing Monitor - 734pm	8K157AA
HP Series 7 Pro 34 inch WQHD Conferencing Monitor - 734pm	8K157AT
HP Series 7 Pro 34 inch WQHD Conferencing Monitor - 734pm	8K157E9
HP Series 7 Pro 27 inch QHD Thunderbolt 4 Monitor - 727pu	8J9E6A5
HP Series 7 Pro 27 inch QHD Thunderbolt 4 Monitor - 727pu	8J9E6AA
HP Series 7 Pro 27 inch QHD Thunderbolt 4 Monitor - 727pu	8J9E6AT
HP Series 7 Pro 27 inch QHD Thunderbolt 4 Monitor - 727pu	8J9E6E9
HP Series 7 Pro 37.5 inch WQHD+ Thunderbolt 4 Monitor - 738pu	8K167A5
HP Series 7 Pro 37.5 inch WQHD+ Thunderbolt 4 Monitor - 738pu	8K167AA
HP Series 7 Pro 37.5 inch WQHD+ Thunderbolt 4 Monitor - 738pu	8K167AT
HP Series 7 Pro 37.5 inch WQHD+ Thunderbolt 4 Monitor - 738pu	8K167E9
HP Series 7 Pro 27 inch 4K Thunderbolt 4 Monitor - 727pk	8J9G2A5
HP Series 7 Pro 27 inch 4K Thunderbolt 4 Monitor - 727pk	8J9G2AA
HP Series 7 Pro 27 inch 4K Thunderbolt 4 Monitor - 727pk	8J9G2AT
HP Series 7 Pro 27 inch 4K Thunderbolt 4 Monitor - 727pk	8J9G2E9
HP Series 7 Pro 27 inch 4K Conferencing Monitor - 727pm	8K135A5
HP Series 7 Pro 27 inch 4K Conferencing Monitor - 727pm	8K135AA
HP Series 7 Pro 27 inch 4K Conferencing Monitor - 727pm	8K135AT
HP Series 7 Pro 27 inch 4K Conferencing Monitor - 727pm	8K135E9
HP Series 7 Pro 24 inch WUXGA USB-C Monitor - 724pu	8Y2F7A5
HP Series 7 Pro 24 inch WUXGA USB-C Monitor - 724pu	8Y2F7AA
HP Series 7 Pro 24 inch WUXGA USB-C Monitor - 724pu	8Y2F7AT
HP Series 7 Pro 24 inch WUXGA USB-C Monitor - 724pu	8Y2F7E9
HP Series 7 Pro 31.5 inch 4K Thunderbolt 4 Monitor - 732pk	8Y2K9A5
HP Series 7 Pro 31.5 inch 4K Thunderbolt 4 Monitor - 732pk	8Y2K9AA
HP Series 7 Pro 31.5 inch 4K Thunderbolt 4 Monitor - 732pk	8Y2K9AT
HP Series 7 Pro 31.5 inch 4K Thunderbolt 4 Monitor - 732pk	8Y2K9E9
HP Series 7 Pro 39.7 inch 5K2K Conferencing Monitor - 740pm	8Y2R2A5
HP Series 7 Pro 39.7 inch 5K2K Conferencing Monitor - 740pm	8Y2R2AA
HP Series 7 Pro 39.7 inch 5K2K Conferencing Monitor - 740pm	8Y2R2AT
HP Series 7 Pro 39.7 inch 5K2K Conferencing Monitor - 740pm	8Y2R2E9

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<b>Date of change:</b>	<b>Version History:</b>		<b>Description of change:</b>
March 12, 2024	From v1 to v2	Changed	At A Glance, POWER sections
March 25, 2024	From v2 to v3	Changed	Page 1 Right image
April 8, 2024	From v3 to v4	Changed	Format
April 24, 2024	From v4 to v5	Changed	WEIGHTS & DIMENSIONS, PORTS/SLOTS, POWER sections
May 22, 2024	From v5 to v6	Changed	HDMI support
July 18, 2024	From v6 to v7	Changed	At A Glance, DISPLAY, SOFTWARE AND SECURITY sections
July 18, 2024	From v7 to v8	Changed	POWER section
July 18, 2024	From v8 to v9	Changed	GRAPHICS, SOFTWARE AND SECURITY section
September 26, 2024	From v9 to v10	Changed	Format