Overview

HP ZBook Firefly 16” G9 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

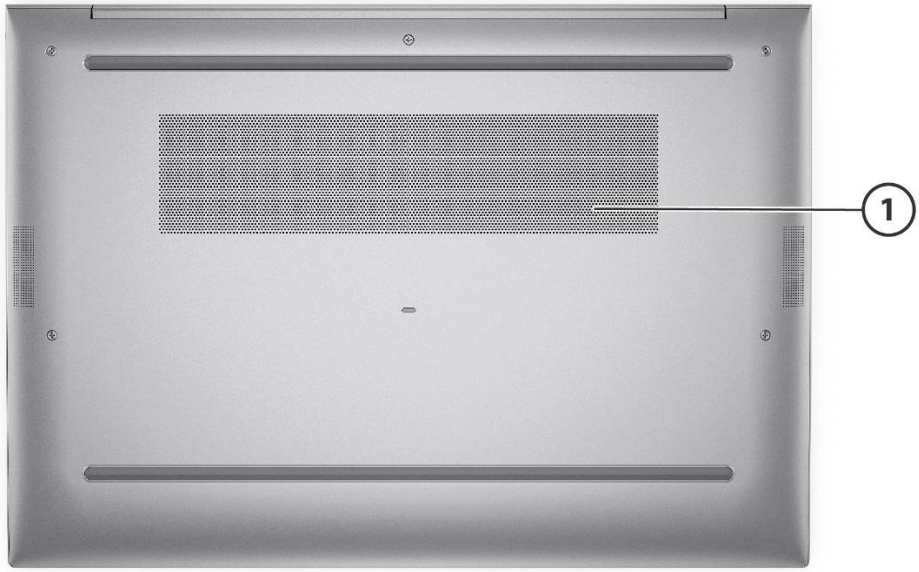
8. Clickpad
9. Power Button Key
10. Audio Combo Jack
11. SuperSpeed USB Type-A 5Gbps signaling rate
12. Nano Security Lock Slot (Lock sold separately)
13. SIM Card Slot (Optional)
14. Touch Fingerprint Sensor (Select models)

Overview

Left

1. HDMI 2.0b Port (Cable not included)
2. SuperSpeed USB Type-A 5Gbps signaling rate (Charging)
3. 2 Thunderbolt™ 4 with USB4 Type-C® 40Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4)1
4. LED Indicator
5. Smartcard Reader (Optional)

Overview



Bottom

1. Fan Venting

Overview

At A Glance

- New premium ultraslim design with precision-crafted all-metal chassis for a premium look and feel
- 12th Generation Intel® Core™ i5, i7 U-series and i5, i7 P-series Processors up to fourteen-core
- Preinstalled with Windows 11 versions or FreeDOS
- New 16:10 ratio screen reduces the need to scroll by showing more vertical content than 16:9
- New 5MP camera[2] with HP Auto Frame[1] allows you around a little without losing viewers’ attention during video calls
- New DDR5 memory and PCI Gen4 SSDs provide fast access to your work.
- Choice of displays:
    - 40.6 cm (16") diagonal WUXGA IPS Anti-Glare LED-backlit non-touch, 250 nits, 45% NTSC
    - 40.6 cm (16") diagonal WUXGA IPS Anti-Glare On-Cell LED-backlit touch, 250 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 IPS Anti-Glare LED-backlit non-touch, 1000 nits, 100% sRGB with HP Sure View Reflect
- Choose from 51Whr or 76Whr battery options
- HP Wolf Security for Business creates a hardware-enforced, always-on, resilient defense.[5]
- Larger Clickpad surface for easier, more intuitive input
- Connectivity with optional Intel® 5000 5G/WWAN available world-wide, and Thunderbolt™ Docking (Dock sold separately)
- Undergoes MIL-STD 810H tests[6]
- Supports fast charging (50% in 30 minutes) with no impact on battery recharge cycles[3]
- Designed to support all HP docking options including the HP Universal Dock G5

[1]Requires the myHP application and Windows OS.
[2]Optional feature that must be configured at the time of purchase.
[3]HP Presence requires myHP application and Windows OS.
[4]Requires Windows OS.
[5]HP Wolf Security for Business requires Windows 10 and higher, includes various HP security features and is available on HP Pro, Elite, Workstation, and RPOS products. See product details for included security features and OS requirements.
[6]MIL-STD 810GH 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.

[7]SuperSpeed USB 20Gbps is not available with Thunderbolt™ 4.

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

Features

OPERATING SYSTEM

Preinstalled OS

Windows 11 Pro - HP recommends Windows 11 Pro for business [2]
Windows 11 Pro Education [2]
Windows 11 Home - HP recommends Windows 11 Pro [2]
Windows 11 Home Single Language - HP recommends Windows 11 Pro [2]
Windows 11 Pro (Windows 11 Enterprise available with a Volume Licensing Agreement) [2]
Windows 10 Pro (available through downgrade rights from Windows 11 Pro)[1,2,3]
FreeDOS

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

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

12th Generation Intel® Core™ i7-1280P (1.3 GHz E-core base frequency, 1.8 GHz P-core base frequency, up to 3.6 GHz E-core Max Turbo Frequency, up to 4.8 GHz P-core Max Turbo frequency with Intel® Turbo Boost Technology, 24 MB L3 cache, 6 P-cores and 8 E-cores, 20 Threads) Supporting Intel® vPro® technology [1,2,3,4,5]

12th Generation Intel® Core™ i7-1270P (1.6 GHz E-core base frequency, 2.2 GHz P-core base frequency, up to 3.5 GHz E-core Max Turbo Frequency, up to 4.8 GHz P-core Max Turbo frequency with Intel® Turbo Boost Technology, 18 MB L3 cache, 4 P-cores and 8 E-cores, 16 Threads) Supporting Intel® vPro® technology [1,2,3,4,5]

12th Generation Intel® Core™ i7-1260P (1.5 GHz E-core base frequency, 2.1 GHz P-core base frequency, up to 3.3 GHz E-core Max Turbo Frequency, up to 4.4 GHz P-core Max Turbo frequency with Intel® Turbo Boost Technology, 18 MB L3 cache, 4 P-cores and 8 E-cores, 16 Threads) [1,2,3,4]

12th Generation Intel® Core™ i5-1250P (1.2 GHz E-core base frequency, 1.7 GHz P-core base frequency, up to 3.3 GHz E-core Max Turbo Frequency, up to 4.4 GHz P-core Max Turbo frequency with Intel® Turbo Boost Technology, 12 MB L3 cache, 4 P-cores and 8 E-cores, 16 Threads) Supporting Intel® vPro® technology [1,2,3,4,5]

12th Generation Intel® Core™ i5-1240P (1.2 GHz E-core base frequency, 1.7 GHz P-core base frequency, up to 3.3 GHz E-core Max Turbo Frequency, up to 4.4 GHz P-core Max Turbo frequency with Intel® Turbo Boost Technology, 12 MB L3 cache, 4 P-cores and 8 E-cores, 16 Threads) [1,2,3,4]

12th Generation Intel® Core™ i7-1265U (1.3 GHz E-core base frequency, 1.8 GHz P-core base frequency, up to 3.6 GHz E-core Max Turbo Frequency, up to 4.8 GHz P-core Max Turbo frequency with Intel® Turbo Boost Technology, 12 MB L3 cache, 2 P-cores and 8 E-cores, 12 Threads) Supporting Intel® vPro® technology [1,2,3,4,5]

Features

12th Generation Intel® Core™ i7-1255U (1.2 GHz E-core base frequency, 1.7 GHz P-core base frequency, up to 3.5 GHz E-core Max Turbo Frequency, up to 4.7 GHz P-core Max Turbo frequency with Intel® Turbo Boost Technology, 12 MB L3 cache, 2 P-cores and 8 E-cores, 12 Threads) [1,2,3,4]

12th Generation Intel® Core™ i5-1245U (1.2 GHz E-core base frequency, 1.6 GHz P-core base frequency, up to 3.3 GHz E-core Max Turbo Frequency, up to 4.4 GHz P-core Max Turbo frequency with Intel® Turbo Boost Technology, 12 MB L3 cache, 2 P-cores and 8 E-cores, 12 Threads) Supporting Intel® vPro® technology [1,2,3,4,5]

12th Generation Intel® Core™ i5-1235U (0.9 GHz E-core base frequency, 1.3 GHz P-core base frequency, up to 3.3 GHz E-core Max Turbo Frequency, up to 4.4 GHz P-core Max Turbo frequency with Intel® Turbo Boost Technology, 12 MB L3 cache, 2 P-cores and 8 E-cores, 12 Threads) [1,2,3,4]

[1] Multicore is designed to improve performance of certain software products. Not all customers or software applications will necessarily benefit from use of this technology. Performance and clock frequency will vary depending on application workload and your hardware and software configurations. Intel’s numbering, branding and/or naming is not a measurement of higher performance.
[2] Processor speed denotes maximum performance mode; processors will run at lower speeds in battery optimization mode.
[3] Intel® Turbo Boost performance varies depending on hardware, software and overall system configuration. See www.intel.com/technology/turboboost for more information.
[4] 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.
[5] Intel vPro® requires Windows 10 Pro 64 bit or higher, a vPro supported processor, vPro enabled chipset, vPro enabled wired LAN and/or Wi-Fi 6E WLAN and TPM 2.0. Some functionality requires additional 3rd party software in order to run. Features of vPro® Essentials and Enterprise vary. See http://intel.com/vpro

Features

CHIPSET

Chipset is integrated with processor

GRAPHICS

Integrated

Intel® Iris® Xe Graphics [1, 3, 4, 5, 6]

Discrete

NVIDIA® T550 Laptop GPU (4 GB GDDR6 dedicated)[2, 4]

Supports

Support HD decode, DX12, HDMI 2.0b, HDCP 2.3

[1] UHD content required to view UHD images.

[2] Both UMA & Discrete configurations support 4 independent displays when on the HP Thunderbolt Dock G2 (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).

[3] Support HD decode, DX12, HDMI 2.0b, HDCP 2.3 via DP up to 4K @ 60Hz and via HDMI up to 4096x2304 @ 60Hz

[4] HDMI cable Sold Separately

[5] Shared video memory (UMA) uses part of the total system memory for video performance. System memory dedicated to video performance is not available for other use by other programs.

[6] Intel® Iris® Xe Graphics capabilities require system to be configured with Intel® Core™ i5 or i7 processors and dual channel memory. Intel® Iris® Xe Graphics with Intel® Core™ i5 or 7 processors and single channel memory will only function as UHD graphics.

DISPLAY

Non-touch

- 40.64 cm (16") diagonal WUXGA Bent, anti-glare UWVA, 250 nits, 45% NTSC for 5MP camera (1920 x 1200)
- 40.64 cm (16") diagonal WUXGA Bent, anti-glare UWVA, 250 nits, 45% NTSC for 5MP+IR camera (1920 x 1200)
- 40.64 cm (16") diagonal WUXGA Bent, anti-glare UWVA, 250 nits, 45% NTSC for WWAN (1920 x 1200)
- 40.64 cm (16") diagonal WUXGA Bent, anti-glare UWVA, 250 nits, 45% NTSC for 5MP camera for WWAN (1920 x 1200)
- 40.64 cm (16") diagonal WUXGA Bent, anti-glare UWVA, 250 nits, 45% NTSC for 5MP+IR camera for WWAN (1920 x 1200)
- 40.64 cm (16") diagonal WUXGA Bent, Low Blue Light, anti-glare UWVA eDP+PSR, 400 nits, 100% sRGB, Low Power, Ambient Light Sensor for 5MP Camera (1920 x 1200)
- 40.64 cm (16") diagonal WUXGA Bent, Low Blue Light, anti-glare UWVA eDP+PSR, 400 nits, 100% sRGB, Low Power, Ambient Light Sensor+Ambient Color Sensor for 5MP+IR Camera (1920 x 1200)
- 40.64 cm (16") diagonal WUXGA Bent, Low Blue Light, anti-glare UWVA eDP+PSR, 400 nits, 100% sRGB, Low Power, Ambient Light Sensor+Ambient Color Sensor for 5MP Camera for WWAN (1920 x 1200)
- 40.64 cm (16") diagonal WUXGA Bent, Low Blue Light, anti-glare UWVA eDP1.3+PSR, 400 nits, 100% sRGB, Low Power, Ambient Light Sensor+Ambient Color Sensor for 5MP+IR Camera for WWAN (1920 x 1200)
- 40.64 cm (16") diagonal WUXGA Bent, Low Blue Light, anti-glare UWVA eDP1.3+PSR, 1000 nits, 100% sRGB with HP Sure View Reflect integrated privacy screen, Ambient Light Sensor+Ambient Color Sensor for 5MP camera (1920 x 1200)
- 40.64 cm (16") diagonal WUXGA Bent, Low Blue Light, anti-glare UWVA eDP1.3+PSR, 1000 nits, 100% sRGB with HP Sure View Reflect integrated privacy screen, Ambient Light Sensor+Ambient Color Sensor for 5MP+IR camera (1920 x 1200)
- 40.64 cm (16") diagonal WUXGA Bent, Low Blue Light, anti-glare UWVA eDP1.3+PSR, 1000 nits, 100% sRGB with HP Sure View Reflect integrated privacy screen, Ambient Light Sensor+Ambient Color Sensor for 5MP+IR camera for WWAN (1920 x 1200)

Features

Touch

- 40.64 cm (16") diagonal WUXGA Bent, anti-glare UWVA, 250 nits, 45% NTSC for 5MP+IR camera Touch on Panel (1920 x 1200)
- 40.64 cm (16") diagonal WUXGA Bent, anti-glare UWVA, 250 nits, 45% NTSC for 5MP+IR camera for WWAN Touch on Panel (1920 x 1200)

DisplayPort™ 1.4
Support resolution up to 8K @60 Hz

Displays support
Supports up to 4 displays max through dock

[1]HD content required to view HD images.
[2]Sold separately or as an optional feature.
[3]Resolutions are dependent upon monitor capability, and resolution and color depth settings.
[4]HP Sure View Reflect integrated privacy screen is an optional feature that must be configured at purchase and is designed to function in landscape orientation.
[5]Actual brightness will be lower with touchscreen or Sure View.

Features

DOCKING

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

Features

STORAGE AND DRIVES*

PCIe® NVMe™ M.2 2280 Storage
2 TB PCIe® Gen4x4 NVMe™ M.2 SSD TLC
1 TB PCIe® Gen4x4 NVMe™ M.2 SSD TLC
512 GB PCIe® Gen4x4 NVMe™ M.2 SSD TLC
512 GB PCIe® Gen4x4 NVMe™ SED TLC OPAL2
512 GB PCIe® NVMe™ Value M.2 SSD
256 GB PCIe® Gen4x4 NVMe™ M.2 SSD TLC
256 GB PCIe® Gen4x4 NVMe™ SED TLC OPAL2
256 GB PCIe® NVMe™ Value M.2 SSD

NOTE: Intel® Optane™ H10 memory system acceleration does not replace or increase the DRAM in your system. Requires 8th Gen or higher Intel® Core™ processor, BIOS version with Intel® Optane™ supported, Windows 10 64-bit, and an Intel® Rapid Storage Technology (Intel® RST) driver.

* 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.

DRIVE CONTROLLERS

M.2 Storage Bay (PCIe NVMe)	Supports up to PCIe® Gen4 x4 lanes NVMe™ Solid State Drive
RAID:	Not supported

MEMORY

Maximum Memory
64GB DDR5-4800
Memory
64GB DDR5-4800 (2x32GB)
48GB DDR5-4800 (1x32GB+1x16GB)
32GB DDR5-4800 (2x16GB)
32GB DDR5-4800 (1x32GB)
16GB DDR5-4800 (2x8GB)
16GB DDR5-4800 (1x16GB)
8GB DDR5-4800 (1x8GB)

Memory Slots
2 SODIMM
DDR5 SODIMMS, system runs at 4800 MT/s
Supports Dual Channel Memory

Features

NETWORKING/COMMUNICATIONS

WLAN

Intel AX211 Wi-Fi6E+BT5.2 M.2 160MHz CNVi World-Wide WLAN vPro
Intel AX211 Wi-Fi6E+BT5.2 M.2 160MHz CNVi World-Wide WLAN non-vPro

[1]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.

WWAN[1]

Intel® 5000 5G Solution WWAN[3]
Intel® XMM 7560 R+ LTE-Advanced Pro WWAN(Cat 16)[2]

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

[2]4G LTE module is optional, must be configured at the factory, requires activation and separately purchased service contract. Check with service provider for coverage and availability in your area. Connection, upload and download speeds will vary due to network, location, environment, network conditions, and other factors. 4G LTE not available on all products, in all regions.

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

Near Field Communication (NFC) module

No Near Field Communication (NFC) module
NFC Mirage WNC XRAV-1

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

Speaker Power

2W/4ohm Per speaker

Camera[1, 2]

5 MP camera
5 MP+IR camera

Features

Sensors

ALS (ambient light sensor)

Magnetometer

Hall Sensor

Gyro

Accelerometer

HP Tamper Lock[3]

[1] HD content required to view HD images.

[2] Windows Hello face authentication utilizes a camera specially configured for near infrared (IR) imaging to authenticate and unlock Windows devices as well as unlock your Microsoft Passport.

[3] HP Tamper Lock must be enabled by the customer or your administrator.

Features

KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS

Keyboard*
HP Premium Keyboard, spill resistant, Backlit keyboard and DuraKeys
HP Premium Keyboard, spill resistant, Non-Backlit keyboard and DuraKeys
HP Premium Keyboard, spill resistant, Backlit keyboard and DuraKeys Privacy

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

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

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

*Backlit keyboard is an optional feature.

SOFTWARE AND SECURITY

Software
HP Quick Touch
HP Quick Drop[21]
HP Easy Clean
HP PC Hardware Diagnostics Windows
HSA Fusion for Commercial
HSA Telemetry for Commercial
Touchpoint Customizer for Commercial
myHP
Tile App[22,25]
HP Smart Support[24]
HP Connection Optimizer[10]
HP Mac Address Manager
HP Hotkey Support
HP Support Assistant[1]

Features

HP Notifications
HP Privacy Settings
HP Power Manager
Buy Microsoft Office (Sold separately)
HP audio Control[33]

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

Security Management
HP Wolf Security of Business [29] includes:
HP Sure Click [30]
HP Sure Sense[19]
HP Sure Run Gen5[31]
HP Sure Recover Gen5[14]
HP Sure Start Gen7[16]
HP Tamper Lock
HP Sure Admin[23]
HP Client Security Manager Gen7[18]

BIOS
HP BIOSphere Gen6[6]
HP Secure Erase[17]
Absolute Persistence Module[7]
HP DriveLock & Automatic DriveLock
BIOS Update via Network
HP Wake on WLAN
HP Fingerprint Sensor[32]
Secured-Core PC Enable[20]
TPM 2.0 Embedded Security Chip (Common Criteria EAL4+ Certified) (FIPS 140-2 Level 2 Certified)

For more information on HP Client Security Software Suite, refer to http://www.hp.com/go/clientsecurity**.**

[1] HP Support Assistant - Requires Windows and Internet Access.
[6] 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.
[7] 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.
[10] HP Connection Optimizer requires Windows 10 and Windows 11.
[12] HP Manageability Integration Kit can be downloaded from http://www.hp.com/go/clientmanagement.
[14] HP Sure Recover Gen5 with Embedded Reimaging is an optional feature which requires Windows 10 and higher must be configured at purchase. You must back up important files, data, photos, videos, etc. before use to avoid loss of data. Network based recovery using Wi-Fi is only available on PCs with Intel Wi-Fi Module
[15] HP Sure Recover with Embedded Reimaging Gen3 is an optional feature which must be configured at purchase with a base unit that has the On System Recovery (OSR) module . See product specifications for availability You must back up important files, data, photos, videos, etc. before use to avoid loss of data. HP Sure Recover with Embedded Reimaging (Gen1) does not support platforms with Intel® Optane™.

Features

[16] HP Sure Start Gen7 is available on select HP PCs and requires Windows 10 and higher
[17] 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™.
[18] HP Client Security Manager Gen7 requires Windows and is available on select HP Pro, Elite and ZBook PCs. See product specifications for details.
[19] HP Sure Sense is available on select HP PCs with Windows 10 Pro, Windows 10 Enterprise, Windows 11 Pro, or Windows 11 Enterprise OS.
[20] 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.
[21] Requires Internet access and Windows 10 PC preinstalled with HP QuickDrop app and either an Android device (phone or tablet) running Android 7 or higher with the Android HP QuickDrop app, and /or an iOS device (phone or tablet) running iOS 12 or higher with the iOS HP QuickDrop app.
[22] Some features require
optional subscription to Tile Premium. Tile application for Windows 10
available for download from the Windows Store. Mobile phone app available for download from App Store and Google Play. Requires iOS 11 and greater or Android 6.0 and greater see https://support.thetileapp.com/hc/en-us/articles/200424778
for more information. HP Tile will function as long as the PC has battery power.
[23] 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.
[24] HP Smart Support is available to commercial customers through your HP Service Representative and HP Factory Configuration Services; or it can be downloaded at: http://www.hp.com/smart-support. HP Smart Support automatically collects the telemetry necessary upon initial boot of the product to deliver device-level configuration data and health insights.
[25] Some Tile features require optional subscription to Tile Premium. Tile application for Windows 10 available for download from the Windows Store. Mobile phone app available for download from App Store and Google Play. Requires iOS 11 and greater or Android 6.0 and greater see https://support.thetileapp.com/hc/en-us/articles/200424778 for more information. Tile will function as long as the PC has battery power.
[26] 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.
[27] 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.
[28] 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.
[29] HP Wolf Security for Business requires Windows 10 or higher, includes various HP security features and is available on HP Pro, Elite, RPOS and Workstation products. See product details for included security features and OS requirement.
[30] HP Sure Click requires Windows 10 Pro or higher or Enterprise. See https://bit.ly/2PrLT6A_SureClick for complete details.
[31] HP Sure Run Gen5 is available on select HP PCs and requires Windows 10 and higher.
[32] HP Fingerprint Reader is an optional feature that requires Windows 10 IoT and must be configured at purchase.
[33] Microphone Noise Reduction and Speaker Noise Reduction feature included under HP Audio Control

Features

POWER

Power Supply
HP Smart 65 W USB Type-C® adapter
HP Slim 100 W USB Type-C® adapter

Battery
HP Long Life 3-cell, 51 Wh Polymer
HP Long Life 6-cell, 76 Wh Polymer

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

Battery life
51Whr Battery: Up to 12 hrs
76Whr Battery: Up to 18 hrs

[1] Battery life will vary depending on the 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 MobileMark18 battery benchmark https://bapco.com/products/mobilemark-2018/ for additional details.

[2] Supports HP Fast Charge Technology

[3]100W Power Adapter is only available with 76 Whr Battery.

[4] 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.

ENVIRONMENTAL

ENERGY STAR® certified
EPEAT® 2019 registered where applicable. EPEAT ® registration varies by country. See www.epeat.net for registration status by country.
EPEAT® 2019 Gold
TCO 8.0 Certified
RCTA DO-160G
Medical EMC: IEC 60601-1-2:2014 EN60601-1-2: 2015
SEPA
GS Mark
Eyesafe Certification - Worldwide

Sustainable Impact Specifications
Recycled Aluminum and Magnesium, 75% PCR w/30% ITE plastics

[1] Based on US EPEAT® registration according to IEEE 1680.1-2018 EPEAT®. Status varies by country. Visit www.epeat.net for more information.
[2] External power supplies, power cords, cables and peripherals are not low halogen. Service parts obtained after purchase may not be low halogen.

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- 51Whr
Starting at 3.97 lb
Starting at 1.8 kg
Product Weight- 76Whr
Starting at 3.97 lb + 0.3lb = 4.27 lb
Starting at 1.8 kg + 138g = 1.938 kg

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

PORTS/SLOTS

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

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

[1]Sold separately or as an optional feature. 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. 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. Consult your local HP Customer Support Center for details.

SYSTEM UNIT

Stand-Alone Power Requirements (AC Power)	**Nominal Operating Voltage**	AC 20V	
	Average Operating Power(idle)		System in idle mode
	Integrated graphics	Yes	

Features

	Discrete Graphics	N/A
	Max Operating Power	UMA<65W
Temperature	**Operating**	32° to 95° F (0° to 35° C)
	Non-operating	41° to 95° F (5° to 35° C) (writing optical)
Relative Humidity	**Operating**	10% to 90%, non-condensing
	Non-operating	5% to 95%, 101.6° F (38.7° C) maximum wet bulb temperature
Shock	**Operating**	40 G, 2 ms, half-sine
	Non-operating	200 G, 2 ms, half-sine
Random Vibration	**Operating**	0.75 grms
	Non-operating	1.50 grms
Maximum Altitude (unpressurized)	**Operating**	-50 to 10,000 ft (-15.24 to 3,048 m)
	Non-operating	-50 to 40,000 ft (-15.24 to 12,192 m)
Planned Industry Standard Certifications	**Regulatory Model Number**	HSN-I45C-3
	UL	Yes
	CSA	Yes
	FCC Compliance	Yes
	ENERGY STAR®	Certified[1]
	EPEAT®	EPEAT 2.0 Gold[2]
	ICES	Yes
	Australia / NZ A-Tick Compliance	Yes
	CCC	Yes
	Japan VCCI Compliance	Yes
	KCC	Yes
	BSMI	Yes
	CE Marking Compliance	Yes
	MIL STD 810H	Yes, 19 tests
	BNCI or BELUS	Yes
	CIT	Yes
	GOST	Yes
	Saudi Arabian Compliance (ICCP)	Yes
	SABS	Yes

[1]Configurations of the HP ZBook Firefly 16” G9 Mobile Workstation PC that are ENERGY STAR® qualified are identified as HP ZBook Firefly 16” G9 Mobile Workstation PC ENERGY STAR on HP websites and on http://www.energystar.gov.
[2] Based on US EPEAT® registration according to IEEE 1680.1-2018 EPEAT®. Status varies by country. Visit www.epeat.net for more information.

DISPLAYS

16.0 in WUXGA (1920 x 1200) Anti-Glare UWVA LED NTSC NB2X 250 eDP 1.2 w/o PSR 45 bent LCD Panel	**Outline Dimensions** (W x H)	350.380 x 226.170 (max)	
	Active Area	344.678 x 215.424 (typ)	
	Weight	390 (max)	
	Diagonal Size	16	
	Thickness	3.0 / 5.0 (max)	
	Interface	eDP 1.2	
	Surface Treatment	Anti-Glare	
	Touch enabled	No	
	Contrast Ratio	1000:1(typ)	
	Refresh Rate	60 Hz	
	Brightness	250 nits	
	Pixel Resolution	**Pitch**	1920 x 1200 (WUXGA)
		Format	RGB Stripe
	Backlight	WLED	
	Color Gamut Coverage	NTSC 45%	
	Color Depth	6	
	Viewing Angle	UWVA 89/89/89/89	
	Low Blue Light	No	
	Power Consumption (W, EBL@ 150nits max/ 200nits max)	2.70 (max) / 2.40 (max)	

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

16.0 in WUXGA (1920 x 1200) Anti-Glare UWVA LED NTSC NB2X 250 TOP eDP 1.2 w/o PSR 45 bent LCD Panel	**Outline Dimensions** (W x H)	350.680 x 226.470 (max)	
	Active Area	344.680 x 215.420 (typ)	
	Weight	400 (max)	
	Diagonal Size	16	
	Thickness	3.0 / 5.0 (max)	
	Interface	eDP 1.2	
	Surface Treatment	Anti-Glare	
	Touch enabled	Yes	
	Contrast Ratio	1000:1(typ)	
	Refresh Rate	60 Hz	
	Brightness	250 nits	
	Pixel Resolution	**Pitch**	1920 x 1200 (WUXGA)
		Format	RGB
	Backlight	WLED	
	Color Gamut Coverage	NTSC 45%	
	Color Depth	8 bits	
	Viewing Angle	UWVA 89/89/89/89	
	Low Blue Light	No	

Technical Specifications – Displays

Power Consumption (W, EBL@ 150nits max/ 200nits max)	2.70 (max) / 2.40 (max)

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

Technical Specifications – Displays

16.0 in WUXGA (1920 x 1200) Anti-Glare UWVA WLED+LBL sRGB NB2X 400 eDP 1.4+PSR2 Low-Power 100 bent LCD Panel	**Outline Dimensions** (W x H)	350.680 x 226.470 (max)	
	Active Area	344.678 x 215.424 (typ)	
	Weight	330 (max)	
	Diagonal Size	16	
	Thickness	2.6 / 4.6 (max)	
	Interface	eDP 1.4	
	Surface Treatment	Anti-Glare	
	Touch enabled	No	
	Contrast Ratio	1000:1(typ)	
	Refresh Rate	60 Hz	
	Brightness	400 nits	
	Pixel Resolution	**Pitch**	1920 x 1200 (WUXGA)
		Format	RGB
	Backlight	WLED	
	Color Gamut Coverage	sRGB 100%	
	Color Depth	8 bits	
	Viewing Angle	UWVA 89/89/89/89	
	Low Blue Light	Yes	
	Power Consumption (W, EBL@ 150nits max/ 200nits max)	1.60 (max) / 1.95 (max)	

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

16.0 in WUXGA (1920 x 1200) Anti-Glare UWVA WLED+LBL sRGB NB2Y 1000 eDP 1.3+PSR 100 PrivacyG4 Plus bent LCD Panel	**Outline Dimensions (W x H)**	349.980 x 225.420 (max)	
	Active Area	344.680 x 215.420 (typ)	
	Weight	310 (max)	
	Diagonal Size	16	
	Thickness	2.2 / 3.9 (max)	
	Interface	eDP 1.3	
	Surface Treatment	Anti-Glare	
	Touch Enabled	No	
	Contrast Ratio	1500:1 (typ)	
	Refresh Rate	60 Hz	
	Brightness	1000 nits	
	Pixel Resolution	**Pitch**	1920 x 1200 (WUXGA)
		Format	RGB
	Backlight	WLED	
	Color Gamut Coverage	sRGB 100%	
	Color Depth	8 bits	
	Viewing Angle	UWVA 85/85/85/85	

Technical Specifications – Displays

Low Blue Light	Yes
Power Consumption (W, EBL@ 150nits max/ 200nits max)	N/A

*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

SSD 256GB 2280 PCIe-4x4 NVMe Three Layer Cell	**Form Factor**	M.2 2280	
	Capacity	256GB	
	NAND Type	TLC	
	Height	0.09 in (2.3 mm)	
	Width	0.87 in (22 mm)	
	Weight	0.02 lb (10 g)	
	Interface	PCIe NVMe Gen4X4	
	Performance	**Maximum Sequential Read**	**Maximum Sequential Write**
		4000 MB/s ±20%	2000 MB/s ±20%
	Logical Blocks	500,118,192	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	
	Features	Pyrite 2.0; TRIM; L1.2	
		Note: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35 GB (for Windows 10) is reserved for system recovery software.	
SSD 512GB 2280 PCIe-4x4 NVMe Three Layer Cell	**Form Factor**	M.2 2280	
	Capacity	512GB	
	NAND Type	TLC	
	Height	0.09 in (2.3 mm)	
	Width	0.87 in (22 mm)	
	Weight	0.02 lb (10 g)	
	Interface	PCIe NVMe Gen4X4	
	Performance	**Maximum Sequential Read**	**Maximum Sequential Write**
		6400 MB/s ±20%	3500 MB/s ±20%
	Logical Blocks	1,000,215,215	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	
	Features	Pyrite 2.0; TRIM; L1.2	
		Note: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35 GB (for Windows 10) is reserved for system recovery software.	
SSD 1TB 2280 PCIe-4x4 NVMe Three Layer Cell	**Form Factor**	M.2 2280	
	Capacity	1TB	
	NAND Type	TLC	
	Height	0.09 in (2.3 mm)	
	Width	0.87 in (22 mm)	
	Weight	0.02 lb (10 g)	
	Interface	PCIe NVMe Gen4X4	
	Performance	**Maximum Sequential Read**	**Maximum Sequential Write**
		6400 MB/s ±20%	5000 MB/s ±20%
	Logical Blocks	2,000,409,264	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	
	Features	Pyrite 2.0; TRIM; L1.2	

Technical Specifications – Storage

		Note: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35 GB (for Windows 10) is reserved for system recovery software.	
SSD 2TB 2280 PCIe-4x4 NVMe Three Layer Cell	**Form Factor**	M.2 2280	
	Capacity	2TB	
	NAND Type	TLC	
	Height	0.09 in (2.3 mm)	
	Width	0.87 in (22 mm)	
	Weight	0.02 lb (10 g)	
	Interface	PCIe NVMe Gen4X4	
	Performance	**Maximum Sequential Read**	**Maximum Sequential Write**
		6400 MB/s ±20%	5000 MB/s ±20%
	Logical Blocks	4,000,797,360	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	
	Features	Pyrite 2.0; TRIM; L1.2	
		Note: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35 GB (for Windows 10) is reserved for system recovery software.	
256GB PCIe-4x4 2280 NVME Self Encrypted OPAL2 Three Layer Cell Solid State Drive	Form Factor	M.2 2280	
	Capacity	256GB	
	NAND Type	TLC	
	Height	0.09 in (2.3 mm)	
	Width	0.87 in (22 mm)	
	Weight	0.02 lb (10 g)	
	Interface	PCIe NVMe Gen4X4	
	Performance	**Maximum Sequential Read**	**Maximum Sequential Write**
		4000 MB/s ±20%	2000 MB/s ±20%
	Logical Blocks	500,118,192	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	
	Features	TCG Opal 2.0; TRIM; L1.2	
		Note: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35 GB (for Windows 10) 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	
	Performance	**Maximum Sequential Read**	**Maximum Sequential Write**
		6400 MB/s ±20%	3500 MB/s ±20%
	Logical Blocks	1,000,215,215	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	
	Features	TCG Opal 2.0; TRIM; L1.2	

Technical Specifications – Storage

		Note: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35 GB (for Windows 10) is reserved for system recovery software.
SSD 256GB 2280 PCIe NVMe Value	**Form Factor**	M.2 2280
	Capacity	256 GB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen3X4
	Performance	**Maximum Sequential Read** / **Maximum Sequential Write**
		1500 MB/s ±20% / 750 MB/s ±20%
	Logical Blocks	500,118,192
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	Pyrite 2.0; TRIM; L1.2
		Note: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35 GB (for Windows 10) is reserved for system recovery software.
SSD 512GB 2280 PCIe NVMe Value	**Form Factor**	M.2 2280
	Capacity	512 GB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen3X4
	Performance	**Maximum Sequential Read** / **Maximum Sequential Write**
		1500 MB/s ±20% / 750 MB/s ±20%
	Logical Blocks	1,000,215,215
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	Pyrite 2.0; TRIM; L1.2
		Note: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35 GB (for Windows 10) is reserved for system recovery software.

Technical Specifications – Networking

NETWORKING/COMMUNICATION

Intel AX211 Wi-Fi 6E +BT 5.2 M.2 160MHz CNVi World-Wide WLAN vPro	**Wireless LAN Standards**	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11ac IEEE 802.11ax IEEE 802.11d IEEE 802.11e IEEE 802.11h IEEE 802.11i IEEE 802.11k IEEE 802.11r IEEE 802.11v
	Interoperability	Wi-Fi certified
	Frequency Band	802.11b/g/n/ax • 2.402 – 2.482 GHz 802.11a/n/ac/ax • 4.9 – 4.95 GHz (Japan) • 5.15 – 5.25 GHz • 5.25 – 5.35 GHz • 5.47 – 5.725 GHz • 5.825 – 5.850 GHz • 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[1]	• 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

Output Power[2]	• 802.11b : +17dBm minimum • 802.11g : +16dBm minimum • 802.11a : +17dBm minimum • 802.11n HT20(2.4GHz) : +14dBm minimum • 802.11n HT40(2.4GHz) : +13dBm minimum • 802.11n HT20(5GHz) : +14dBm minimum • 802.11n HT40(5GHz) : +13dBm minimum • 802.11ac VHT80(5GHz) : +10dBm minimum • 802.11ac VHT160(5GHz) : +10dBm minimum • 802.11ax HE40(2.4GHz) : +12dBm minimum • 802.11ax HE80(5GHz) : +10dBm minimum • 802.11ax HE160(5GHz) : +10dBm minimum
Power Consumption	• Transmit mode 2.0 W • Receive mode 1.6 W • Idle mode (PSP) 180 mW (WLAN Associated) • Idle mode 50 mW (WLAN unassociated) • Connected Standby 10mW • Radio disabled 8 mW
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity[3]	•802.11b, 1Mbps : -93.5dBm maximum •802.11b, 11Mbps : -84dBm maximum • 802.11a/g, 6Mbps : -86dBm maximum • 802.11a/g, 54Mbps : -72dBm maximum • 802.11n, MCS07 : -67dBm maximum • 802.11n, MCS15 : -64dBm maximum • 802.11ac, MCS0(VHT80) : -84dBm maximum • 802.11ac, MCS9(VHT80) : -59dBm maximum • 802.11ac, MCS9(VHT160) : -58.5dBm maximum •802.11ax, MCS11(HE40): -57dBm maximum •802.11ax, MCS11(HE80): -54dBm maximum •802.11ax, MCS11(HE160): -53.5dBm maximum
Antenna Type	High efficiency antenna with spatial diversity, mounted in the display enclosure Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications
Form Factor	PCI-Express M.2 MiniCard
Dimensions	1. Type 2230 : 2.3 x 22.0 x 30.0 mm 2. Type 1216: 1.67 x 12.0 x 16.0 mm
Weight	1. Type 2230 : 2.8g 2. Type 1216: 1.3g
Operating Voltage	3.3v +/- 9%
Temperature	Operating 14° to 158° F (-10° to 70° C) Non-operating -40° to 176° F (-40° to 80° C)
Humidity	Operating 10% to 90% (non-condensing) Non-operating 5% to 95% (non-condensing)
Altitude	Operating 0 to 10,000 ft (3,048 m) Non-operating 0 to 50,000 ft (15,240 m)
LED Activity	LED Amber – Radio Off; LED Off – Radio ON

Technical Specifications – Networking

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

* 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.

Intel AX211 Wi-Fi 6E +BT 5.2 M.2 160MHz CNVi World-Wide WLAN non-vPro	**Wireless LAN Standards**	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11ac IEEE 802.11ax IEEE 802.11d IEEE 802.11e IEEE 802.11h IEEE 802.11i IEEE 802.11k IEEE 802.11r IEEE 802.11v
	Interoperability	Wi-Fi certified
	Frequency Band	802.11b/g/n/ax • 2.402 – 2.482 GHz 802.11a/n/ac/ax • 4.9 – 4.95 GHz (Japan) • 5.15 – 5.25 GHz • 5.25 – 5.35 GHz • 5.47 – 5.725 GHz • 5.825 – 5.850 GHz • 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[1]	• IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware • 802.1x authentication • WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. • WPA2 certification • WPA3 certification • IEEE 802.11i • WAPI
	Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
	Roaming	IEEE 802.11 compliant roaming between access points
	Output Power[2]	• 802.11b : +17dBm minimum • 802.11g : +16dBm minimum

Technical Specifications – Networking

	• 802.11a : +17dBm minimum • 802.11n HT20(2.4GHz) : +14dBm minimum • 802.11n HT40(2.4GHz) : +13dBm minimum • 802.11n HT20(5GHz) : +14dBm minimum • 802.11n HT40(5GHz) : +13dBm minimum • 802.11ac VHT80(5GHz) : +10dBm minimum • 802.11ac VHT160(5GHz) : +10dBm minimum • 802.11ax HE40(2.4GHz) : +12dBm minimum • 802.11ax HE80(5GHz) : +10dBm minimum • 802.11ax HE160(5GHz) : +10dBm minimum
Power Consumption	• Transmit mode 2.0 W • Receive mode 1.6 W • Idle mode (PSP) 180 mW (WLAN Associated) • Idle mode 50 mW (WLAN unassociated) • Connected Standby 10mW • Radio disabled 8 mW
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity[3]	•802.11b, 1Mbps : -93.5dBm maximum •802.11b, 11Mbps : -84dBm maximum • 802.11a/g, 6Mbps : -86dBm maximum • 802.11a/g, 54Mbps : -72dBm maximum • 802.11n, MCS07 : -67dBm maximum • 802.11n, MCS15 : -64dBm maximum • 802.11ac, MCS0(VHT80) : -84dBm maximum • 802.11ac, MCS9(VHT80) : -59dBm maximum • 802.11ac, MCS9(VHT160) : -58.5dBm maximum •802.11ax, MCS11(HE40): -57dBm maximum •802.11ax, MCS11(HE80): -54dBm maximum •802.11ax, MCS11(HE160): -53.5dBm maximum
Antenna Type	High efficiency antenna with spatial diversity, mounted in the display enclosure Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications
Form Factor	PCI-Express M.2 MiniCard
Dimensions	1. Type 2230 : 2.3 x 22.0 x 30.0 mm 2. Type 1216: 1.67 x 12.0 x 16.0 mm
Weight	1. Type 2230 : 2.8g 2. Type 1216: 1.3g
Operating Voltage	3.3v +/- 9%
Temperature	Operating 14° to 158° F (-10° to 70° C) Non-operating -40° to 176° F (-40° to 80° C)
Humidity	Operating 10% to 90% (non-condensing) Non-operating 5% to 95% (non-condensing)
Altitude	Operating Non-operating 0 to 10,000 ft (3,048 m) 0 to 50,000 ft (15,240 m)
LED Activity	LED Amber – Radio OFF; LED White – Radio ON
HP Integrated Module with Bluetooth 4.0/4.1/4.2/5.0/5.1/5.2 Wireless Technology	
Frequency Band	2402 to 2480 MHz

Technical Specifications – Networking

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

* 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.

Technical Specifications – Networking

Intel® 5G Solution 5000

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

Technical Specifications – Networking

	n78: 3300 to 3800 MHz (UL/DL) n79: 4400 to 5000 MHz (UL/DL)
Wireless protocol standards	5GNR Air Interface 3GPP Rel15 5G NR sub-6 LTE Rel14 20 layers and 2 Gbps downlink (DL) throughput – 4 × 4 MIMO across 5x CA 200 Mbps/uplink (UL) throughput – 40 MHz ULCA and 256 QAM WCDMA R99, 3GPP Release 5, 6, 7 and 8 UMTS Specification
GPS	Standalone, A-GPS (MS-A, MS-B)
GPS bands	GPS: L1 (1575.42MHz) GLONASS: L1 (1602MHz) BeidouB1(1561.098MHz) Galileo E1 (1575.42) QZSS(1575.42 MHz)
Maximum data rates	SA 5G/NR sub-6 Peak: DL4.67Gbps/ UL 1.25Gbps 5G NSA sub 6G : DL: 3.8 Gbps/UL 700Mbps LTE: ue-CategoryDL 19, (DL : 1.6 Gbps) ue-CategoryUL 13 , (UL: 150Mbps) DC-HSPA+: 42 Mbps (Download), 11.5 Mbps (Upload)
Maximum output power	LTE: 23 dBm in all band except B41 LTE B41 HPUE = 26dBm NR: 23 dBm in all band except n41, n77, n78 and n79 LTE n41, n77, n78 and n79 HPUE = 26dBm HSPA+: 23.5 dBm
Maximum power consumption	5G Sub 6 : 2500 mA LTE: 1,300 mA (peak); 1100 mA (average) HSPA+: 1,100 mA (peak); 800 mA (average)
Form Factor	M.2, 3042-S3 Key B
Weight	8 g
Dimensions (Length x Width x Thickness)	52 mm × 30 mm × 2.6 mm

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

Intel® XMM™ 7560 R+ LTE-Advanced Pro

Technology/Operating bands	FDD LTE: 2100 (Band 1), 1900 (Band 2), 1800 (Band 3), 1700/2100 (Band 4), 850 (Band 5), 2600 (Band 7), 900 (Band 8), 700 (Band 12 lower), 700 (Band 13 upper), 700 (Band 14 upper), 700 (Band 17 lower), 850 (Band 18 lower), 850 (Band 19 upper), 800 (Band 20), 1900 (Band 25), 850 (Band 26), 700 (Band 28), 700 (Band 29 RX only), 2300 (Band 30), 1700/2100 (Band 66), 600 (band 71). TDD LTE: 2100 (Band 34), 2600 (Band 38), 1900 (Band 39), 2400 (Band 40), 2500 (Band 41), 3500 (Band 42), 3700 (Band 43), 3700 (band 48), 5200 (Band 46 RX only) MHz; HSPA+: 2100 (Band 1), 1900 (Band 2), 1700/2100 (Band 4), 850 (Band 5), 900 (Band 8) MHz

Technical Specifications – Networking

Wireless protocol standards	3GPP Release 12 LTE Specification DL-CAT.16, DL 100MHz BW throughput up to 978Mbps; UL-CAT.13 40MHz throughput up to 150Mbps WCDMA R99, 3GPP Release 5, 6, 7 and 8 UMTS Specification
GPS	Standalone GPS/Beidou/Glonass, A-GPS (MS-A, MS-B)
GPS Bands	1575.42 MHz ± 1.023 MHz, GLONASS 1596-1607MHz, Beidou 1561.098 MHz
Maximum Data Rates	LTE: 978 Mbps (Download), 150 Mbps (Upload) DC-HSPA+: 42 Mbps (Download), 5.76 Mbps (Upload) HSPA+: 21Mbps (Download), 5.76 Mbps (Upload)
Maximum Output Power	LTE: 23 dBm in all band except B41 LTE B41 HPUE = 26dBm HSPA+: 23.5 dBm
Maximum Power Consumption	LTE: 1,200 mA (peak); 900 mA (average) HSPA+: 1,100 mA (peak); 800 mA (average)
Form Factor	M.2, 3042-S3 Key B
Weight	6 g
Dimensions (Length x Width x Thickness)	42 x 30 x 2.3 mm

*4G LTE module is optional, must be configured at the factory, requires activation and separately purchased service contract. Check with service provider for coverage and availability in your area. Connection, upload and download speeds will vary due to network, location, environment, network conditions, and other factors. 4G LTE not available on all products, in all regions.

Near Field Communications Controller (optional)

Dimensions (L x W x H)	Module 25 mm by 10 mm by 2.0 mm
Chipset	NPC100
System interface	I2C
NFC RF standards	ISO/IEC 14443 A ISO/IEC 14443 B ISO/IEC 15693 ISO/IEC 18092 ECMA-340 NFCIP-1 Target and Initiator ECMA-320 NFCIP-2
NFC Forum Support	Tag Type 1, Type 2, Type3 and Type 4, NFCIP-1 and NFCIP-2
Reader (PCD-VCD) Mode(1)	ISO/IEC 14443 A ISO/IEC 14443 B ISO/IEC 15693 MIFARE 1K MIFARE 4K MIFARE DESFire FeliCa Jewel and Topaz cards
Card Emulation (PICC-VICC) Mode(1)	ISO/IEC 14443 A ISO/IEC 14443 B and B’ MIFARE FeliCa
Frequency	13.56 MHz
NFC Modes Supported	Reader/Writer, Peer-to-Peer
Raw RF Data Rates	106, 212, 424, 848 kbps

Technical Specifications – Networking

Operating temperature	0°C to 70°C		
Storage temperature	-20°C to 125°C		
Humidity	10-90% operating 5-95% non-operating		
Supply Operating voltage	4.35 to 5.25 Volts		
I/O Voltage	1.8V or 3.3V		
Power Consumption	**Booster enable, VCC_BOOST = 5V) Mode Power Consumption, Typical**	VBAT= 3.3V, **Polling**	7.3 mA
		Detected Test Tag Type 1	Total 283.8 mA Net Module 236.8 mA
		Detected Test Tag Type 2	Total 288.8 mA Net Module 241.8 mA
		Detected Test Tag Type 3	Total 287.7 mA Net Module 240.7 mA
		Detected Test Tag Type 4	Total 282.3 mA Net Module 235.3 mA
Antenna	Antenna connector, 0.5mm pitch, 7 connector FPC. Antenna matching is external to module.		

AUDIO

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

FINGERPRINT READER

Sensor vendor	Synaptics FS7604
Sensor type	Capacitive
DPI resolution	363DPI
Scan area	7.4x6mm sensor area
False Rejection Rate	<1%
False Acceptance Rate	1:50K FAR
Mobile Voltage Operation	Mobile Voltage Operation: 3.0V to 3.6V
Operating Temperature	Operating Temperature: 0~60°C

Technical Specifications – Networking

Current Consumption Image	Current Consumption Image: 100mA Max
Low Latency Wait For Finger	Low Latency Wait For Finger: 260 uA
Capture Rate	Capture Rate: <30msec per image
ESD Resistance	ESD Resistance: IEC 61000-4-2 4B (+/-15KV)
Detection Matrix	Detection Matrix: 363 dpi / 7.4x6mm sensor area

POWER

AC Adapter 65 Watt nPFC Slim USB type C Straight 1.8m	**Dimensions**	88x53.5x21mm	
	Weight	unit: 220g +/- 10g	
	Input	**Input Efficiency**	81.5% min at 115 Vac/ 230Vac @ 5V/3A 86.7% min at 115 Vac/ 230Vac @ 9V/3A 88% min at 115 Vac/ 230Vac @ 12V/5A 89% min at 115 Vac/ 230Vac @ 15V/4.33A 89% min at 115 Vac/ 230Vac @ 20V/3.25A
		Input frequency range	47 ~ 63 Hz
		Input AC current	1.6 A at 90 VAC and maximum load
	Output	**Output power**	65W
		DC output	5V/9V/12V/15V/20V
		Hold-up time	5ms at 115 Vac input
		Output current limit	<8.0A
	Connector	C6	
	Environmental Design	**Operating temperature**	32° to 95° F (0° to 35° C)
		Non-operating (storage) temperature	-4° to 185° F (-20° to 85° C)
		Altitude	0 to 16,400 ft (0 to 5000m)
		Humidity	5% to 95%
		Storage Humidity	5% to 95%
	EMI and Safety Certifications	Eg: *CE Mark - full compliance with LVD and EMC directives * Worldwide safety standards - IEC60950-1 and/or IEC62368-1, EN60950-1 and/or EN62368-1, UL60950-1 and/or UL62368-1 , Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC, NOM-001 NYCE. * MTBF - over 200,000 hours at 25°C ambient condition.	

Technical Specifications – Power

AC Adapter 65 Watt nPFC Standard USB type C Straight 1.8m	**Dimensions**	90.0mm*51.0mm*28.5mm	
	Weight	250g +/-10%	
	Input	**Input Efficiency**	Average Efficiency of 25%, 50%, 75%, 100% load condition with 115Vac/230Vac Spec: 5V : 81.5% 9V : 86.7% 12V : 88% 15V : 88% 20V : 89%
		Input frequency range	47 ~ 63 Hz
		Input AC current	Max. 1.6 A at 90 Vac
	Output	**Output power**	5V/15W 9V/27W 12V/60W 15V/60W 20V/65W
		DC output	5V/9V/12V/15V/20V
		Hold-up time	5ms at 115 Vac input
		Output current limit	<8.0A
	Connector	C6	
	Environmental Design	**Operating temperature**	32° to 95° F (0° to 35° C)
		Non-operating (storage) temperature	-4° to 185° F (-20° to 85° C)
		Altitude	0 to 16,400 ft (0 to 5000m)
		Humidity	20% to 95%
		Storage Humidity	10% to 95%
	EMI and Safety Certifications	Eg: *CE Mark - full compliance with LVD and EMC directives * Worldwide safety standards - IEC60950-1 and/or IEC62368-1, EN60950-1 and/or EN62368-1, UL60950-1 and/or UL62368-1 , Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC, NOM-001 NYCE. * MTBF - over 200,000 hours at 25°C ambient condition.	
HP 100W+10W Slim USB-C+USB-A Straight AC Power Adapter Kenting	**Dimensions**	136x60x22mm	
	Weight	unit: 365g +/- 10g	
	Input	**Input Efficiency**	Average Efficiency of 25%, 50%, 75%, 100% load condition with 115Vac/230Vac Spec: 5VusbA : 73.62% 5VusbC : 81.5% 9V : 86.7% 12V : 88% 15V : 89% 20V : 89% > 90% efficiency at 100W (20V/5A) output condition
		Input frequency range	47 ~ 63 Hz
		Input AC current	1.6 A at 90 VAC and maximum load

Technical Specifications – Power

	Output	**Output power**	110W
		DC output	5VusbA/5V/9V/12V/15V/20V
		Hold-up time	5ms at 115 Vac input
		Output current limit	<6.25A
	Connector	C6 USB Type C	
	Environmental Design	**Operating temperature**	32° to 95° F (0° to 35° C)
		Non-operating (storage) temperature	-4° to 185° F (-20° to 85° C)
		Altitude	0 to 16,400 ft (0 to 5000m)
		Humidity	5% to 95%
		Storage Humidity	5% to 95%
	EMI and Safety Certifications	Eg: *CE Mark - full compliance with LVD and EMC directives * Worldwide safety standards - IEC60950-1 and/or IEC62368-1, EN60950-1 and/or EN62368-1, UL60950-1 and/or UL62368-1, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC, NOM-001 NYCE. * MTBF - over 200,000 hours at 25°C ambient condition.	
HP 3-cell Long Life Li-Ion (51 WHr)	**Dimensions (H x W x L)**	251.8*70.3*6.82mm (9.91*2.77*0.27 inch)	
	Weight	0.229kg +/- 10g(0.505 lb)	
	Cells/Type	3cell Lithium-Ion Polymer cell / 566075	
	Energy	Voltage	11.58V
		Amp-hour capacity	4.431Ah
		Watt-hour capacity	51.3Wh
	Temperature	Operating (Charging)	32˚ to 113˚ F (0˚ to 45˚ C)
		Operating (Discharging)	14˚ to 140˚ F (-10˚ to 60˚ C)
	Fuel Gauge LED	NA	
	Warranty	Follow product spec	
	Optional Travel Battery Available	No	
	*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.		
HP 6-cell Long Life Li-Ion (76WHr)	**Dimensions (H x W x L)**	303.2*90.1*6.82mm(11.94*3.55*0.27 inch)	
	Weight	0.357kg +/- 10g(0.787 lb)	
	Cells/Type	6cell Lithium-Ion Polymer cell / 564975	
	Energy	Voltage	11.58V
		Amp-hour capacity	6.565Ah
		Watt-hour capacity	76Wh
	Temperature	Operating (Charging)	32˚ to 113˚ F (0˚ to 45˚ C)
		Operating (Discharging)	14˚ to 140˚ F (-10˚ to 60˚ C)
	Fuel Gauge LED	NA	

Technical Specifications – Power

Warranty	Follow product spec
Optional Travel Battery Available	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.

ENVIRONMENTAL DATA

Eco-Label Certifications & declarations

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

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

Sustainable Impact Specifications

- Ocean-bound plastic in Speaker Box[1]
- 35% post-consumer recycled plastic[2]
- External Power Supply 90% Efficiency
- Low halogen[3]
- Outside Box and corrugated cushions are 100% sustainably sourced and recyclable[4]
- Molded Paper Pulp Cushion inside box is 100% sustainably sourced and recyclable[5]
- 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)	5.71 W	6.14 W	5.89 W
Normal Operation (Long idle)	1.14 W	1.28 W	1.23 W
Sleep	1.14 W	1.28 W	1.23 W
Off	0.42 W	0.44 W	0.42 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)	19.5 BTU/hr	21 BTU/hr	20.1 BTU/hr
Normal Operation (Long idle)	3.9 BTU/hr	4.4 BTU/hr	4.2 BTU/hr
Sleep	3.9 BTU/hr	4.4 BTU/hr	4.2 BTU/hr
Off	1.4 BTU/hr	1.5 BTU/hr	1.4 BTU/hr

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

Technical Specifications – Environmental

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)	Sound Power (L_{WAd}, bels)	Sound Pressure (L_{pAm}, decibels)
Typically Configured – Idle	2.3	16.1
Fixed Disk – Random writes	2.5	17.8
Optical Drive – Sequential reads	3.2	22.9

Longevity and Upgrading

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

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

Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC.
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold level, see www.epeat.net
- Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.
- This product is 3.5% recycle-able when properly disposed of at end of life.

Packaging Materials

External:	PAPER/Corrugated	287 g
	PAPER/Paperboard	72 g
	PAPER/Paper	4 g
	PAPER/Molded Pulp	162 g
Internal:	PLASTIC/Polyethylene low density - LDPE	13 g

The plastic packaging material contains at least 100% recycled content.

The corrugated paper packaging materials contains at least 35.6% recycled content.

RoHS Compliance

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

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

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

To obtain a copy of the HP RoHS Compliance Statement, see 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):

- 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

[1]Percentage of ocean-bound plastic contained in each component varies by product
[2]Recycled plastic content percentage is based on the definition set in the IEEE 1680.1-2018 standard.
[3]External power supplies, WWAN modules, power cords, cables and peripherals excluded.
[4]100% outer box packaging and corrugated cushions made from sustainably sourced certified and recycled fibers.
[5]Fiber cushions made from 100% recycled wood fiber and organic materials.

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

Type	Description	Part #
Audio/Video	HP Wired USB-A Stereo Headset	428K6AA
	HP Wired 3.5mm Stereo Headset	428K7AA
Cases	HP Executive 15.6 Backpack	6KD07AA
	HP Executive 15.6 Top Load	6KD06AA
	HP Prelude G2 15.6 Backpack	1E7D6AA
	HP Prelude G2 15.6 Top Load	1E7D7AA
	HP Prelude Pro Recycled 15.6Backpack	1X644AA
	HP Prelude Pro Recycled 15.6 Top Load	1X645AA
	HP Renew Business 17.3 Laptop Backpack	3E2U5AA
	HP Renew Business 17.3 Laptop Bag	3E2U6AA
	HP Renew Business 15.6 Laptop Bag	3E5F8AA
Docking station	HP 120W G2 Dock	2UK37AA
	HP 120W G2 Dock w/Audio	3YE87AA
	HP 230W G2 Dock w/Combo Cable	3TR87AA
	HP USB-C 120W G5 Dock	5TW10AA
	HP USB-C/A 120W G2 Universal Dock	5TW13AA
Hub	HP USB-C Mini Dock	1PM64AA
	HP Universal USB-C Multiport Hub	50H55AA
	HP USB-C Travel Dock G2	7PJ38AA
	HP USB-C to USB-A Hub	Z6A00AA
Adapter	HP USB-C to RJ45 Adapter G2	4Z527AA
	HP USB 3.0 to Gigabit RJ45 Adapter G2	4Z7Z7AA
	HP HDMI to DVI Adapter	F5A28AA
	HP HDMI to VGA Adapter	H4F02AA
	HP USB to Gigabit RJ45 Adapter	N7P47AA
	HP USB-C to DisplayPort Adapter	N9K78AA
	HP USB-C to HDMI 2.0 Adapter	1WC36AA
	HP USB-C to RJ45 Adapter	V7W66AA
	HP USB-C to USB 3.0 Adapter	N2Z63AA
	HP USB-C to VGA Adapter	N9K76AA
Keyboard/Combo	HP 975 USB+BT Dual-Mode Wireless Keyboard	3Z726AA
	HP 455 Programmable Wireless Keyboard	4R177AA
	HP 125 WD USB Keyboard	266C9AA
	HP 320K WD USB Keyboard	9SR37AA
	HP 655 Wireless Keyboard and Mouse Combo	4R009AA
	HP 225 Wired Mouse and Keyboard Combo	286J4AA
	HP 235 Wireless Mouse and Keyboard Combo	1Y4D0AA
	HP Slim Wireless Keyboard and Mouse	T6L04AA

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

	HP Wired Desktop 320MK Mouse and Keyboard	9SR36AA
	HP Wireless Rechargeable 950MK Mouse and Keyboard	3M165AA
Mouse	HP USB Premium Wireless Mouse	1JR31AA
	HP 435 Multi-Device Wireless Mouse	3B4Q5AA
	HP 125 USB-A Wired Mouse	265A9AA
	HP 128 USB Laser Wired Mouse	265D9AA
	HP 320M USB-A Wired Mouse	9VA80AA
	HP Creator USB-A+Bluetooth 935 Wireless Mouse Black	1D0K8AA
	HP USB-A+Bluetooth Multi-Device 635 Wireless Mouse Black	1D0K2AA
	HP USB-A+Bluetooth Travel Bluetooth Mouse	6SP30AA
Power	HP 65W USB-C Auto AC Power Adapter	5TQ76AA
	HP 45W USB-C G2 AC Power Adapter	1HE07AA
	HP 45W USB-C LC AC Power Adapter	1MZ01AA
	HP 65W USB-C AC Power Adapter	1HE08AA
	HP 65W USB-C LC AC Power Adapter	1P3K6AA
	HP 65W USB-C Travel Slim AC Power Adapter	3PN48AA
Commodity	HP USB DVD-Writer EXT ODD	F2B56AA
	HP Nano Keyed Cable Lock	1AJ39AA
	HP Nano Master Keyed Cable Lock	1AJ40AA
	HP SureKey Standard/Nano/Wedge Cable Lock	6UW42AA
	HP 16GB (1x16GB) DDR4 3200 1.2v SODIMM Memory	286J1AA
	HP 8GB (1x8GB) DDR4 3200 1.2v SODIMM Memory	286H8AA

Date of change:	Version History:		Description of change:
May 20, 2022	From v1 to v2	Changed	POWER section
May 31, 2022	From v2 to v3	Changed	DRIVE CONTROLLERS section
June 29, 2022	From v3 to v4	Changed	SOFTWARE AND SECURITY section