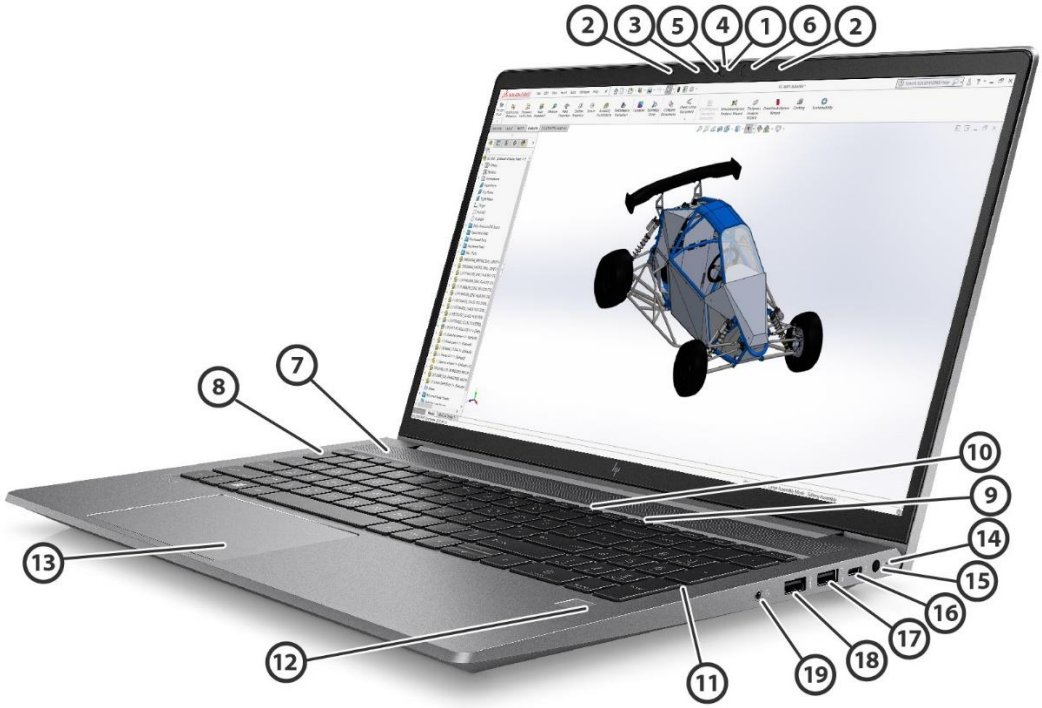
Overview

HP ZBook Power 15.6” G9 Mobile Workstation PC

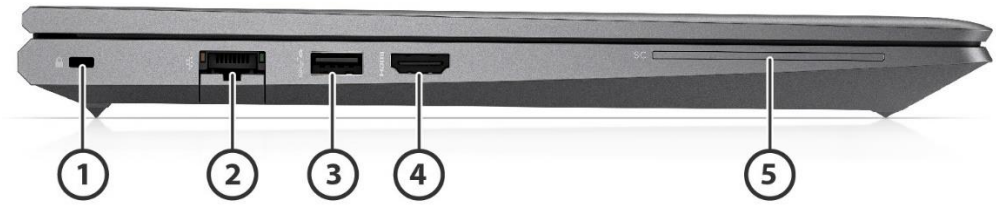


1. Ambient Light Sensor
2. Internal Microphones (optional)
3. Camera LEDs (optional)
4. Camera LEDs (optional)
5. IR Camera (optional)
6. Camera Cover
7. Speakers
8. Function Keys (changes with configured options)
9. Power button
10. HP Programmable Key

Right

11. Numeric Keypad
12. Fingerprint Sensor (optional)
13. Touchpad
14. Indicator LEDs: Power light, Wireless light, Storage usage light
15. Power connector
16. USB Type-C® with Thunderbolt™ 4
17. USB 3.2 Gen 1
18. USB 3.2 Gen 1
19. Audio Combo Jack

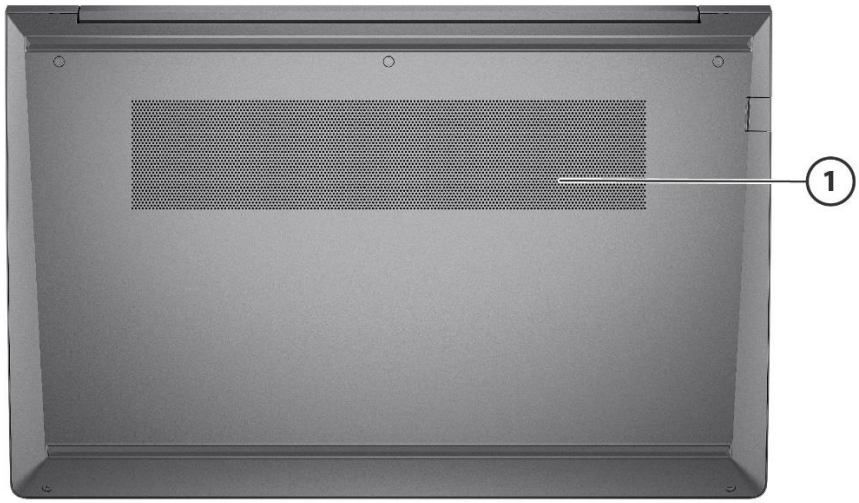
Overview



Left

1. Nano Security lock slot
2. RJ-45
3. USB 3.2 Gen 1 Charging Port
4. HDMI port
5. Smart Card Reader (optional)

Overview



Bottom

1. Fan Venting

Overview

At A Glance

- Work without compromising on performance or security with Windows 10 Pro and HP’s collaboration and connectivity technology.
- NVIDIA Professional GPUs provide the interactive visual workspace you need to do great work wherever, whenever. With twice the CUDA cores as previous generations, NVIDIA Professional GPUs deliver the performance professionals need to work from anywhere.
- Take multitasking to the next level with 12th gen Intel® Core™ i9 processors built to handle multithreaded apps like Adobe Premiere Pro®, and with fast clock speeds to boost your speed on single threaded apps like Autodesk 3ds Max.
- Strenuously tested to meet ISV certification and deliver superb performance and support with leading software providers, including Autodesk and Adobe®.
- Have confidence with HP's and defend against firmware and malware attacks with HP Sure Start and Sure Sense.
- Built with the environment in mind, this ZBook includes recycled ocean-bound plastics, plastic-free packaging, and ultraefficient power consumption.
- Designed for ultimate durability, this ZBook undergoes brutal MIL-STD 810H tests to help ensure this PC keeps rolling through your workday.
- Plug in to greater connectivity at your desktop with the HP Thunderbolt™ Dock for lightning fast Thunderbolt™ 4 transfers and the flexibility to run up to 1 external 4K and 1 external 5K.
- Work without limits in any location with up to 8TB of local PCIe storage.

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 Home - HP recommends Windows 11 Pro [2]
Windows 11 Home Single Language - HP recommends Windows 11 Pro [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™ i9-12900H with Intel® Iris® Xe Graphics (1.8 GHz E-core base frequency, 2.5 GHz P-core base frequency, up to 3.8 GHz E-core Max Turbo Frequency, up to 5.0 GHz P-core Max Turbo frequency, 24MB L3 cache, 6 P-cores and 8 E-cores, 20 Threads), supports Intel® vPro® Technology [1,2,3,4,5]

12th Generation Intel® Core™ i9-12900HK with Intel® Iris® Xe Graphics (1.8 GHz E-core base frequency, 2.5 GHz P-core base frequency, up to 3.8 GHz E-core Max Turbo Frequency, up to 5.0 GHz P-core Max Turbo frequency, 24MB L3 cache, 6 P-cores and 8 E-cores, 20 Threads) [1,2,3,4]

12th Generation Intel® Core™ i7-12800H with Intel® Iris® Xe Graphics (1.8 GHz E-core base frequency, 2.4 GHz P-core base frequency, up to 3.7 GHz E-core Max Turbo Frequency, up to 4.8 GHz P-core Max Turbo frequency, 24MB L3 cache, 6 P-cores and 8 E-cores, 20 Threads), supports Intel® vPro® Technology [1,2,3,4,5]

12th Generation Intel® Core™ i7-12700H with Intel® Iris® Xe Graphics (1.7 GHz E-core base frequency, 2.3 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, 24MB L3 cache, 6 P-cores and 8 E-cores, 20 Threads), supports Intel® vPro® Technology [1,2,3,4,5]

12th Generation Intel® Core™ i5-12600H with Intel® Iris® Xe Graphics (2.0 GHz E-core base frequency, 2.7 GHz P-core base frequency, up to 3.3 GHz E-core Max Turbo Frequency, up to 4.5 GHz P-core Max Turbo frequency, 18MB L3 cache, 4 P-cores and 8 E-cores, 16 Threads), supports Intel® vPro® Technology[1,2,3,4,5]

12th Generation Intel® Core™ i5-12500H with Intel® Iris® Xe Graphics (1.8 GHz E-core base frequency, 2.5 GHz P-core base frequency, up to 3.3 GHz E-core Max Turbo Frequency, up to 4.5 GHz P-core Max Turbo frequency, 18MB L3 cache, 4 P-cores and 8 E-cores, 16 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.

Features

[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

INTEL® CORE™ I5 WITH VPRO/CORE I7 WITH VPRO TECHNOLOGY CAPABLE

Intel® Core™ i5 with vPro®, Core™ i7 with vPro®, Core™ i9 with vPro® technology is a selectable feature that is available on units configured with select processors, a qualified Intel® WLAN module and a preinstalled Windows® operating system. It provides advances in remote manageability, security, energy efficient performance, and wireless connectivity. Intel® Active Management Technology (iAMT) offers built-in manageability and proactive security for networked mobile workstations, even when they are powered off* or when the operating system is inoperable. It can help identify threats before they reach the network, isolate infected systems, and update regardless of their power state.[1,2]

[1] Requires a Windows operating system, network hardware and software, connection with a power source, and a direct (non-VPN) corporate network connection which is either cable or wireless LAN.
[2] 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, see data sheet

GRAPHICS

Integrated

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

Discrete

NVIDIA Graphic options:
NVIDIA RTX™ A2000 Laptop GPU (8 GB GDDR6 dedicated) [1,2,3,4,5]
NVIDIA RTX™ A1000 Laptop GPU (4 GB GDDR6 dedicated) [1,2,3,4,5]
NVIDIA T600 Laptop GPU (4 GB GDDR6 dedicated) [1,2,3,4,5]

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

Features

- 15.6 inch FHD (1920x1080) Anti-Glare WLED UWVA 45percent cg 250nits eDP 1.2 w/o PSR bent NWBZ
- 15.6 inch FHD (1920x1080) Anti-Glare WLED UWVA sRGB 100percent cg 400nits eDP 1.4+PSR2 bent LP NWBZ
- 15.6 inch UHD (3840x2160) Anti-Glare WLED UWVA sRGB 100percent cg 400nits eDP 1.4+PSR2 bent LP NB2Y

Touch

- 15.6 inch FHD (1920x1080) Anti-Glare WLED UWVA 45percent cg 250nits eDP 1.2 w/o PSR bent Touch on Panel NWBZ

DisplayPort™ 1.2
HDMI 2.0 Support resolution up to 4K @60 Hz

Displays support
Supports dual display through the 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]Actual brightness will be lower with touchscreen.

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
Technicallimitations	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
Technicallimitations	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*

Max Storage
8TB through two m.2 NVMe drivers

(Up to 2) m.2 storage (NVMe PCIe Gen4 SSDs)

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

* 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)	PCIe® Gen4 x4 lanes NVMe™ Solid State Drive
RAID:	RAID 0/1 is supported (and available from factory)

MEMORY

Maximum Memory
64GB DDR5-4800
Memory
64GB DDR5-4800 (2x32GB)
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
Supports Dual Channel Memory

[1] 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.

Features

NETWORKING/COMMUNICATIONS

LAN[1]

Intel® I219-LM GbE, vPro®
Intel® I219-V GbE, non-vPro®

[1]GbE - The term "10/100/1000" or "Gigabit" Ethernet indicates compatibility with IEEE standard 802.3ab for Gigabit Ethernet, and does not connote actual operating speed of 1 Gb/s. For high-speed transmission, connection to a Gigabit Ethernet server and network infrastructure is required.

WLAN[1]

Intel® AX211 Wi-Fi6E+BT5.2 M.2 1216 160MHz CNVi World-Wide WLAN vPro
Intel® AX211 Wi-Fi6E +BT5.2 M.2 1216 160MHz CNVi World-Wide WLAN non-vPro

[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.

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]

720p HD camera with IR

720p HD camera

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

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

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
F3 - Brightness Down
F4 - Brightness Up
F5 - Audio Mute
F6 - Volume Down
F7 - Volume Up
F8 - Mic Mute
F9 - Blank or Backlit Toggle
F10 - Insert
F11 - Airplane Mode
F12 - HP Command Center
home
end
Power Button (with LED)
delete

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
HP Smart Support[24]
HP Connection Optimizer[10]
HP Mac Address Manager
HP Hotkey Support
HP Support Assistant[1]
HP Notifications
HP Privacy Settings
HP Power Manager
Buy Microsoft Office (Sold separately)

Features

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 beyond version.
[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™.
[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.

Features

[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.
[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.
[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.

Features

POWER

Power Supply

120 W Slim Smart external AC power adapter[3]
150 W Slim Smart external AC power adapter[4]

Battery

HP Long Life 6-cell, 83 Wh Polymer

Power Cord

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

Battery life

Up to 18 hrs

Supports Battery fast charge approximately 50% in 30 minutes (defined under system hibernation and off mode).

[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]Only available with UMA graphics
[4] Only available with discrete graphic options
[5]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[1]
TCO 8.0 Certified
RCTA DO-160G
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.

Features

WEIGHTS & DIMENSIONS

Dimensions (w x d x h)
35.94 x 23.39 x 2.28 cm
14.15 x 9.21 x 0.9 in

Weights*
Starting at 1.9kg (4.16 lb)
Weight varies by configuration and components.
A deck: Anodized Aluminum
B deck: PC-ABS with Talc
C deck: Anodized Aluminum
D deck: Anodized Aluminum
Metal Alloy Hinges

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

PORTS/SLOTS

Left side
1 RJ-45
1 SuperSpeed USB Type-A 5Gbps signaling rate (charging) [USB 3.2 Gen 1 Type A charging]
1 HDMI 2.0
1 smart card reader (optional)
1 Nano Security Lock Slot

Right side
1 power connector
1 Audio Combo Jack
1 USB Type-C® (Thunderbolt™ 4 with USB4™ Type-C® 40Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4, HP Sleep and Charge)
2 SuperSpeed USB Type-A 5Gbps signaling rate [USB 3.2 Gen 1 Type A]

*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.

Features

SYSTEM UNIT

Stand-Alone Power Requirements (AC Power)	**Nominal Operating Voltage**	AC 20V	
	Average Operating Power(idle)		System in idle mode
		WIN10	UMA 2.3W DIS 2.6W
	Integrated graphics	Yes	
	Discrete Graphics	N/A	
	Max Operating Power	UMA<65W	
Temperature	**Operating**	32° to 95° F (0° to 35° C)	
	Non-operating	41° to 95° F (5° to 35° C) (writing optical)	
Relative Humidity	**Operating**	10% to 90%, non-condensing	
	Non-operating	5% to 95%, 101.6° F (38.7° C) maximum wet bulb temperature	
Shock	**Operating**	40 G, 2 ms, half-sine	
	Non-operating	200 G, 2 ms, half-sine	
Random Vibration	**Operating**	0.75 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)	
Temperature Derating with Altitude	**Operating**	1.8°F / 1000 ft (1°C / 304.8 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	
	EAC	Yes	
	Saudi Arabian Compliance (ICCP)	Yes	
	SABS	Yes	

[1]Configurations of the HP Zbook Power 15.6” G9 Mobile Workstation PC that are ENERGY STAR® qualified are identified as HP Zbook Power 15.6” G9 Mobile Workstation PC ENERGY STAR on HP websites and on http://www.energystar.gov.

Features

[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

Panel LCD 15.6 inch FHD (1920x1080) Anti-Glare WLED UWVA 45percent cg 250nits eDP 1.2 w/o PSR bent NWBZ	**Outline Dimensions** (W x H)	350.96 x 205.54 mm (max)	
	Active Area	344.16 x 193.59 mm (typ.)	
	Weight	370 g (max)	
	Diagonal Size	15.6 inch	
	Thickness	3.0 mm/ 5.0 mm (w/PCB) (max)	
	Interface	eDP 1.2 (2 lane)	
	Surface Treatment	Anti-Glare	
	Touch enabled	No	
	Contrast Ratio	600:1 (typ.)	
	Refresh Rate	60 Hz	
	Brightness	250 nits	
	Pixel Resolution	**Pitch**	1920 x 1080 (FHD)
		Format	RGB Stripe
	Backlight	LED	
	Color Gamut Coverage	NTSC 45%	
	Color Depth	6 bits (Hi FRC supportive w/ condition to enable)	
	Viewing Angle	UWVA 85/85/85/85	

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

Panel LCD 15.6 inch FHD (1920x1080) Anti-Glare WLED UWVA 45percent cg 250nits eDP 1.2 w/o PSR bent Touch on Panel NWBZ	**Outline Dimensions** (W x H)	350.96 x 205.74 mm (max)	
	Active Area	344.16 x 193.59 mm (typ.)	
	Weight	380 g (max)	
	Diagonal Size	15.6 inch	
	Thickness	3.2mm/ 5.2mm (PCB) (max)	
	Interface	eDP 1.2 (2 lane)	
	Surface Treatment	Anti-Glare On-cell	
	Touch enabled	Yes	
	Contrast Ratio	600:1 (typ.)	
	Refresh Rate	60 Hz	
	Brightness	250 nits	
	Pixel Resolution	**Pitch**	1920 x 1080 (FHD)
		Format	RGB Stripe
	Backlight	LED	
	Color Gamut Coverage	NTSC 45%	
	Color Depth	6 bits	
	Viewing Angle	UWVA 85/85/85/85	

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

Technical Specifications – Displays

Panel LCD 15.6 inch FHD (1920x1080) Anti-Glare WLED UWVA sRGB 100percent cg 400nits eDP 1.4+PSR2 bent LP NWBZ	**Outline Dimensions** (W x H)	349.46 x 204.79 mm (max)	
	Active Area	344.16 x 193.59 mm (typ.)	
	Weight	325 g (max)	
	Diagonal Size	15.6 inch	
	Thickness	2.6mm / 4.6mm (PCB) (max)	
	Interface	eDP 1.4 (2 lane)	
	Surface Treatment	Anti-Glare	
	Touch enabled	No	
	Contrast Ratio	1200:1 (typ.)	
	Refresh Rate	60 Hz	
	Brightness	400 nits	
	Pixel Resolution	**Pitch**	1920 x 1080 (FHD)
		Format	RGB Stripe
	Backlight	LED	
	Color Gamut Coverage	sRGB 100% (NTSC 72%)	
	Color Depth	8 bit	
	Viewing Angle	UWVA 85/85/85/85	

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

Panel LCD 15.6 inch UHD (3840x2160) Anti-Glare WLED UWVA sRGB 100percent cg 400nits eDP 1.4+PSR2 bent LP NB2Y	**Outline Dimensions (W x H)**	349.52 x 205.42 mm (max)	
	Active Area	344.22 x 193.62 mm (typ.)	
	Weight	320 g (max)	
	Diagonal Size	15.6 inch	
	Thickness	2.6mm / 4.6mm (PCB) (max)	
	Interface	eDP 1.4 (4 lane)	
	Surface Treatment	Anti-Glare	
	Touch Enabled	No	
	Contrast Ratio	1200:1 (typ.)	
	Refresh Rate	60 Hz	
	Brightness	400 nits	
	Pixel Resolution	**Pitch**	3840 x 2160 (UHD)
		Format	RGB Stripe
	Backlight	LED	
	Color Gamut Coverage	sRGB 100% only for UHD LP	
	Color Depth	8 bits	
	Viewing Angle	UWVA 85/85/85/85	

*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.
4TB PCIe-4x4 2280 NVMe Three Layer Cell double-sided M.2 Solid State Drive	**Form Factor**	M.2 2280
	Capacity	4TB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	15g
	Interface	PCIe NVMe Gen4X4
	Performance	**Maximum Sequential Read** / **Maximum Sequential Write**
		Up to 6000 MB/s / Up to 6000 MB/s
	Logical Blocks	8,001,594,720
	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® I219v 1 Gigabit Network Connection LOM (non-vPro)	**Connector**	RJ-45
	System Interface	PCI(Intel proprietary) + SMBus
	Data Rates Supported	1. 10 Mbit/s operation (10BASE-T; IEEE 802.3i; IEEE 802.3 clauses 13-14) 2. 100 Mbit/s operation (100BASE-TX; IEEE 802.3u; IEEE 802.3 clauses 21-30) 3. 1000 Mbit/s operation (1000BASE-T; IEEE 802.3ab; IEEE 802.3 clauses 40) 4. Auto-Negotiation (Automatic Speed Selection) Full Duplex Operation at all Speeds, Half Duplex operation at 10, 100 & 1000 Mbit/s
	IEEE Compliance	IEEE 802.1p QoS (Quality of Service) Support IEEE 802.1q VLAN support IEEE 802.3x Flow Control (IEEE 802.3 clauses 31-32; configurable) IEEE 802.3az EEE (Energy Efficient Ethernet) IEEE 802.3i 10BASE-T IEEE 802.3u 100BASE-TX IEEE 802.3ab 1000BAE-T IEEE 802.3bz 2.5GBASE-T
	Performance	TCP/IP/UDP Checksum Offload (configurable) Protocol Offload (ARP & NS) Large send offload and Giant send offload Receiving Side Scaling(Hash Mode only) Jumbo Frame 9K
	Power consumption	Cable Disconnetion: 25mW 100Mbps Full Run: 450mW 1000bps Full Run: 1000mW WoL Enable(S3/S4/S5): 50mW WoL Disable(S3/S4/S5): 25mW
	Power Management	ACPI compliant – multiple power modes Situation-sensitive features reduce power consumption Advanced link down power saving for reducing link down power consumption
	Management Interface	Auto MDI/MDIX Crossover cable detection
	IT Manageability	Wake-on-LAN from modern standby or sleep state (Magic Packet and Microsoft Wake-Up Frame); Wake-on-LAN from off (Magic Packet only) PXE 2.1 Remote Boot Statistics Gathering (SNMP MIB II, Ethernet-like MIB, Ethernet MIB (802.3x, clause 30)) Comprehensive diagnostic and configuration software suite Virtual Cable Doctor for Ethernet cable status
	Security & Manageability	Intel® non-vPro™ support with appropriate Intel® chipset components

Intel AX211 Wi-Fi 6E +BT 5.2 M.2 160MHz CNVi WLAN vPro	**Wireless LAN Standards**	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11ac

Technical Specifications – Networking

	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 • 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

Technical Specifications – Networking

	• 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 1216: 1.67 x 12.0 x 16.0 mm
Weight	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 Off – 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
Number of Available Channels	Legacy : 0~79 (1 MHz/CH) BLE : 0~39 (2 MHz/CH)
Data Rates and Throughput	Legacy : 3 Mbps data rate; throughput up to 2.17 Mbps BLE : 1 Mbps data rate; throughput up to 0.2 Mbps Legacy : Synchronous Connection Oriented links up to 3, 64 kbps, voice channels Legacy : Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)

Technical Specifications – Networking

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.

Intel AX211 Wi-Fi 6E +BT 5.2 M.2 160MHz CNVi 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

Technical Specifications – Networking

	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 • 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)

Technical Specifications – Networking

	• 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 1216: 1.67 x 12.0 x 16.0 mm
Weight	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
Number of Available Channels	Legacy : 0~79 (1 MHz/CH) BLE : 0~39 (2 MHz/CH)
Data Rates and Throughput	Legacy : 3 Mbps data rate; throughput up to 2.17 Mbps BLE : 1 Mbps data rate; throughput up to 0.2 Mbps Legacy : Synchronous Connection Oriented links up to 3, 64 kbps, voice channels Legacy : Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)
Transmit Power	The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 9.5 dBm for BR and EDR.
Power Consumption	Peak (Tx): 330 mW Peak (Rx): 230 mW Selective Suspend: 17 mW

Technical Specifications – Networking

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.

Near Field Communications Controller (optional)

Dimensions (L x W x H)	Module 25 mm by 10 mm by 2.0 mm
Chipset	NPC300
System interface	I2C
NFC RF standards	ISO/IEC 14443 A ISO/IEC 14443 B ISO/IEC 15693 ISO/IEC 18092 ECMA-340 NFCIP-1 Target and Initiator ECMA-320 NFCIP-2

Technical Specifications – Networking

NFC Forum Support	Tag Type 1, Type 2, Type3 and Type 4, NFCIP-1 and NFCIP-2		
Reader (PCD-VCD) Mode	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	ISO/IEC 14443 A ISO/IEC 14443 B and B' MIFARE FeliCa		
Frequency	13.56 MHz		
NFC Modes Supported	Reader/Writer, Peer-to-Peer		
Raw RF Data Rates	106, 212, 424, 848 kbps		
Operating temperature	0°C to 70°C		
Storage temperature	-20°C to 125°C		
Humidity	10-90% operating 5-95% non-operating		
Supply Operating voltage	4.35 to 5.25 Volts		
I/O Voltage	1.8V or 3.3V		
Power Consumption	**Booster enable, 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

Technical Specifications – Networking

# 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
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 150 Watt Smart PFC Slim Barrel 4.5mm Right Angle	**Dimensions**	138x66x22mm	
	Weight	unit: 325g +/- 10g	
	Input	**Input Efficiency**	88% at 115 Vac and 89% at 230Vac
		Input frequency range	47 ~ 63 Hz
		Input AC current	2.7 A at 90 Vac and Maximum Load
	Output	**Output power**	150W
		DC output	19.5V
		Hold-up time	5ms at 115 Vac input
		Output current limit	<16.0A
	Connector	C6	
		DC Plug	4.5mm Barrel Type
	Environmental Design	**Operating temperature**	32° to 95° F (0° to 35° C)
		Non-operating (storage) temperature	-4° to 185° F (-20° to 85° C)
		Altitude	0 to 16,400 ft (0 to 5000m)
		Humidity	5% to 95%
		Storage Humidity	5% to 95%
	EMI and Safety Certifications	Eg: *CE Mark – full compliance with LVD and EMC directives	

Technical Specifications – Networking

* 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 120 Watt Smart PFC Slim Barrel 4.5mm Right Angle – Delphin	**Dimensions**	138x68.5x25.4mm	
	Weight	unit: 350g +/- 10g	
	Input	**Input Efficiency**	88% at 115 Vac and 89% at 230Vac
		Input frequency range	47 ~ 63 Hz
		Input AC current	1.7 A at 90 Vac and Maximum Load
	Output	**Output power**	120W
		DC output	19.5V
		Hold-up time	5ms at 115 Vac input
		Output current limit	<18.0A
	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.	

Battery 6 Cell WHr 83 Long Life -PL Fast Charge	**Dimensions (H x W x L)**	8.7 x 316.1 x70.2mm (0.342 x 12.44 x 2.763 inch)	
	Weight	0.31kg (0.683lb)	
	Cells/Type	6cell Lithium-Ion Polymer cell / 685257	
	Energy	Voltage	11.58V
		Amp-hour capacity	7.170Ah
		Watt-hour capacity	83Wh
	Temperature	Operating (Charging)	32˚ to 113˚ F (0˚ to 45˚ C)
		Operating (Discharging)	14˚ to 122˚ F (-10˚ to 60˚ C)
	Fuel Gauge LED	NA	
	Warranty	Refer to http://www.hp.com/support/batterywarranty/ for battery warranty information.	
	Optional Travel Battery Available	N/A	

*Batteries have a default one year limited warranty except for Long Life batteries which will have same 1-year or 3-year limited warranty as the platform.

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
- IEC 60601-1-2:2014 EN60601-1-2: 2015
- 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)	6.25 W	6.11 W	6.13 W
Normal Operation (Long idle)	1.42 W	1.5 W	1.4 W
Sleep	1.42 W	1.5 W	1.4 W
Off	0.4 W	0.42 W	0.4 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)	21.4 BTU/hr	20.9 BTU/hr	21 BTU/hr
Normal Operation (Long idle)	4.9 BTU/hr	5.1 BTU/hr	4.8 BTU/hr
Sleep	4.9 BTU/hr	5.1 BTU/hr	4.8 BTU/hr
Off	1.4 BTU/hr	1.4 BTU/hr	1.4 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_{Wad}, bels)	Sound Pressure (L_{pAm}, decibels)
Typically Configured – Idle	2.6	13.7
Fixed Disk – Random writes	2.6	14.9
Optical Drive – Sequential reads	3.8	31.4

Longevity and Upgrading

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

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

Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive – 2011/65/EC.
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold level, see www.epeat.net
- Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.
- This product is 93.7% recycle-able when properly disposed of at end of life.

Packaging Materials

External:	PAPER/Corrugated	295 g
	PAPER/Molded Pulp	170 g
Internal:	PLASTIC/Polyethylene low density – LDPE	10 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.

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Date of change:	**Version History:**		**Description of change:**
March 29, 2022	From v1 to v2	Changed	DRIVE CONTROLLERS and Power sections
March 31, 2022	From v2 to v3	Changed	PROCESSOR section
April 13, 2022	From v3 to v4	Changed	ENVIRONMENTAL DATA and Power sections
April 21, 2022	From v4 to v5	Changed	DRIVE CONTROLLERS and Power sections
May 2, 2022	From v5 to v6	Changed	MEMORY section
May 9, 2022	From v6 to v7	Changed	STORAGE AND DRIVES and DRIVE CONTROLLERS sections
May 17, 2022	From v7 to v8	Changed	PORTS/SLOTS section
May 20, 2022	From v8 to v9	Changed	KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS section
June 7, 2022	From v9 to v10	Changed	PROCESSOR section
June 24, 2022	From v10 to v11	Changed	POWER section
July 8, 2022	From v11 to v12	Changed	NETWORKING/COMMUNICATIONS section
August 19, 2022	From v12 to v13	Changed	Format
August 29, 2022	From v13 to v14	Changed	PORTS/SLOTS section
September 15, 2022	From v14 to v15	Changed	NETWORKING/COMMUNICATION section
		Removed	Tile App for Software
October 24, 2022	From v15 to v16	Changed	Format page 2
November 4, 2022	From v16 to v17	Removed	Sure view reference