

Overview

HP EliteBook 645 14 inch G9 Notebook PC



Left

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

Overview



Right

1. Power Button Key
2. Power Connector
3. SuperSpeed USB Type-C® 10Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4)
4. SuperSpeed USB Type-A 5Gbps signaling rate port (Powered port) (USB 3.2 Gen 1)
5. SuperSpeed USB Type-A 5Gbps signaling rate port (USB 3.2 Gen 1)
6. HDMI 2.1 Port (Cable not included)
7. Audio Combo Jack
8. External SIM Card Slot (Optional)
9. Touch Fingerprint Sensor (Select Models)

Overview

AT A GLANCE

- Preinstalled with Windows 11 Pro, other Windows OS or FreeDOS
- Fast and upgradeable dual channel DDR4 SODIMM memory up to 64 GB
- Choice of AMD Barcelo™ 5000 series mobile processors, R7, R5 and R3
- Choice of 35.56 cm (14") diagonal HD, Ultra-Wide Viewing Angle FHD, Touch or Non-Touch screen, and Privacy Panel option.
- Features redesigned quiet and responsive HP Keyboard with the HP Programmable key and backlit options
- Choice of solid state drives up to 1 TB
- Multi-layered security with HP SureStart Gen7, HP Privacy Camera, HP Sure View Gen4, HP Wolf Security (Includes HP Sure Sense and HP Sure Click), HP Secure Erase, HP Client Security Manager Gen7 (Includes Sure Run Gen5, Sure Recover Gen5), Touch Fingerprint reader, and Tamper Lock.
- Supports wireless options for connectivity on the go including gigabit-speed Wi-Fi® 6e and CAT9 4G/LTE WWAN
- Supports fast charging (50% in 30 minutes) with no impact on battery recharge cycles
- Designed to support HP docking options
- Passed MIL-STD 810H tests
- Battery life up to 20 hours and 30 minutes with the optional 51.3Whr battery
- Optimize your video calls with an HD camera and temporal noise reduction that adjusts to the lighting in your environment.
- 180° synchronized hinge allows the EliteBook to lay completely flat, without lifting the keyboard, and includes everyone with visibility from multiple angles.

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

Technical Specifications

PRODUCT NAME

HP EliteBook 645 14 inch G9 Notebook PC

OPERATING SYSTEM

Preinstalled	Windows 11 Pro ¹
	Windows 11 Pro Education ¹
	Windows 11 Home - HP recommends Windows 11 Pro for business ¹
	Windows 11 Home Single Language - HP recommends Windows 11 Pro for business ¹
	Windows 11 Pro (Windows 11 Enterprise or Windows 10 Enterprise available with a Volume Licensing Agreement) ¹
	Windows 11 Pro (preinstalled with Windows 10 Pro Downgrade) ^{1,2}
	FreeDOS

1. Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. Windows 10 is automatically updated, which is always enabled. ISP fees may apply, and additional requirements may apply over time for updates. See <http://www.windows.com>.

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

PROCESSORS

AMD Ryzen™ 7 PRO 5875U with AMD Radeon™ Graphics (2.00 GHz base clock, up to 4.50 GHz max boost clock, 16 MB L3 cache, 8 cores, 16 threads) ^{3,4,5,6}

AMD Ryzen™ 7 5825U with AMD Radeon™ Graphics (2.00 GHz base clock, 16 MB L3 cache, 8 cores, 16 threads) ^{3,4,5,6}

AMD Ryzen™ 5 PRO 5675U with AMD Radeon™ Graphics (2.30 GHz base clock, up to 4.30 GHz max boost clock, 16 MB L3 cache, 6 cores, 12 threads) ^{3,4,5,6}

AMD Ryzen™ 5 5625U with AMD Radeon™ Graphics (2.30 GHz base clock, 16 MB L3 cache, 6 cores, 12 threads) ^{3,4,5,6}

AMD Ryzen™ 3 5425U with AMD Radeon™ Graphics (2.70 GHz base clock, 8 MB L3 cache, 4 cores, 8 threads) ^{3,4,5,6}

Processor Family

AMD Ryzen™ processor ⁶

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

4. Processor speed denotes maximum performance mode; processors will run at lower speeds in battery optimization mode.

5. AMD Max Boost frequency performance varies depending on hardware, software and overall system configuration.

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

Technical Specifications

CHIPSET

Chipset is integrated with processor.

GRAPHICS

Integrated

AMD Radeon Graphics

Supports

Support HD decode, DX12, HDMI 2.1b ⁷

[7. HD content required to view HD images.](#)

DISPLAY

Non-Touch

35.56 cm (14") diagonal FHD UWVA eDP anti-glare Low Blue Light narrow bezel bent, 1000 nits, 100% sRGB for HD + IR camera and WWAN HP Sure View Gen4 integrated privacy screen (1920 x 1080) with HP Eye Ease ^{8,9,10,11,12}

35.56 cm (14") diagonal FHD UWVA eDP anti-glare, low power, bent, 400 nits, 72% NTSC for HD + IR camera and WWAN (1920 x 1080) ^{8,9,10}

35.6 cm (14") diagonal, FHD UWVA eDP anti-glare narrow bezel bent, 400 nits, 100% sRGB for HD Webcam (1920 x 1080) ^{8,9,10}

35.56 cm (14") diagonal FHD UWVA eDP anti-glare narrow bezel bent, 250 nits, 45% NTSC for HD + IR camera and WWAN (1920 x 1080) ^{8,9,10}

35.56 cm (14") diagonal FHD UWVA eDP + W/O PSR anti-glare narrow bezel bent, 250 nits, 45% NTSC for HD + IR camera (1920 x 1080) ^{8,9,10}

35.56 cm (14") diagonal FHD UWVA eDP anti-glare narrow bezel bent, 250 nits, 45% NTSC for HD camera and WWAN (1920 x 1080) ^{8,9,10}

35.56 cm (14") diagonal FHD UWVA eDP anti-glare narrow bezel bent, 250 nits, 45% NTSC for HD camera (1920 x 1080) ^{8,9,10}

35.6 cm (14") diagonal, FHD UWVA eDP 1.4 w/o PSR, anti-glare, 250 nits, 45%, no mic (1920 x 1080) ^{8,9,10}

35.6 cm (14") diagonal, FHD UWVA eDP 1.2 w/o PSR, Anti-Glare, 250 nits, 45% NTSC Narrow Bezel bent (1920 x 1080) ^{8,9,10}

35.56 cm (14") diagonal HD SVA eDP anti-glare narrow bezel bent, 250 nits, 45% NTSC for HD Camera (1366 x 768) ^{8,9,10}

35.6 cm (14") diagonal, HD SVA eDP 1.2 w/o PSR, Anti-Glare, 250 nits, 45% NTSC Narrow Bezel bent (1366 x 768) ^{8,10,12}

Touch

35.56 cm (14") diagonal FHD Anti-Glare UWVA eDP narrow bezel bent touch-on-panel screen, 250 nits, 45% NTSC for HD + IR camera and WWAN (1920 x 1080) ^{8,9,10,12}

35.56 cm (14") diagonal FHD Anti-Glare UWVA eDP narrow bezel bent touch-on-panel screen, 250 nits, 45% NTSC for HD camera (1920 x 1080) ^{8,9,10,12}

Display Size

14" diagonal

35.6 cm (14") diagonal

[8. HD content required to view HD images.](#)

[9. Sold separately or as an optional feature.](#)

[10. Resolutions are dependent upon monitor capability, and resolution and color depth settings.](#)

[11. 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.](#)

Technical Specifications

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

DOCKING (Sold Separately)

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

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

STORAGE AND DRIVES

Primary M.2 Storage

- 128 GB PCIe® NVMe™ M.2 Value Solid State Drive ¹³
- 256 GB PCIe® NVMe™ M.2 Value Solid State Drive ¹³
- 256 GB PCIe® Gen4x4 NVMe™ M.2 TLC Self Encrypted OPAL2 Solid State Drive ^{13,14}
- 256 GB PCIe® Gen4x4 NVMe™ M.2 TLC single-sided Solid State Drive ^{13,14}
- 256 GB PCIe® NVMe™ M.2 SSD ¹³
- 512 GB PCIe® Gen4x4 NVMe™ M.2 TLC Self Encrypted OPAL2 Solid State Drive ^{13,14}
- 512 GB PCIe® Gen4x4 NVMe™ M.2 TLC Solid State Drive ^{13,14}
- 512 GB PCIe® NVMe™ M.2 SSD ¹³
- 1 TB PCIe® Gen4x4 NVMe™ M.2 TLC Solid State Drive ^{13,14}

Secondary M.2 Storage (Optional)

- 128 GB PCIe® NVMe™ M.2 Value Solid State Drive ^{13,15}
- 256 GB PCIe® NVMe™ M.2 Value Solid State Drive ^{13,15}

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

14. Only functions at the Gen3x4 capacity with AMD Ryzen Barcelo processor.

15. Second storage is only available with non-WWAN base Unit AND Primary M.2 storage.

MEMORY

Maximum Memory

- 64 GB DDR4-3200 SDRAM ¹⁶

Memory

- 64 GB DDR4-3200 SDRAM (2 x 32 GB) ¹⁶
- 32 GB DDR4-3200 SDRAM (1 x 32 GB) ¹⁶
- 32 GB DDR4-3200 SDRAM (2 x 16 GB) ¹⁶
- 16 GB DDR4-3200 SDRAM (1 x 16 GB) ¹⁶
- 16 GB DDR4-3200 SDRAM (2 x 8 GB) ¹⁶
- 8 GB DDR4-3200 SDRAM (1 x 8 GB) ¹⁶
- 8 GB DDR4-3200 SDRAM (2 x 4 GB) ¹⁶

Technical Specifications

Memory Slots

2 SODIMM

Both slots are customer accessible / upgradeable

DDR4 PC4 SODIMMS (Barcelo runs at 3200)

Supports Dual Channel Memory

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

NETWORKING/COMMUNICATIONS

WLAN

Realtek RTL8852BE 802.11ax 2x2 Wi-Fi® + BT5.3 ¹⁷

Qualcomm® Fast Connect 6900 Wi-Fi 6E + BT5.3 (802.11ax 2x2) ¹⁸

WWAN

Intel® XMM™ 7560 R+ LTE-Advanced Pro Cat 16 ¹⁹

NFC

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

Miracast

Native Miracast Support

Ethernet

Realtek RTL8111HSH 10/100/1000 Integrated NIC ²⁰

Realtek RTL8111FPH 10/100/1000 Integrated NIC ²⁰

Wake on WLAN

Support on S3 AC mode only

17. Wireless access point and internet service required and sold separately. Availability of public wireless access points limited. Wi-Fi 6 is backwards compatible with prior 802.11 specs.

18. 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.

19. WWAN module is an optional feature, requires factory configuration and requires separately purchased service contract. Check with service provider for coverage and availability in your area. Connection speeds will vary due to location, environment, network conditions, and other factors. 4G LTE not available on all products, in all regions.

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

Technical Specifications

AUDIO/MULTIMEDIA

Audio

2 Integrated stereo speakers
Integrated microphone (Dual Array)

Speaker Power

2W/4ohm Per speaker

Camera

720p HD camera with Temporal Noise Reduction ^{8,9}
720p HD camera+IR Camera with Temporal Noise Reduction ^{8,9}

[8. HD content required to view HD images.](#)

[9. Sold separately or as an optional feature.](#)

KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS

Keyboard

HP Premium Keyboard, spill resistant with optional backlit function ²¹

Pointing Device

Clickpad with multi-touch gesture support

Function Keys

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

Hidden Function Keys

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

[21. Backlit keyboard is an optional feature.](#)

Technical Specifications

SOFTWARE AND SECURITY

Software

HP Quick Touch

HP Quick Drop ²²

HP PC Hardware Diagnostics Windows

Touchpoint Customizer for Commercial

myHP

HP Smart Support ²³

HP Connection Optimizer

HP Hotkey Support

HP Support Assistant ²⁴

HP Notifications

HP Privacy Settings

Buy Microsoft Office (Sold separately)

Manageability Features

HP Connect for Microsoft Endpoint Manager²⁵

HP Image Assistant Gen5 (download)

HP Manageability Integration Kit (download)²⁶

HP Client Management Script Library (download)

HP Patch Assistant (download)²⁷

HP Driver Packs (download)

HP Client Catalog (download)

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

Security Management

HP Wolf Security of Business²⁸ includes:

HP Sure Click ²⁹

HP Sure Sense ³⁰

HP Sure Run Gen5 ³¹

HP Sure Recover Gen5 ³²

HP Sure Start Gen7 ³³

HP Tamper Lock

HP Sure Admin ³⁴

HP Client Security Manager Gen7 ³⁵

BIOS

HP BIOSphere Gen6 ³⁶

HP Secure Erase ³⁷

Absolute Persistence Module ³⁸

HP DriveLock & Automatic DriveLock

BIOS Update via Network

HP Wake on WLAN

HP Fingerprint Sensor ³⁹

Secured-Core PC Enable ⁴⁰

TPM 2.0 Embedded Security Chip (Common Criteria EAL4+ Certified) (FIPS 140-2 Level 2 Certified)

Security



Technical Specifications

TPM

Model: Infineon SLB9672VU2.0

Version: 15.21

Revision: TPM 2.0

FIPS 140-2 Compliant: Yes

Smartcard Reader

Model number: Alcor AU9560

FIPS 201 Compliant: Yes

IPv6 Support

Yes

FirstNet Certified

No

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

UEFI version: 2.7

Class: Class 3

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

24. HP Support Assistant requires Windows and Internet Access

25. 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.

26. HP Manageability Integration Kit can be downloaded from <http://www.hp.com/go/clientmanagement>.

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 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.

29. HP Sure Click requires Windows 10 Pro or higher or Enterprise. See https://bit.ly/2PrLT6A_SureClick for complete details.

30. HP Sure Sense is available on select HP PCs with Windows 10 Pro, Windows 10 Enterprise, Windows 11 Pro, or Windows 11 Enterprise OS.

31. HP Sure Run Gen5 is available on select HP PCs and requires Windows 10 and higher.

32. HP Sure Recover Gen5 is available on select HP PCs and requires Windows 10 and higher and an open network connection. You must back up important files, data, photos, videos, etc. before using HP Sure Recover to avoid loss of data. Network based recovery using Wi-Fi is only available on PCs with Intel Wi-Fi Module.

33. HP Sure Start Gen7 is available on select HP PCs and requires Windows 10 and higher

34. HP Sure Admin requires Windows 10 and higher, HP BIOS, HP Manageability Integration Kit from

<http://www.hp.com/go/clientmanagement> and HP Sure Admin Local Access Authenticator smartphone app from the Android or Apple store.

35. HP Client Security Manager Gen7 requires Windows and is available on the select HP Elite and Pro PCs.

Technical Specifications

- 36. HP BIOSphere Gen6 features may vary depending on the platform and configuration.
 - 37. 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™.
 - 38. Absolute firmware module is shipped turned off and can only be activated with the purchase a license subscription and full activation of the software agent. License subscriptions can be purchased for terms ranging multiple years. Service is limited, check with Absolute for availability outside the U.S. Certain conditions apply. For full details visit: <https://www.absolute.com/about/legal/agreements/absolute/>.
 - 39. Fingerprint Reader is an optional feature that must be configured at purchase.
 - 40. Requires an Intel® vPro®, AMD Ryzen™ Pro processor or Qualcomm® processor with SD850 or higher and requires 8 GB or more system memory. Secured-core PC is enabled from the factory.
-

Technical Specifications

POWER

Power Supply

- AC Adapter 45 Watt nPFC Standard USB type C Straight 1.8m ⁴¹
- AC Adapter 45 Watt Smart nPFC Standard Barrel 4.5mm Right Angle 1.8m ⁴¹
- AC Adapter 45 Watt Smart nPFC Standard C8 for 2 prong Barrel 4.5mm Right Angle ⁴¹
- AC Adapter 65 Watt nPFC Slim USB type C Straight 1.8m ⁴¹
- AC Adapter 65 Watt nPFC Standard USB type C Straight 1.8m ⁴¹
- AC Adapter 65 Watt Smart nPFC EM Barrel 4.5mm ⁴¹
- AC Adapter 65 Watt Smart nPFC Standard Barrel 4.5mm Right Angle 1.8m ⁴¹

Battery

- HP Long Life 3-cell, 42.75 Wh Polymer ^{42,43}
- HP Long Life 3-cell, 51.3 Wh Polymer ^{42,43}
- Compliant with UL 1642 Standard

Power Cord

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

Battery Life

- Up to 20 hours and 30 minutes with 51whr battery (HP Long Life 3-Cell, 51 Whr Polymer, UMA graphic, AMD R7, display set to 200 nits, 8G memory, 256 GB SSD)⁴⁴
- Up to 17 hours and 30 minutes with 42whr battery (HP Long Life 3-Cell, 42 Whr Polymer, UMA graphic, AMD R7, display set to 200 nits, 8G memory, 256 GB SSD)⁴⁴

Battery Weight

- HP Long Life 3-cell - 42.75 Wh Polymer - .40 lb
- HP Long Life 3-cell - 51.3 Wh Polymer - .45 lb
- HP Long Life 3-cell - 42.75 Wh Polymer - 181.83 g
- HP Long Life 3-cell - 51.3 Wh Polymer - 203.56 g

41. Availability may vary by country.

42. Battery is internal and not replaceable by customer. Serviceable by warranty.

43. 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.

44. MM18 battery life will vary depending on various factors including product model, configuration, loaded applications, features, use, wireless functionality, and power management settings. The maximum capacity of the battery will naturally decrease with time and usage. See <http://www.bapco.com> for additional details.

Technical Specifications

WEIGHTS & DIMENSIONS

Product Weight

Starting at 3.03 lb ⁴⁵

Starting at 1.37 kg ⁴⁵

Product Dimensions (W x D x H)

12.67 x 8.42 x 0.78 in

32.19 x 21.39 x 1.99 cm

[45. Weight will vary by configuration. Does not include power adapter.](#)

PORTS/SLOTS

Ports

1 SuperSpeed USB Type-C® 10Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4)

3 SuperSpeed USB Type-A 5Gbps signaling rate Port includes 1 Powered port (USB 3.2 Gen 1)

1 AC power

1 HDMI 2.1 ⁴⁶

1 Headphone/microphone combo jack

1 Nano SIM slot for WWAN (optional)

1 RJ-45

Expansion Slots

Smart Card Reader (optional)

[46. HDMI cable sold separately.](#)

Technical Specifications

SERVICE AND SUPPORT

1-year and 3-year limited warranties and 90 day software limited warranty options depending on country. Batteries have a default one year limited warranty except for Long Life batteries which will have same 1-year or 3-year limited warranty as the platform. Refer to <http://www.hp.com/support/batterywarranty/> for additional battery information. On-site service and extended coverage is also available. HP Care Pack Services are optional extended service contracts that go beyond the standard limited warranties. To choose the right level of service for your HP product, use the HP Care Pack Services Lookup Tool at: <http://www.hp.com/go/cpc>.⁴⁷

47. HP Care Packs are sold separately. Service levels and response times for HP Care Packs may vary depending on your geographic location. Service starts on date of hardware purchase. Restrictions and limitations apply. For details, visit <http://www.hp.com/go/cpc>. HP services are governed by the applicable HP terms and conditions of service provided or indicated to Customer at the time of purchase. Customer may have additional statutory rights according to applicable local laws, and such rights are not in any way affected by the HP terms and conditions of service or the HP Limited Warranty provided with your HP Product.

CERTIFICATION AND COMPLIANCE

Energy Efficiency Compliance: ENERGY STAR® certified

Energy Efficiency Compliance: EPEAT® 2019 Gold⁴⁸

Environmental Specifications: Low halogen⁴⁹

Environmental Specifications: TCO 9.0 Certification

48. Based on US EPEAT® registration according to IEEE 1680.1-2018 EPEAT®. EPEAT® status varies by country. Visit <http://www.epeat.net> for more information

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

Technical Specifications

SYSTEM UNIT

Nominal Operating Voltage	19V
Average Operating Power	7.52W (Idle)
Integrated graphics	Yes (AMD Radeon™ Graphics)
Discrete Graphics	N/A
Max Operating Power	Discrete < 65W UMA < 45W
Temperature	
Operating	32° to 95° F (0° to 35° C)
Non-operating	-4° to 140° F (-20° to 60° C)
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	1.043 grams
Non-operating	3.5 grams
Altitude (unpressurized)	
Operating	-50 to 10,000 ft (-15.24 to 3,048 m)
Non-operating	-50 to 40,000 ft (-15.24 to 12,192 m)
Planned Industry Standard Certifications	
Regulatory Model Number	HSN-Q35C-4
UL	Yes
CSA	Yes
FCC Compliance	Yes
ENERGY STAR®	Yes ⁵⁰
EPEAT®	EPEAT® 2019 Gold in United States ⁵¹
ICES	Yes
Australia /	Yes
NZ A-Tick Compliance	Yes
CCC	Yes
Japan VCCI Compliance	Yes
KC	Yes
BSMI	Yes
CE Marking Compliance	Yes
BNCI or BELUS	Yes
CIT	Yes
GOST	Yes
Saudi Arabian Compliance (ICCP)	Yes
SABS	Yes
UKRSERTCOMPUTER	Yes

Technical Specifications

50. Configurations of the HP EliteBook 645 G9 that are ENERGY STAR® certified are identified as HP EliteBook 645 G9 ENERGY STAR on HP websites and on <http://www.energystar.gov>.

51. Based on US EPEAT® registration according to IEEE 1680.1-2018 EPEAT®. EPEAT® status varies by country. Visit <http://www.epeat.net> for more information.

DISPLAYS

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

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

<p>14.0 in FHD (1920 x 1080) Anti-Glare UWVA Low Blue Light sRGB NB2Y 1000 eDP 1.3+PSR 100 PrivacyG4 Plus bent LCD Panel</p>	<p>Outline Dimensions (W x H) Active Area Weight Diagonal Size Thickness Interface Surface Treatment Touch Enabled Contrast Ratio Refresh Rate Brightness Pixel Resolution Format Backlight Color Gamut Coverage Color Depth Viewing Angle Low Blue Light Power Consumption (W, EBL@ 150nits max/ 200nits max)</p>	<p>314.612x 185.330 (max) 309.312 x 173.990 mm (typ) 230 g 14 inch 2.2/3.9 (max) eDP 1.3 Anti-Glare No 1500:1 60 Hz 1000 nits 1920 x1080 (FHD) WLED RGB sRGB 100% 8 UWVA 85/85/85/85 Yes NA</p>
---	---	---

<p>Panel LCD 14 inch FHD (1920 x 1080) Anti-Glare WLED UWVA 45percent cg 250nits eDP 1.2 w/o PSR bent Touch on Panel NWBZ</p>	<p>Outline Dimensions (W x H) Active Area Weight Diagonal Size Thickness Interface Surface Treatment Touch Enabled Contrast Ratio Refresh Rate Brightness Pixel Resolution Format Backlight</p>	<p>316.170 x 186.400 (max) 309.370 x 174.020 mm (typ) 305 g (max) 14.0 inch 3.0 / 5.0 (max) eDP 1.2 Anti-Glare On-cell Yes¹ 600:1 (typ) 60 Hz 250 nits¹ 1920 x 1080 (FHD) WLED RGB</p>
--	---	--

Technical Specifications

Color Gamut Coverage	NTSC 45%
Color Depth	6 (Hi FRC w/ condition to enable)
Viewing Angle	UWVA 85/85/85/85
Low Blue Light	No
Power Consumption (W, EBL@ 150nits max/ 200nits max)	2.30 (max)/ 2.80 (max)

Panel LCD 14 inch FHD (1920 x 1080) Anti-Glare WLED UWVA sRGB 100percent cg 400nits eDP 1.4+PSR2 bent LP NB2X

Outline Dimensions (W x H)	315.070 x 186.600 (max)
Active Area	309.370 X 174.020 mm (typ)
Weight	200 g (max)
Diagonal Size	14.0 inch
Thickness	2.0 /4.0 (max)
Interface	eDP 1.4
Surface Treatment	Anti-Glare
Touch Enabled	No
Contrast Ratio	1200:1 (typ)
Refresh Rate	60 Hz
Brightness	400 nits
Pixel Resolution	1920 x 1080 (FHD)
Format	WLED
Backlight	RGB
Color Gamut Coverage	sRGB 100%
Color Depth	6
Viewing Angle	UWVA 85/85/85/85
Low Blue Light	No
Power Consumption (W, EBL@ 150nits max/ 200nits max)	2.07 (max)/ 2.50 (max)

Panel LCD 14-in FHD (1920 x 1080) Anti-Glare WLED UWVA 45percent cg 250nits eDP 1.2 w/o PSR NWBZ bent

Outline Dimensions (W x H x D)	316.170 x 186.400 (max)
Active Area	309.370 x 174.020 mm (typ)
Weight	300 g (max)
Diagonal Size	14.0 inch
Thickness	3.0 / 5.0 (max)
Interface	eDP 1.2
Surface Treatment	Anti-Glare
Touch Enabled	No
Contrast Ratio	600:1 (typ)
Refresh Rate	60 Hz
Brightness	250 nits
Pixel Resolution	1920 x 1080 (FHD)
Format	WLED
Backlight	RGB
Color Gamut Coverage	NTSC 45%
Color Depth	6 (Hi FRC w/ condition to enable)

Technical Specifications

Viewing Angle	UWVA 85/85/85/85
Low Blue Light	No
Power Consumption (W, EBL@ 150nits max/ 200nits max)	2.205 (max)/ 2.716 (max)

Panel LCD 14-in HD (1366 x 768) Anti-Glare WLED SVA 45percent cg 250nits eDP 1.2 w/o PSR NWBZ bent

Outline Dimensions (W x H x D)	316.110 x 186.370 (max)
Active Area	309.400 x 173.950 mm (typ)
Weight	300 g (max)
Diagonal Size	14.0 inch
Thickness	3.0 / 5.0 (max)
Interface	eDP 1.2
Surface Treatment	Anti-Glare
Touch Enabled	No
Contrast Ratio	300:1 (typ)
Refresh Rate	60 Hz
Brightness	250 nits
Pixel Resolution	1366 x 768 (HD)
Format	WLED
Backlight	RGB
Color Gamut Coverage	NTSC 45%
Color Depth	6
Viewing Angle	SVA 45/45/15/35
Low Blue Light	No
Power Consumption (W, EBL@ 150nits max/ 200nits max)	2.52 (max) / 2.86 (max)

Technical Specifications

STORAGE AND DRIVES

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

SSD 128GB 2230 PCIe NVMe Value	Drive Weight	M.2 2230
	Rotation speed	128GB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.01 lb (5 g)
	Interface	PCIe NVMe Gen3
	Maximum Sequential Read	Up to 2100 MB/s
	Maximum Sequential Write	Up to 1200 MB/s
	Logical Blocks	250069680
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	Pyrite; TRIM; L1.2

SSD 256GB 2230 PCIe NVMe Value	Form Factor	M.2 2230
	Capacity	256 GB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Interface	PCIe NVMe Gen3
	Maximum Sequential Read	up to 2500 MB/s
	Maximum Sequential Write	up to 1300 MB/s
	Logical Blocks	500118192
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	Pyrite; TRIM; L1.2

SSD 256GB 2280 PCIe NVMe Value	Form Factor	M.2 2280
	Capacity	256GB
	NAND Type	Value
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Interface	PCIe NVMe Gen3
	Maximum Sequential Read	Up to 2900 MB/s
	Maximum Sequential Write	Up to 1400 MB/s
	Logical Blocks	500118192
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	ATA Security; TRIM; L1.2

Technical Specifications

SSD 256GB 2280 PCIe-4x4 NVMe Three Layer Cell	Form Factor	M.2 2280
	Capacity	256 GB
	NAND Type	3D TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	9.0g
	Interface	PCIe NVMe Gen4
	Maximum Sequential Read	Up to 6,400 MB/s
	Maximum Sequential Write	Up to 2,700 MB/s
	Logical Blocks	500118192
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	Pyrite 2.0; TRIM; L1.2

256GB PCIe-4x4 2280 NVMe Self Encrypted OPAL2 Three Layer Cell Solid State Drive	Form Factor	M.2 2280
	Capacity	256GB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Interface	PCIe NVMe Gen4
	Maximum Sequential Read	6400
	Maximum Sequential Write	2700
	Logical Blocks	500118192
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	ATA Security (Option); TCG Opal 2.0; TRIM; L1.2

SSD 512GB 2280 PCIe NVMe Value	Form Factor	M.2 2280
	Capacity	512GB
	NAND Type	Value
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Interface	PCIe NVMe Gen3
	Maximum Sequential Read	Up to 3500 MB/s
	Maximum Sequential Write	up to 3000 MB/s
	Logical Blocks	1000215216
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	TRIM; L1.2

Technical Specifications

SSD 512GB 2280 PCIe-4x4 NVMe Three Layer Cell	Form Factor	M.2 2280
	Capacity	512GB
	NAND Type	3D TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	9.0g
	Interface	PCIe NVMe Gen4
	Maximum Sequential Read	Up to 6,600 MB/s
	Maximum Sequential Write	Up to 5,100 MB/s
	Logical Blocks	1000215216
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	Pyrite 2.0; TRIM; L1.2

512GB PCIe-4x4 2280 NVME Self Encrypted OPAL2 Three Layer Cell Solid State Drive	Form Factor	M.2 2280
	Capacity	512GB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Interface	PCIe NVMe Gen4
	Maximum Sequential Read	Up to 6,600 MB/s
	Maximum Sequential Write	Up to 5,100 MB/s
	Logical Blocks	1000215216
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	ATA Security (Option); TCG Opal 2.0; TRIM; L1.2

SSD 1TB 2280 PCIe-4x4 NVMe Three Layer Cell	Form Factor	M.2 2280
	Capacity	1TB
	NAND Type	3D TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Interface	PCIe NVMe Gen4
	Maximum Sequential Read	Up to 7,100 MB/s
	Maximum Sequential Write	Up to 5,200 MB/s
	Logical Blocks	2000409264
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	Pyrite 2.0; TRIM; L1.2

Technical Specifications

NETWORKING/COMMUNICATIONS

<p>Qualcomm® Fast Connect Wireless LAN Standards 6900 Wi-Fi 6E + BT5.3 (802.11ax 2x2, AMD AIM-T AME, supporting gigabit file transfer speeds)¹</p>	<ul style="list-style-type: none"> 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 802.11u IEEE 802.11v IEEE 802.11w
<p>Interoperability</p>	<p>Wi-Fi certified</p>
<p>Frequency Band</p>	<ul style="list-style-type: none"> •802.11b/g/n/ax 2.402 – 2.482 GHz •802.11a/n/ac/ax 5.15 – 5.25 GHz 5.25 – 5.35 GHz 5.47 – 5.725 GHz 5.825 – 5.850 GHz 5.925 – 7.125 GHz
<p>Data Rates</p>	<ul style="list-style-type: none"> •802.11b: 1, 2, 5.5, 11 Mbps •802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps •802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps •802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz) •802.11ac: MCS0 ~ MCS9, (1SS, and 2SS) (20MHz, 40MHz, ,80MHz & 160MHz) • 802.11ax: MCS0 ~ MCS11, (1SS and 2SS) (20MHz, 40MHz, ,80MHz & 160MHz)
<p>Modulation</p>	<p>Direct Sequence Spread Spectrum OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM, 4096QAM</p>
<p>Security³</p>	<ul style="list-style-type: none"> •AES-CCMP: 128 bit in hardware •802.1x authentication •WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. •WPA2 certification •IEEE 802.11i
<p>Network Architecture Models</p>	<p>Wi-Fi Direct in Win10 for peer-to-peer connection. Infrastructure (Access Point Required)</p>
<p>Roaming</p>	<p>IEEE 802.11 compliant roaming between access points</p>
<p>Output Power²</p>	<p>2.4GHz (MIMO, typical):</p> <ul style="list-style-type: none"> • 802.11b: +18dBm • 802.11g: +16.5dBm • 802.11n/ac/ax (HT20/VHT20/HE20): +16dBm • 802.11n/ac/ax (HT40/VHT40/HE40): +12.5dBm <p>5GHz (MIMO, typical):</p> <ul style="list-style-type: none"> • 802.11a: +13dBm • 802.11n/ac/ax (HT20/VHT20/HE20): +13.5dBm • 802.11n/ac/ax (HT40/VHT40/HE40): +12.5dBm

Technical Specifications

- 802.11ac/ax (VHT80/HE80): +11.5dBm
 - 802.11ax HE160: +11.5dBm
- 6GHz LPI mode (MIMO, typical):
- 802.11a: 0dBm
 - 802.11ax HE20: +1dBm
 - 802.11ax HE40: +4dBm
 - 802.11ax HE80: +7dBm
 - 802.11ax HE160: +7.5dBm

Power Consumption

- Transmit mode: 3.0 W
- Receive mode: 2.0 W
- Idle mode (WLAN associated): 300mW
- Idle mode (WLAN unassociated): 100mW
- Modern Connected Standby: 10mW
- Radio disabled: 8 mW

Power Management

ACPI and PCI Express compliant power management
802.11 compliant power saving mode

Receiver Sensitivity⁴

- 2.4GHz (SISO):
- 802.11b, 11Mbps: -82dBm maximum
 - 802.11g, 54Mbps: -71dBm maximum
 - 802.11n, MCS7: -64dBm maximum
 - 802.11ac, MCS9: -52dBm maximum
 - 802.11ax, MCS11(HT40): -49dBm maximum
- 5GHz (SISO):
- 802.11a, 54Mbps: -71dBm maximum
 - 802.11n, MCS07: -64dBm maximum
 - 802.11ac, MCS9: -52dBm maximum
 - 802.11ax, MCS11(HE80/HE160): -46dBm maximum
- 6GHz (SISO):
- 802.11a, 54Mbps: -71dBm maximum
 - 802.11n, MCS7: -64dBm maximum
 - 802.11ac, MCS9: -52dBm maximum
 - 802.11ax, MCS11(HE160): -46dBm maximum"

Antenna type

High efficiency antenna with spatial diversity, mounted in the display enclosure.
Two embedded dual band 2.4/5/6 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications

Form Factor

PCI-Express M.2 MiniCard

Dimensions

Type 2230: 2.3 x 22.0 x 30.0 mm

Weight

Type 2230: 3g

Operating Voltage

3.3 +/- 0.165v

Temperature

Operating -10° to 60° C
Non-operating -40° to 85° C

Humidity

Operating 10% to 60% (non-condensing)
Non-operating 5% to 95% (non-condensing)"

Altitude

Operating 0 to 10,000 ft (3,048 m)
Non-operating 0 to 50,000 ft (15,240 m)

LED Activity

N/A

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

Bluetooth Specification

4.0/4.1/4.2/5.0/5.1/5.2/5.3 Compliant

Frequency Band

2402 to 2480 MHz

Number of Available Channels

Legacy : 0~79 (1 MHz/CH)
BLE : 0~39 (2 MHz/CH)

Technical Specifications

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 1.5 Bluetooth device with a maximum transmit power of + 14 dBm and 10 dBm for BR and EDR, respectively.

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

Realtek RTL8852BE 802.11ax 2x2 Wi-Fi® + BT5.3 (802.11ax 2x2, supporting gigabit data rate) ¹

Wireless LAN Standards

- IEEE 802.11a
- IEEE 802.11b
- IEEE 802.11g
- IEEE 802.11n
- IEEE 802.11ac
- IEEE 802.11ax
- IEEE 802.11d
- IEEE 802.11e
- IEEE 802.11h
- IEEE 802.11i
- IEEE 802.11k
- IEEE 802.11r
- IEEE 802.11v

Interoperability Frequency Band

- Wi-Fi certified modules
- 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

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: max 866.7Mbps
- 802.11ax: max 1201Mbps

Modulation

- Direct Sequence Spread Spectrum
- BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM

Security³

- IEEE and WiFi certified 64 / 128 bit WEP encryption for a/b/g mode only
- AES-CCMP: 128 bit in hardware

Technical Specifications

	<ul style="list-style-type: none"> •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 Power²	<ul style="list-style-type: none"> • 802.11b: +18.5dBm minimum • 802.11g: +17.5dBm minimum • 802.11a: +18.5dBm minimum • 802.11n HT20(2.4GHz): +15.5dBm minimum • 802.11n HT40(2.4GHz): +14.5dBm minimum • 802.11n HT20(5GHz): +15.5dBm minimum • 802.11n HT40(5GHz): +14.5dBm minimum • 802.11ac VHT80(5GHz): +11.5dBm minimum • 802.11ax HE40(2.4GHz): +10dBm minimum • 802.11ax HE80(5GHz): +10dBm minimum
Power Consumption	<ul style="list-style-type: none"> •Transmit mode:2.5 W •Receive mode:2 W •Idle mode (PSP)180 mW(WLAN Associated) •Idle mode:50 mW(WLAN unassociated) •Connected Standby/Modern Standby: 10mW •Radio disabled: 8 mW
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity⁴	<ul style="list-style-type: none"> •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 : -84dBm maximum •802.11ac, MCS9 : -59dBm maximum •802.11ax, MCS11(HE40): -57dBm maximum •802.11ax, MCS11(HE80): -54dBm 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 126: 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)

Technical Specifications

Altitude	Operating	0 to 10,000 ft (3,048 m)
	Non-operating	0 to 50,000 ft (15,240 m)
LED Activity		LED Amber – Radio OFF LED Off – Radio ON

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

Bluetooth Specification	4.0/4.1/4.2/5.0/5.1/5.2/5.3 Compliant
Frequency Band	2402 to 2480 MHz
Number of Available Channels	Legacy: 0~79 (1 MHz/CH) BLE: 0~39 (2 MHz/CH)
Data Rates and Throughput	Legacy: 3 Mbps data rate; throughput up to 2.17 Mbps BLE: 1 Mbps data rate; throughput up to 0.2 Mbps Legacy: Synchronous Connection Oriented links up to 3, 64 kbps, voice channels Legacy: Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)
Transmit Power	The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 4 dBm for BR and EDR.

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

Technical Specifications

Intel® XMM™ 7560 R+ LTE-Advanced Pro¹	Technology/Operating bands	<p>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).</p> <p>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</p>
	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 GPS bands	Standalone GPS/Beidou/Glonass, A-GPS (MS-A, MS-B) 1575.42 MHz ± 1.023 MHz, GLONASS 1596-1607MHz, Beidou 1561.098 MHz
	Maximum data rates	LTE: 978 Mbps (Download), 150 Mbps (Upload) DC-HSPA+: 42 Mbps (Download), 5.76 Mbps (Upload) HSPA+: 21Mbps (Download), 5.76 Mbps (Upload)
	Maximum output power	LTE: 23 dBm in all band except B41 LTE B41 HPUE = 26dBm HSPA+: 23.5 dBm
	Maximum power consumption	LTE: 1,200 mA (peak); 900 mA (average) HSPA+: 1,100 mA (peak); 800 mA (average)
	Form Factor	M.2, 3042-S3 Key B
	Weight	6 g
	Dimensions (Length x Width x Thickness)	42 x 30 x 2.3 mm
	eSIM	Support

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

Technical Specifications

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

Technical Specifications

1. WWAN module is an optional feature, requires factory configuration and requires separately purchased service contract. Check with service provider for coverage and availability in your area. Connection speeds will vary due to location, environment, network conditions, and other factors. LTE not available on all products, in all regions

Realtek RTL8111HSH 10/100/1000 Integrated NIC	Ethernet Features	10 Mbit/s operation (10BASE-T; IEEE 802.3i; IEEE 802.3 clauses 13-14) 100 Mbit/s operation (100BASE-TX; IEEE 802.3u; IEEE 802.3 clauses 21-30) 1000 Mbit/s operation (1000BASE-T; IEEE 802.3ab; IEEE 8023 clauses 40) Auto-Negotiation (Automatic Speed Selection) Full Duplex Operation at all Speeds, Half Duplex operation at 10 and 100 Mbit/s
	Power Management	ACPI compliant – multiple power modes Situation-sensitive features reduce power consumption Advanced link down power saving for reducing link down power consumption
	Performance Features	TCP/IP/UDP Checksum Offload (configurable) Protocol Offload (ARP & NS) Large send offload and Giant send offload Receiving Side Scaling Jumbo Frame 9K
	Manageability	Wake-on-LAN from modern standby or sleep state (Magic Packet and Microsoft Wake-Up Frame); Wake-on-LAN from off (Magic Packet only) PXE 2.1 Remote Boot Statistics Gathering (SNMP MIB II, Ethernet-like MIB, Ethernet MIB (802.3x, clause 30)) Comprehensive diagnostic and configuration software suite Virtual Cable Doctor for Ethernet cable status
	Interface NIC Device Driver Name	PCIe + SMBus Realtek PCIe GBE Ethernet Family Controller

Realtek RTL8111FPH 10/100/1000 Integrated NIC	Ethernet Features	10 Mbit/s operation (10BASE-T; IEEE 802.3i; IEEE 802.3 clauses 13-14) 100 Mbit/s operation (100BASE-TX; IEEE 802.3u; IEEE 802.3 clauses 21-30) 1000 Mbit/s operation (1000BASE-T; IEEE 802.3ab; IEEE 8023 clauses 40) Auto-Negotiation (Automatic Speed Selection) Full Duplex Operation at all Speeds, Half Duplex operation at 10 and 100 Mbit/s
	Power Management	ACPI compliant – multiple power modes Situation-sensitive features reduce power consumption Advanced link down power saving for reducing link down power consumption
	Performance Features	TCP/IP/UDP Checksum Offload (configurable) Protocol Offload (ARP & NS) Large send offload and Giant send offload Receiving Side Scaling Jumbo Frame 9K

Technical Specifications

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 &

Support DASH 1.2 compliant

Manageability:**Interface**

PCIe + SMBus

NIC Device Driver

Realtek PCIe GBE Ethernet Family Controller

Name

Technical Specifications

POWER

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

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

AC Adapter 45 Watt Smart nPFC Standard Barrel 4.5mm Right Angle 1.8m	Dimensions	95x45x26.5mm
	Weight	unit: 200g +/- 10g
	Input	Input Efficiency
		87.74 % at 115 Vac and 88.4 % at 230Vac
		Input frequency range
		47 ~ 63 Hz
		Input AC current
		Max. 1.4 A at 90 Vac
	Output	Output power
		45W
		DC output
		19.5V
		Hold-up time
		5ms at 115 Vac input
		Output current limit
		<8.0A

Technical Specifications

Connector	4.5mm Barrel Type
Environmental Design	Operating temperature 32°F to 95°F (0°to 35°C)
	Non-operating (storage) temperature -4°F to 185°F (-20°to 85°C)
	Altitude 0 to 16,400 ft (0 to 5,000m)
	Humidity 20% to 95%
	Storage Humidity 10% to 95%
EMI and Safety Certifications	Eg:
	*CE Mark - full compliance with LVD and EMC directives
	* Worldwide safety standards - IEC60950-1 and/or IEC62368-1, EN60950-1 and/or EN62368-1, UL60950-1 and/or UL62368-1 , Class1, SELV;
	Agency approvals - C-UL-US, NORDICS, DENAN, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC, NOM-001 NYCE.
	* MTBF - over 200,000 hours at 25°C ambient condition.

AC Adapter 65 Watt nPFC Standard USB type C Straight 1.8m

Dimensions	90.0 x 51 x 28.5mm
	Weight unit: 250g +/- 10g
Input	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 1.6 A at 90 VAC and maximum load 5V/15W 9V/27W 12V/60W 15V/60W 20V/65W
	Output power 5V/9V/12V/15V/20V
	DC output 5V/9V/12V/15V/20V
Output	Hold-up time 5ms at 115 Vac input
	Output current limit <8.0A
Connector	USB Type C
Environmental Design	Operating temperature 32°Fto 95°F (0°to 35°C)
	Non-operating (storage) temperature -4°Fto 185°F (-20°to 85°C)
	Altitude 0 to 16,400 ft (0 to 5,000m)
	Humidity 20% to 95
	Storage Humidity 10% to 95%

Technical Specifications

EMI and Safety Certifications

Eg:
 *CE Mark - full compliance with LVD and EMC directives
 * Worldwide safety standards - IEC60950-1 and/or IEC62368-1, EN60950-1 and/or EN62368-1, UL60950-1 and/or UL62368-1 , Class1, SELV;
 Agency approvals - C-UL-US, NORDICS, DENAN, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC, NOM-001 NYCE.
 * MTBF - over 200,000 hours at 25°C ambient condition.

AC Adapter 65 Watt Smart nPFC EM Barrel 4.5mm

Dimensions

102 x 55 x 30mm

Weight

unit: 250g +/- 10g

Input

Input Efficiency 88.0 % at 115 Vac and 89.0 % at 230Vac
Input frequency range 47 ~ 63 Hz
Input AC current Max. 1.7 A at 90 Vac

Output

Output power 65W
DC output 19.5V
Hold-up time 5ms at 115 Vac input
Output current limit <11.0A

Connector

4.5mm Barrel Type

Environmental Design

Operating temperature 32°F to 95°F (0°to 35°C)
Non-operating (storage) temperature -4°F to 185°F (-20°to 85°C)
Altitude 0 to 16,400 ft (0 to 5,000m)
Humidity 20% to 95%
Storage Humidity 10% to 95%

EMI and Safety Certifications

Eg:
 *CE Mark - full compliance with LVD and EMC directives
 * Worldwide safety standards - IEC60950-1 and/or IEC62368-1, EN60950-1 and/or EN62368-1, UL60950-1 and/or UL62368-1 , Class1, SELV;
 Agency approvals - C-UL-US, NORDICS, DENAN, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC, NOM-001 NYCE.
 * MTBF - over 200,000 hours at 25°C ambient condition.

AC Adapter 65 Watt Smart nPFC Standard Barrel 4.5mm Right Angle 1.8m

Dimensions

90 x 51 x 28.5mm

Weight

230g +/-10%

Input

Input Efficiency 88.0 % at 115 Vac and 89.0 % at 230 Vac
Input frequency range 47 ~ 63 Hz
Input AC current Max. 1.7 A at 90 Vac

Output

Output power 65W
DC output 19.5V
Hold-up time 5 ms at 115 Vac input
Output current limit <11.0A

Connector

4.5mm Barrel Type

Technical Specifications

Environmental Design	Operating temperature	32°F to 95°F (0°to 35°C)
	Non-operating (storage) temperature	-4°F to 185°F (-20°to 85°C)
	Altitude	0 to 16,400 ft (0 to 5000m)
	Humidity	20% to 95%
	Storage Humidity	10% to 95%
	EMI and Safety Certifications	Eg: *CE Mark - full compliance with LVD and EMC directives * Worldwide safety standards - IEC60950-1 and/or IEC62368-1, EN60950-1 and/or EN62368-1, UL60950-1 and/or UL62368-1 , Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC, NOM-001 NYCE. * MTBF - over 200,000 hours at 25°C ambient condition.

AC Adapter 65 Watt 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	1.7 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	
	Connector	Output current limit	<8.0A	
	Environmental Design	USB Type C		
		Operating temperature	32°F to 95°F (0°to 35°C)	
		Non-operating (storage) temperature	-4°F to 185°F (-20°to 85°C)	
		Altitude	0 to 16,400 ft (0 to 5,000m)	
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

RH 42Whr Long Life Polymer Fast Charge 3 cell Battery	Dimensions (H x W x L)	6.2 x 76.25 x 249.50 mm (0.244 x 3.002 x 9.823 inch)
	Weight	0.18 kg (0.397 lb)
	Cells/Type	3cell Lithium-Ion Polymer cell / 545974
	Energy	
	Voltage	11.4V
	Amp-hour capacity	3.752Ah
	Watt-hour capacity¹	42.75Wh
	Temperature	
	Operating (Charging)	32° to 113° F (0° to 45° C)
	Operating (Discharging)	14° to 122° F (-10° to 60° C)
	Fuel Gauge LED	N/A
	Warranty	
	Optional Travel Battery Available	No

RH 51Whr Long Life Polymer Fast Charge 3 cell Battery	Dimensions (H x W x L)	6.50 x 67.80 x 254.00 mm (0.256 x 2.669 x 10 inch)
	Weight	0.2025 kg (0.446 lb)
	Cells/Type	3cell Lithium-Ion Polymer cell / 566075
	Energy	
	Voltage	11.58V
	Amp-hour capacity	4.431Ah
	Watt-hour capacity¹	51.3Wh
	Temperature	
	Operating (Charging)	32° to 113° F (0° to 45° C)
	Operating (Discharging)	14° to 122° F (-10° to 60° C)
	Fuel Gauge LED	N/A
	Warranty	
	Optional Travel Battery Available	No

Technical Specifications

AUDIO

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

FINGERPRINT READER

Sensor vendor	Model: Elan efsa80ST (module P1515E)
Sensor type	Capacitive
DPI resolution	508 dpi
Scan area	80*80 pixels
False Rejection Rate	FRR: ≤ 3%
False Acceptance Rate	FAR: 1:100K
Mobile Voltage Operation	2.7V to 3.6V
Operating Temperature	-4°F – 175°F (-20° ~ +80°C)
Current Consumption	50mA peak
Image	
Low Latency Wait For Finger	900uA
Capture Rate	30 frame/sec
ESD Resistance	+15KV
Detection Matrix	80*80 pixels/ 508 dpi / 4*4mm sensor area

Technical Specifications

ENVIRONMENTAL DATA

Eco-Label Certifications & declarations	<p>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:</p> <ul style="list-style-type: none"> • 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 Specifications	Impact <ul style="list-style-type: none"> • Ocean-bound plastic in Speaker • 15% post-consumer recycled plastic • Low halogen • Outside Box and corrugated cushions are 100% sustainably sourced and recyclable • Recycled Plastic cushions • Bulk packaging available 		
System Configuration	<p>The configuration used for the Energy Consumption and Declared Noise Emissions data for the Notebook model is based on a “Typically Configured Notebook”.</p>		
Energy Consumption (in accordance with US ENERGY STAR® test method)	115VAC, 60Hz	230VAC, 50Hz	100VAC, 50Hz
Normal Operation (Sort idle)	5.57 W	5.47 W	5.01 W
Normal Operation (Long idle)	0.95 W	1.31 W	1.23 W
Sleep	0.95 W	1.31 W	1.23 W
Off	0.30 W	0.30 W	0.28 W
	<p>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.</p>		
Heat Dissipation*	115VAC, 60Hz	230VAC, 50Hz	100VAC, 50Hz
Normal Operation (Short idle)	19 BTU/hr	18.7 BTU/hr	17.1 BTU/hr
Normal Operation (Long idle)	3.2 BTU/hr	4.5 BTU/hr	4.2 BTU/hr
Sleep	3.2 BTU/hr	4.5 BTU/hr	4.2 BTU/hr
Off	1 BTU/hr	1 BTU/hr	1 BTU/hr
	<p>*NOTE: Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.</p>		

Technical Specifications

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)	Sound Power (L _{WAd} , bels)	Sound Pressure (L _{pAm} , decibels)	
Typically Configured – Idle	2.2	13.3	
Fixed Disk – Random writes	2.7	18.3	
Optical Drive – Sequential reads	2.9	22.4	
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	<ul style="list-style-type: none"> 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 93.2% recycle-able when properly disposed of at end of life. 		
Packaging Materials	External:	PAPER/Corrugated	220 g
	Internal:	PLASTIC/EPE (Expanded Polyethylene)	170 g
		PLASTIC/Polyethylene low density - LDPE	55 g
		PLASTIC/Polypropylene - PP	3 g
	The plastic packaging material contains at least 0.0% recycled content.		
The corrugated paper packaging materials contains at least 54.5% recycled content.			
RoHS Compliance	<p>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.</p> <p>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.</p> <p>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.</p> <p>To obtain a copy of the HP RoHS Compliance Statement, see HP RoHS position statement.</p>		
Material Usage	<p>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):</p> <ul style="list-style-type: none"> Asbestos Certain Azo Colorants 		

Technical Specifications

	<ul style="list-style-type: none"> • 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)
<p>Packaging Usage</p>	<p>HP follows these guidelines to decrease the environmental impact of product packaging:</p> <ul style="list-style-type: none"> • 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.
<p>End-of-life Management and Recycling</p>	<p>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.</p> <p>The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: http://www.hp.com/go/recyclers. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.</p>

Technical Specifications

<p>HP, Inc. Corporate Environmental Information</p>	<p>For more information about HP's commitment to the environment:</p> <p>Global Citizenship Report http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html</p> <p>Eco-label certifications http://www8.hp.com/us/en/hp-information/environment/ecolabels.html</p> <p>ISO 14001 certificates: http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842 and http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf</p>
<p>footnotes</p>	<ul style="list-style-type: none"> • Percentage of ocean-bound plastic contained in each component varies by product • Recycled plastic content percentage is based on the definition set in the IEEE 1680.1-2018 standard. • External power supplies, WWAN modules, power cords, cables and peripherals excluded. • 100% outer box packaging and corrugated cushions made from sustainably sourced certified and recycled fibers. • Plastic cushions are made from >90% recycled plastic.

COUNTRY OF ORIGIN

China

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

DOCKING (Sold Separately)

Docking station model #1	HP Thunderbolt Dock G2
Total number of supported displays (incl.the notebook display)	4
Max.resolutions supported	Dual 4K @30Hz or dual 4K UHD @ 60Hz is supported Dual 8K@ 60Hz for TB hosts or USB-C hosts DP 1.4 with DSC in high res mode 2xDP, 1xVGA, 1xTB, 1xUSB-C alt-mode
Dock Connectors	
Technical limitations	Thunderbolt Hosts: Maximum of (4) displays with maximum resolution of 5K@ 30Hz running Thunderbolt host. Maximum resolution possible is dual 8K displays @ 60Hz running Thunderbolt host or running a non-Thunderbolt host in high resolution mode @30Hz Non-Thunderbolt hosts: The highest resolution for dual displays running a non-Thunderbolt host in multi-function mode is (1) 5K dual cable (using both DP ports) +(1) 4K on USB-C DP port Non-Thunderbolt hosts support (3) displays with a maximum resolution of (2) 5K single cable + (1) 4K UHD @ 60 Hz in high resolution mode. In multi-function mode the maximum resolution for (3) displays is (2) 5K single cable @ 30Hz + (1) 4K UHD @ 30Hz.
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 3840 x 2160
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.

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

Category	Description	Part Number
Audio/Video	HP Wired USB-A Stereo Headset	428K6AA
	HP Wired 3.5mm Stereo Headset	428K7AA
Cases	HP Business 14.1 Sleeve	2UW01AA
	HP Business Slim 17.3 Top Load	2UW02AA
	HP Executive 14.1 Tote	6KD10AA
	HP Executive 15.6 Backpack	6KD07AA
	HP Executive 15.6 Top Load	6KD06AA
	HP Executive 17.3 Backpack	6KD05AA
	HP Executive 17.3 Top Load	6KD08AA
	HP Executive Leather 15.6 Top Load	6KD09AA
	HP Executive Slim 14.1 Top Load	6KD04AA
	HP Prelude G2 15.6 Backpack	1E7D6AA
	HP Prelude G2 15.6 Top Load	1E7D7AA
	HP Prelude Pro Recycled 15.6 Backpack	1X644AA
	HP Prelude Pro Recycled 15.6 Top Load	1X645AA
	HP Renew 14 Laptop Sleeve	2E6U9AA,2E6V0AA
	HP Renew Business 14.1 Laptop Sleeve	3E2U7AA
	HP Renew Business 17.3 Laptop Backpack	3E2U5AA
	HP Renew Business 17.3 Laptop Bag	3E2U6AA
	HP Renew Business 14.1 Laptop Bag	3E5F9AA
HP Renew Business 15.6 Laptop Bag	3E5F8AA	
Docking	HP Thunderbolt 120W G2 Dock	2UK37AA
	HP Thunderbolt 120W G2 Dock w/Audio	3YE87AA
	HP Thunderbolt 120W G4 Dock	4J0A2AA
	HP Thunderbolt 230W G2 Dock w/Combo Cable	3TR87AA
	HP Thunderbolt 280W G4 Dock w/Combo Cable	4J0G4AA
	HP USB-C/A 120W G2 Universal Dock	5TW13AA
	HP USB-C 120W G5 Dock	26D32AA
Hub	HP Universal USB-C Multiport Hub	50H55AA
	HP USB-C Travel Dock G2	7PJ38AA
	HP USB-C to USB-A Hub	Z6A00AA
Adapter	HP HDMI to DVI Adapter	F5A28AA
	HP HDMI to VGA Adapter	H4F02AA
	HP USB-C to DisplayPort Adapter	N9K78AA
	HP USB-C to HDMI 2.0 Adapter	1WC36AA
	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

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

	HP 125 WD USB Keyboard	266C9AA
	HP 320K WD USB Keyboard	9SR37AA
	HP 655 Wireless Keyboard and Mouse Combo	4R009AA
	HP 225 Wired Mouse and Keyboard Combo	286J4AA
	HP 235 Wireless Mouse and Keyboard Combo	1Y4D0AA
	HP Slim Wireless Keyboard and Mouse	T6L04AA
	HP Wired Desktop 320MK Mouse and Keyboard	9SR36AA
	HP Wireless Rechargeable 950MK Mouse and Keyboard	3M165AA
Mouse	HP USB Premium Wireless Mouse	1JR31AA
	HP 435 Multi-Device Wireless Mouse	3B4Q5AA
	HP 125 USB-A Wired Mouse	265A9AA
	HP 128 USB Laser Wired Mouse	265D9AA
	HP 320M USB-A Wired Mouse	9VA80AA
	HP Creator USB-A+Bluetooth 935 Wireless Mouse Black	1D0K8AA
	HP USB-A+Bluetooth Multi-Device 635 Wireless Mouse Black	1D0K2AA
	HP USB-A+Bluetooth Travel Bluetooth Mouse	6SP30AA
Power	HP 65W USB-C Auto Chevy AC Power Adapter	5TQ76AA
	HP 45W 4.5 mm Smart AC Power Adapter	H6Y88AA
	HP 45W USB-C G2 Zeus AC Power Adapter	1HE07AA
	HP 45W USB-C LC Dali AC Power Adapter	1MZ01AA
	HP 65W 4.5 mm LC Smart non-EM India Ony AC Power Adapter	3FF84AA#ACJ
	HP 65W 4.5 mm Smart AC Power Adapter	H6Y89AA
	HP 65W 4.5 mm wDongle 7.4 mm Slim AC Power Adapter	H6Y82AA
	HP 65W USB-C Hades AC Power Adapter	1HE08AA
	HP 65W USB-C LC AC Power Adapter	1P3K6AA
Commodity	HP USB DVD-Writer EXT ODD	F2B56AA
	HP Nano Keyed Cable Lock	1AJ39AA
	HP Nano Master Keyed Cable Lock	1AJ40AA
	HP SureKey Standard/Nano/Wedge Cable Lock	6UW42AA

Summary of Changes

Date of change	Version History		Description of change
January 25, 2022	V1 to V2	Added	TPM, Smart reader, IPv6 Compliance and FirstNet Certified in Security section and Battery Life
February 11, 2022	V2 to V3	Updated	USB Type-C® and HDMI from Ports/Slots section
February 22, 2022	V3 to V4	Updated	Battery life and WWAN module
March 1, 2022	V4 to V5	Added	Wake on WLAN in Networking section
March 14, 2022	V5 to V6	Added	Battery Compliance in Power section
April 11, 2022	V6 to V7	Added	Reference for USB ports
May 24, 2022	V7 to V8	Added	DASH support in Networking section
June 15, 2022	V8 to V9	Added	Added note in Manageability Feature
October 19, 2022	V9 to V10	Updated	Bluetooth version
November 4, 2022	V10 to V11	Updated	Ports section
December 7, 2022	V11 to V12	Updated	Windows OS
December 19, 2022	V12 to V13	Updated	Battery life section
January 20, 2023	V13 to V14	Updated	Operating System
January 25, 2023	V14 to V15	Added	Miracast in Networking section

© Copyright 2023 HP Development Company, L.P. The information contained herein is subject to change without notice. The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.

Intel, Core and Intel vPro are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. DisplayPort™ and the DisplayPort™ logo are trademarks owned by the Video Electronics Standards Association (VESA®) in the United States and other countries. USB Type-C® and USB-C® are trademarks of USB Implementers Forum. ENERGY STAR is a registered trademark of the U.S. Environmental Protection Agency. Microsoft and Windows are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.