

Overview

HP EliteBook 845 G8 Notebook PC



Left

- | | |
|------------------------------------|---|
| 1. Ambient Light Sensor (Optional) | 7. Smartcard Reader (Optional) |
| 2. Internal microphones (2) | 8. Audio Combo Jack |
| 3. Webcam LED (Optional) | 9. SuperSpeed USB Type-A 5Gbps signaling rate (USB 3.2 Gen 1) |
| 4. Camera Shutter | 10. SuperSpeed USB Type-A 5Gbps signaling rate (1 charging) (USB 3.2 Gen 1) |
| 5. HD and IR Camera (Optional) | 11. Nano Security Lock Slot (Lock sold separately) |
| 6. Glass Clickpad | |

Overview



Left

1. Power Button Key
2. Power Connector
3. HDMI 2.0 port (Cable not included)
4. SuperSpeed USB Type-C® 10Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4)
5. SuperSpeed USB Type-C® 10Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4)
6. SIM Card Slot (Optional)
7. Touch Fingerprint Sensor (Select models)

Technical Specifications

AT A GLANCE

- Windows 11 Pro, other Windows OS or FreeDOS preinstalled
- Premium ultraslim design with precision-crafted machined aluminum (CNC) chassis for a premium look and feel
- Latest AMD® Ryzen PRO and non-PRO 5000 processors
- Display include your choice of 35.56cm (14") diagonal IPS Wide viewing Angle, FHD, Touch or Non-Touch
- AMD Radeon™ Graphics
- Enterprise grade security with HP Sure Sense, HP Sure Start Gen, HP Privacy Camera, HP Sure View, HP Sure, Run Gen, HP Sure Recover Gen, HP Sure Click, SmartCard Reader and Touch Fingerprint reader (selective models)
- Designed to pass 19 MIL-STD 810H testing, plus an additional 120,000 hours of reliability testing through HP's Total Test Process¹
- Weight starting at 3.02 lb (1.37 kg)
- Battery life up to 20 hours
- Supports wireless LAN and wireless WAN options for connectivity on the go
- Up to 2 TB Solid State Drives
- Up to 64 GB total system memory
- 720p HD webcam, IR camera for face authentication with Windows Hello
- Support HP Sure View with optional 1000 nit Anti-Glare Privacy Screen which prevents visual hacking
- World's first AMD-based business laptops with Wi-Fi 6E²

1. MIL-STD 810H is not intended to demonstrate fitness of U.S. Department of Defense contract requirements or for military use. Test results are not a guarantee of future performance under these test conditions. Accidental damage requires an optional HP Accidental Damage Protection Care Pack.

2. Based on HP's internal analysis of AMD based business laptops with encryption, authentication, malware protection. BIOS level protection and passing MIL-STD testing shipping with Wi-Fi6E as of 08/29/2021. Wi-Fi 6E requires separately purchased 6GHz router and is only available in countries where Wi-Fi 6E is supported.

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

Technical Specifications

PRODUCT NAME

HP EliteBook 845 G8 Notebook PC

OPERATING SYSTEM

Preinstalled	Windows 11 Pro ²
	Windows 11 Pro Education ²
	Windows 11 Home – HP recommends Windows 11 Pro for business ²
	Windows 11 Home Single Language – HP recommends Windows 11 Pro for business ²
	Windows 11 Pro (Windows 11 Enterprise available with a Volume Licensing Agreement) ²
	Windows 10 Pro ^{1,2}
	Windows 10 Pro Education ^{1,2}
	Windows 10 Home – HP recommends Windows 11 Pro for business ^{1,2}
	Windows 10 Home Single Language – HP recommends Windows 11 Pro for business ^{1,2}
	Windows 10 Pro (Windows 10 Enterprise available with a Volume Licensing Agreement) ^{1,2}
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>.
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PROCESSORS

AMD Ryzen™ 7 PRO 5850U APU (1.9 GHz base clock, up to 4.4 GHz max boost clock, 20 MB L2+L3 cache, 8 cores)
AMD Ryzen™ 5 PRO 5650U APU (2.3 GHz base clock, up to 4.2 GHz max boost clock, 19 MB L2+L3 cache, 6 cores)
AMD Ryzen™ 3 PRO 5450U APU (2.6 GHz base clock, up to 4.0 GHz max boost clock, 10 MB L2+L3 cache, 4 cores)
AMD Ryzen™ 7 5800U APU (1.9 GHz base clock, up to 4.4 GHz max boost clock, 20 MB L2+L3 cache, 8 cores)
AMD Ryzen™ 5 5600U APU (2.3 GHz base clock, up to 4.2 GHz max boost clock, 19 MB L2+L3 cache, 6 cores)
AMD Ryzen™ 3 5400U APU (2.6 GHz base clock, up to 4.0 GHz max boost clock, 10 MB L2+L3 cache, 4 cores)

Processor Family

3 Gen AMD® Ryzen™ PRO processor^{3, 4, 5}

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

Technical Specifications

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. 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>.

CHIPSET

Chipset is integrated with processor

GRAPHICS

Integrated

AMD Radeon™ Graphics⁶

Supports

Support HW decode, DX12, HDMI 2.0 and HDCP 2.2

6. HD content required to view HD images.

DISPLAY

Non-Touch

35.56 cm (14") diagonal FHD IPS eDP anti-glare WLED-backlit bent, 250 nits, 45% NTSC (1920 x 1080)^{6,7,8}

35.56 cm (14") diagonal FHD IPS eDP anti-glare WLED-backlit bent, 250 nits, 45% NTSC for HD camera (1920 x 1080)^{6,7,8}

35.56 cm (14") diagonal FHD IPS eDP anti-glare WLED-backlit bent, 250 nits, 45% NTSC for HD + IR camera (1920 x 1080)^{6,7,8}

35.56 cm (14") diagonal FHD IPS eDP anti-glare WLED-backlit bent, 250 nits, 45% NTSC for WWAN (1920 x 1080)^{6,7,8}

35.56 cm (14") diagonal FHD IPS eDP anti-glare WLED-backlit bent, 250 nits, 45% NTSC for HD camera for WWAN (1920 x 1080)^{6,7,8}

35.56 cm (14") diagonal FHD IPS eDP anti-glare WLED-backlit bent, 250 nits, 45% NTSC for HD + IR camera for WWAN (1920 x 1080)^{6,7,8}

35.56 cm (14") diagonal FHD IPS eDP + PSR anti-glare WLED-backlit bent, 1000 nits with HP Sure View Integrated Privacy Screen, 72% NTSC with Ambient Light Sensor and HD camera (1920 x 1080)^{6,7,8,9,10}

35.56 cm (14") diagonal FHD IPS eDP + PSR anti-glare WLED-backlit bent, 1000 nits with HP Sure View Integrated Privacy Screen, 72% NTSC with Ambient Light Sensor and HD + IR camera (1920 x 1080)^{6,7,8,9,10}

35.56 cm (14") diagonal FHD IPS eDP + PSR anti-glare WLED-backlit bent, 1000 nits with HP Sure View Integrated Privacy Screen, 72% NTSC with Ambient Light Sensor and HD camera for WWAN (1920 x 1080)^{6,7,8,9,10}

35.56 cm (14") diagonal FHD IPS eDP + PSR anti-glare WLED-backlit bent, 1000 nits with HP Sure View Integrated Privacy Screen, 72% NTSC with Ambient Light Sensor and HD + IR camera for WWAN (1920 x 1080)^{6,7,8,9,10}

Technical Specifications

35.56 cm (14") diagonal FHD IPS eDP + PSR anti-glare WLED-backlit bent, 400 nits 100% NTSC with Ambient Light Sensor and HD + IR camera with Low Power (1920 x 1080)^{6,7,8}

35.56 cm (14") diagonal FHD IPS eDP + PSR anti-glare WLED-backlit bent, 400 nits, 100% NTSC with Ambient Light Sensor and HD + IR camera for WWAN with Low Power (1920 x 1080)^{6,7,8}

Touch

35.56 cm (14") diagonal FHD IPS eDP anti-glare On-Cell WLED-backlit bent touch screen, 250 nits, 45% NTSC with HD+IR camera (1920 x 1080)^{6,7,8,10}

35.56 cm (14") diagonal FHD IPS eDP anti-glare On-Cell WLED-backlit bent touch screen, 250 nits, 45% NTSC, for HD+IR camera for WWAN (1920 x 1080)^{6,7,8,10}

HDMI 2.0

Support resolution up to 4K @ 60 Hz

Display Size

14"

35.56 cm (14")

- 6 HD content required to view HD images.
- 7 Sold separately or as an optional feature.
- 8 Resolutions are dependent upon monitor capability, and resolution and color depth settings.
- 9 HP Sure View integrated privacy screen is an optional feature that must be configured at purchase and is designed to function in landscape orientation.
- 10 Actual brightness will be lower with HP Sure View and touch screen.

STORAGE AND DRIVES

Primary Storage

128 GB PCIe® Gen3x2 NVMe™ M.2 SSD TLC¹¹

256 GB PCIe® Gen3x4 NVMe™ TLC Opal 2¹¹

256 GB PCIe® Gen3x4 NVMe™ SS TLC¹¹

256 GB PCIe® NVMe™ Value¹¹

512 GB PCIe® Gen3x4 NVMe™ TLC Opal 2¹¹

512 GB PCIe® Gen3x4 NVMe™ M.2 SS TLC¹¹

512 GB PCIe® NVMe™ Value¹¹

1 TB PCIe® Gen3 x4 NVMe™ SS TLC¹¹

2 TB PCIe® Gen3 x4 NVMe™ SS TLC¹¹

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

Technical Specifications

Technical Specifications

MEMORY

Maximum Memory

64 GB DDR4-3200 SDRAM

Memory

64 GB DDR4-3200 SDRAM (2 x 32 GB)¹²

32 GB DDR4-3200 SDRAM (2 x 16 GB)¹²

16 GB DDR4-3200 SDRAM (1 x 16 GB)¹²

16 GB DDR4-3200 SDRAM (2 x 8 GB)¹²

8 GB DDR4-3200 SDRAM (1 x 8 GB)¹²

8 GB DDR4-3200 SDRAM (2 x 4 GB)¹²

4 GB DDR4-3200 SDRAM (1 x 4 GB)¹²

Memory Slots

2 SODIMM

Both slots are customer accessible / upgradeable

DDR4 SODIMMS, system runs at 3200

Supports Dual Channel Memory

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

NETWORKING/COMMUNICATIONS

WLAN

Intel® AX200 Wi-Fi 6 (2x2) and Bluetooth® 5 Combo, non-vPro™ (supporting gigabit data rate)^{13,14}

Realtek RTL8822CE 802.11ac (2x2) and Bluetooth® 5 Combo¹⁵

Qualcomm WCN6856 Wi-Fi 6E and Bluetooth® 5.2 combo^{13,14}

Mediatek MT7921 Wi-Fi CERTIFIED 6™ (2x2) and Bluetooth® 5.2 combo^{13,14}

WWAN

Intel® XMM™ 7360 LTE-Advanced Cat 9¹⁶

NFC

NXP NPC300 Near Field Communication Module

Miracast

Native Miracast Support¹⁷

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13. 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.
14. 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.
15. Wireless access point and internet service required and sold separately. Availability of public wireless access points limited. Wi-Fi 5 (802.11 ac) is backwards compatible with prior 802.11 specs.
16. 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.
17. 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

Integrated 3 Multi Array Microphone

Speaker Power

2W/4ohm per speaker

Camera

720p HD camera^{6,7}

720p HD+IR camera^{6,7,18}

Sensors

Ambient light sensor (select models only)

Hall Sensor

6. HD content required to view HD images.
7. Sold separately or as an optional feature.
18. Internet access required.

Technical Specifications

KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS

Keyboard

HP Premium Keyboard, spill resistant
Backlit keyboard available as an option

Pointing Device

Clickpad with multi-touch gestures enabled, taps enabled as default
Microsoft Precision Touchpad Default Gestures Support

Function Keys

F1 - Display Switching
F2 - Blank or Privacy
F3 - Brightness Down
F4 - Brightness Up
F5 - Audio Mute
F6 - Volume Down
F7 - Volume Up
F8 - Mic Mute
F9 - Blank or Backlit Toggle
F10 - Insert
F11 - Airplane Mode
F12 - HP Command Center (Programmable Key)
Print Screen
Power Button (with LED)

Hidden Function Keys

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

Technical Specifications

SOFTWARE AND SECURITY

Software

HP Connection Optimizer¹⁹
HP Hotkey Support
myHP
HP Support Assistant²⁰
HP QuickDrop
HP Noise Cancellation Software
Touchpoint Customizer for Commercial
HP Notifications
HP Privacy Settings
HP Wireless Button Driver
HP Power Manager HP PC Hardware Diagnostics Windows
Microsoft Defender
Buy Microsoft Office (sold separately)
HP Smart Support ⁴⁶

Manageability Features

HP Driver Packs (download)²¹
HP Manageability Integration Kit Gen4 (download)²²
HP Client Catalog (download)
HP Client Management Script Library (download)
HP Image Assistant (download)

Security Management

HP Wolf Pro Security Edition²³
HP Client Security Manager Gen7²⁴
HP Sure Sense²⁵
HP Sure Click²⁶
HP Sure Run Gen4²⁷
HP Sure Recover Gen4²⁸
HP Sure Start Gen6²⁹
HP Sure Admin³⁰
HP BIOSphere Gen6³¹
BIOS Update via Network
HP Secure Erase³²
Absolute Persistence Module³³
HP Drive Lock & Automatic Drive Lock
TPM 2.0 Embedded Security Chip (Common Criteria EAL4+ Certified) (FIPS 140-2 Level 2 Certified)
HP Fingerprint Sensor³⁴

IPv6 Certification

Technical Specifications

Yes

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

UEFI version: 2.7

Class: Class 3

19. HP Connection Optimizer requires Windows 10.

20. HP Support Assistant internet access required.

21. HP Driver Packs not preinstalled, however available for download at

<http://www.hp.com/go/clientmanagement>.

22. HP Manageability Integration Kit can be downloaded from

<http://www8.hp.com/us/en/ads/clientmanagement/overview.html>.

23. HP Wolf Pro Security Edition (including HP Sure Click Pro and HP Sure Sense Pro) is available preloaded on select SKUs and, depending on the HP product purchased, includes a paid 1-year or 3-year license. The HP Wolf Pro Security Edition software is licensed under the license terms of the HP Wolf Security Software - End-User license Agreement (EULA) that can be found at: https://support.hp.com/us-en/document/ish_3875769-3873014-16 as that EULA is modified by the following: "7. Term. Unless otherwise terminated earlier pursuant to the terms contained in this EULA, the license for the HP Wolf Pro Security Edition (HP Sure Sense Pro and HP Sure Click Pro) is effective upon activation and will continue for either a twelve (12) month or thirty-six (36) month license term ("Initial Term"). At the end of the Initial Term you may either (a) purchase a renewal license for the HP Wolf Pro Security Edition from HP.com, HP Sales or an HP Channel Partner, or (b) continue using the standard versions of HP Sure Click and HP Sure Sense at no additional cost with no future software updates or HP Support. 24. HP Client Security Manager Gen7 requires Windows and is available on the select HP Elite and Pro PCs.

25. HP Sure Sense is available on select HP PCs and is not available with Windows 10 Home.

26. HP Sure Click requires Windows 10. See https://bit.ly/2PrLT6A_SureClick for complete details.

27. HP Sure Run Gen4 is available on select HP PCs and requires Windows 10.

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

29. HP Sure Start Gen6 is available on select HP PCs and requires Windows 10.

30. 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.

31. HP BIOSphere Gen6 requires Windows 10 and is available on select HP Pro and Elite PCs. Features may vary depending on the platform and configurations.

32. 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™.

33. 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/>.

34. HP Fingerprint sensor is an optional feature that must be configured at purchase.

46. 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.

Technical Specifications

Technical Specifications

SMART CARD READER

Smart Card Reader (Optional)	Smart card standard	PC/SC 2.0 for Windows smart card standard
	Dimensions (L x W x H)	0.41 x 0.08 x 0.32 in (10.5 x 2 x 8.2 mm)
	Smart Card support	ISO 7816 Class A and AB smart cards
	Smart Card Interface	Smart Card Interface with T = 0 and T = 1 support Support I2C memory card, SLE4418, SLE4428, SLE4432, SLE4442, SLE4436, SLE5536, SLE6636, AT88SC1608, AT45D041 card and AT45DB041 card via external EEPROM
	Model number	Alcor AU9560
	FIPS 201 Compliant	Yes

POWER**Power Supply**

HP Smart 45 W External AC power adapter³⁵

HP Smart 45 W External AC power adapter, 2-prong (Japan only)³⁵

HP Smart 65 W External AC power adapter³⁵

HP Smart 65 W EM External AC power adapter³⁵

HP Smart 65 W Slim Type-C[®] adapter³⁵

HP Smart 65 W Standard Type-C[®] adapter³⁵

Primary Battery

HP Long Life 3-cell, 53 Wh Li-ion^{36,37,38}

Support HP Fast Charge (Up to 50% in 30 minutes with 65W AC Adapter)³⁷

Power Cord

2-wire plug - 1.0m³⁵

3-wire plug - 1.0m³⁵

Battery Life

Up to 20 hours³⁹

Battery Weight

0.205 kg (0.45 lb)

35. Availability may vary by country.

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

37. Supports HP Fast Charge with 65W AC Adapter. Recharges the battery up to 50% within 30 minutes when the system is off or in standby mode. Power adapter with a minimum capacity of 65 watts is required. After charging has reached 50% capacity, charging will return to normal. Charging time may vary +/-10% due to System tolerance.

Technical Specifications

38. 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.

39. Windows 10 MM18 battery life will vary depending on various factors including product model, configuration, loaded applications, features, use, wireless functionality, and power management settings. The maximum capacity of the battery will naturally decrease with time and usage. See <http://www.bapco.com> for additional details.

WEIGHTS & DIMENSIONS

Product Weight⁴⁰

Non-touch

Starting at 3.02 lb

Starting at 1.37 kg

Touch

Starting at 3.28 lb

Starting at 1.49 kg

Product Dimensions (w x d x h)

Non-touch, WLAN only

12.73 x 8.44 x 0.70 in

32.34 x 21.46 x 1.79 cm

Touch, WLAN only

12.73 x 8.44 x 0.75 in

32.34 x 21.46 x 1.91 cm

WWAN

12.73 x 8.44 x 0.75 in

32.34 x 21.46 x 1.91 cm

40. Weight will vary by configuration.

Technical Specifications

PORTS

- 2 SuperSpeed USB Type-A 5Gbps signaling rate includes 1 charging port (USB 3.2 Gen 1)
- 2 SuperSpeed USB Type-C® 10Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4)
- 1 HDMI 2.0⁶
- 1 headphone/microphone combo
- 1 AC Power
- 1 SIM Card slot⁴¹
- 1 Smartcard reader (optional)

6. HD content required to view HD images.

41. SIM slot is not user accessible without WWAN configuration.

SERVICE AND SUPPORT

HP Services offers 1-year or 3-year limited warranties and 90-day software limited warranty options depending on country. Batteries have a default one-year limited warranty except for Long Life batteries which will have same 1-year or 3-year limited warranty as the platform. Refer to <http://www.hp.com/support/batterywarranty/> for additional battery information. On-site service and extended coverage is also available. HP Care Pack Services are optional extended service contracts that go beyond the standard limited warranties. To choose the right level of service for your HP product, use the HP Care Pack Services Lookup Tool at: <http://www.hp.com/go/cpc> ⁴²

42. 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 STAR® certified
- EPEAT® Gold⁴³
- Low halogen⁴⁴
- TCO 8.0 Certified

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

44. 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

Stand-Alone Power Requirements (AC Power)

Nominal Operating Voltage	19V
Average Operating Power	2.78w
Integrated graphics	Yes
Discrete Graphics	N/A
Max Operating Power	UMB < 45W

Temperature

Operating	32° to 95° F (0° to 35° C) (not writing optical)
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 g
Non-operating	1.50 g

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

UL	Yes
CSA	Yes
FCC Compliance	Yes
ENERGY STAR®	Yes
EPEAT	EPEAT Golden in United States ⁴⁵
ICES	Yes
Australia /	Yes
NZ A-Tick Compliance	Yes
CCC	Yes
Japan VCCI Compliance	Yes
KC	Yes
BSMI	Yes
CE Marking Compliance	Yes

Technical Specifications

BNCI or BELUS	Yes
CIT	Yes
GOST	Yes
Saudi Arabian Compliance (ICCP)	Yes
SABS	Yes

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

Technical Specifications

DISPLAYS¹

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

Panel LCD 14 inch FHD (1920 x 1080) Anti-Glare WLED UWVA 45% cg 250 nits eDP 1.2 w/o PSR bent NWBZ	Outline Dimensions (W x H x D)	316.17 x 186.4 mm (max) (w/ PCB)
	Active Area	309.37 x 174.02 mm
	Weight	300 g (max)
	Diagonal Size	14.0 in
	Thickness	3.0 mm/ 5.0 mm (PCB) (max)
	Interface	eDP 1.2 (2lane)
	Surface Treatment	Anti-Glare
	Touch Enabled	No
	Contrast Ratio	600:1
	Refresh Rate	60 Hz
	Brightness	250 nits
	Pixel Resolution	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

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	Outline Dimensions (W x H x D)	316.17 x 186.4 mm (max) (w/ PCB)
	Active Area	309.37 x 174.02 mm
	Weight	305 g (max)
	Diagonal Size	14.0 in
	Thickness	3.0 mm/ 5.0 mm (PCB) (max)
	Interface	eDP 1.2
	Surface Treatment	Anti-Glare On-cell
	Touch Enabled	Yes
	Contrast Ratio	600:1
	Refresh Rate	60 Hz
	Brightness	250 nits
	Pixel Resolution	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

Technical Specifications

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 x D)	315.07 x 186.6 mm (max)
	Active Area	309.37 X 174.02 mm
	Weight	200 g (max)
	Diagonal Size	14.0 in
	Thickness	2.0 mm / 4.0 mm (PCB) (max)
	Interface	eDP 1.4
	Surface Treatment	Anti-Glare
	Touch Enabled	No
	Contrast Ratio	1200:1
	Refresh Rate	60 Hz
	Brightness	400 nits
	Pixel Resolution	1920 x 1080 (FHD)
	Format	RGB Stripe
	Backlight	LED
	Color Gamut Coverage	sRGB 100% (NTSC 72%)
	Color Depth	6 bits
	Viewing Angle	UWVA 85/85/85/85

Panel LCD 14-in FHD (1920 x 1080) Anti-Glare WLED UWVA 72percent cg 1000nits eDP 1.4+PSR Sure View Reflect bent	Outline Dimensions (W x H x D)	314.612 x 185.33 mm (max.)
	Active Area	309.312 x 173.99 mm
	Weight	230 g (max)
	Diagonal Size	14.0 in
	Thickness	3.9 mm (max)
	Interface	eDP
	Surface Treatment	Anti-glare (AG)
	Touch Enabled	No
	Contrast Ratio	1500:1
	Refresh Rate	60 Hz
	Brightness	1000 nits
	Pixel Resolution	1920 x 1080 (FHD)
	Format	RGB
	Backlight	LED
	Color Gamut Coverage	sRGB 100% (NTSC 72%)
	Color Depth	8 bits
	Viewing Angle	UWVA 85/85/85/85

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STORAGE ¹

1. 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 128 GB 2280 PCIe-3x2 Three Layer Cell	Form Factor	M.2 2280
	Capacity	128 GB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen3X2
	Maximum Sequential Read	Up to 1400 ~ 2100 MB/s
	Maximum Sequential Write	Up to 800 ~ 1200 MB/s
	Logical Blocks	250,069,680
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	ATA Security (Option); TRIM; L1.2

SSD 1TB 2280 PCIe-3x4 NVMe Three Layer Cell single-sided	Form Factor	M.2 2280
	Capacity	1 TB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen3X4
	Maximum Sequential Read	Up to 3100 ~ 3500 MB/s
	Maximum Sequential Write	Up to 2700 ~ 3037 MB/s
	Logical Blocks	2,000,409,264
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	ATA Security; TRIM; L1.2

SSD 256GB 2280 M2 PCIe-3x4 SS NVMe TLC	Form Factor	M.2 2280
	Capacity	256 GB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen3X4
	Maximum Sequential Read	Up to 2800 ~ 3500 MB/s
	Maximum Sequential Write	Up to 1600 ~ 2200 MB/s
	Logical Blocks	500,118,192

Technical Specifications

SSD 256GB 2280 PCIe NVMe Value	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	ATA Security; TRIM; L1.2
	Form Factor	M.2 2280
	Capacity	256 GB
	NAND Type	Value
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen3X2
	Maximum Sequential Read	Up to 2100 ~ 2400 MB/s
	Maximum Sequential Write	Up to 950 ~ 1400 MB/s
	Logical Blocks	500,118,192
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
Features	ATA Security (Option); TRIM; L1.2	
SSD 256GB 2280 PCIe-3x4 NVMe Self Encrypted OPAL2 Three Layer Cell	Form Factor	M.2 2280
	Capacity	256 GB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen3X4
	Maximum Sequential Read	Up to 2800 ~ 3500 MB/s
	Maximum Sequential Write	Up to 1663 ~ 2200 MB/s
	Logical Blocks	500,118,192
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	ATA Security (Option); TCG Opal 2.0; TRIM; L1.2
	SSD 2TB 2280 PCIe-3x4 NVMe Three Layer Cell single-sided	Form Factor
Capacity		2 TB
NAND Type		TLC
Height		0.09 in (2.3 mm)
Width		0.87 in (22 mm)
Weight		0.02 lb (10 g)
Interface		PCIe NVMe Gen3X4
Maximum Sequential Read		Up to 3100 ~ 3500 MB/s
Maximum Sequential Write		Up to 2800 ~ 3000 MB/s
Logical Blocks		3,907,029,168
Operating Temperature		32° to 158°F (0° to 70°C) [ambient temp]
Features		ATA Security; TRIM; L1.2

Technical Specifications

 Technical Specifications

SSD 512GB 2280 M2 PCIe-3x4 SS NVMe TLC	Form Factor	M.2 2280
	Capacity	512 GB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen3X4
	Maximum Sequential Read	Up to 3100 ~ 3500 MB/s
	Maximum Sequential Write	Up to 2400 ~ 2956 MB/s
	Logical Blocks	1,000,215,215
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	ATA Security; TRIM; L1.2

SSD 512GB 2280 PCIe NVMe Value	Form Factor	M.2 2280
	Capacity	512 GB
	NAND Type	Value
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen3X2
	Maximum Sequential Read	Up to 1500 ~ 2400 MB/s
	Maximum Sequential Write	Up to 1000 ~ 1750 MB/s
	Logical Blocks	1,000,215,215
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	ATA Security (Option); TRIM; L1.2

SSD 512GB 2280 PCIe-3x4 NVMe Self Encrypted OPAL2 Three Layer Cell	Form Factor	M.2 2280
	Capacity	512 GB
	NAND Type	TLC
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen3X4
	Maximum Sequential Read	Up to 3100 ~ 3500 MB/s
	Maximum Sequential Write	Up to 2400 ~ 2956 MB/s
	Logical Blocks	1,000,215,215
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	ATA Security (Option); TCG Opal 2.0; TRIM; L1.2

Technical Specifications

Technical Specifications

NETWORKING

Intel Wi-Fi 6¹ AX200 +
Bluetooth 5 (802.11ax 2x2,
non-vPro, supporting
gigabit data rate ⁴speeds)
non-vPro

Wireless LAN Standards

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

Interoperability

Wi-Fi certified

Frequency Band

- 802.11b/g/n/ax
2.402 – 2.482 GHz
- 802.11a/n/ac/ax
4.9 – 4.95 GHz (Japan)
5.15 – 5.25 GHz
5.25 – 5.35 GHz
5.47 – 5.725 GHz
5.825 – 5.850 GHz

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: 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)

Modulation

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

Security³

- 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)

Technical Specifications

Roaming	IEEE 802.11 compliant roaming between access points
Output Power²	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 Sensitivity³	<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(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	Type 2230: 2.3 x 22.0 x 30.0 mm
Weight	Type 2230: 2.8 g
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)

Technical Specifications

Altitude	Non-operating	5% to 95% (non-condensing)
	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 Wireless Technology

Bluetooth Specification	4.0/4.1/4.2/5.0/5.1 Compliant
Frequency Band	2402 to 2480 MHz
Number of Available Channels	Legacy: 0~79 (1 MHz/CH) BLE: 0~39 (2 MHz/CH)
Data Rates and Throughput	Legacy: 3 Mbps data rate; throughput up to 2.17 Mbps BLE: 1 Mbps data rate; throughput up to 0.2 Mbps Legacy: Synchronous Connection Oriented links up to 3, 64 kbps, voice channels Legacy: Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)
Transmit Power	The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 9.5 dBm for BR and EDR.
Power Consumption	Peak (Tx): 330 mW
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)

Technical Specifications

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.
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. 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.

<p>Realtek RTL8822CE 802.11ac¹ 2x2 Wi-Fi + Bluetooth 5</p>	<p>Wireless LAN Standards</p> <p>Interoperability</p> <p>Frequency Band</p> <p>Data Rates</p> <p>Modulation</p> <p>Security³</p>	<p>IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11ac IEEE 802.11d IEEE 802.11e IEEE 802.11h IEEE 802.11i IEEE 802.11k IEEE 802.11r IEEE 802.11v</p> <p>Wi-Fi certified modules</p> <ul style="list-style-type: none"> • 802.11b/g/n 2.402 – 2.482 GHz • 802.11a/n/ac 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 <p>• 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)</p> <p>Direct Sequence Spread Spectrum BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM</p> <ul style="list-style-type: none"> • IEEE and WiFi certified 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
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Technical Specifications

	<ul style="list-style-type: none"> • 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
Power Consumption	<ul style="list-style-type: none"> • 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/Modern Standby: 10mW • Radio disabled: 8 mW
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity³	<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
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	Type 2230: 2.3 x 22.0 x 30.0 mm
Weight	Type 2230: 2.8 g
Operating Voltage	3.3v +/- 9%
Temperature	Operating 14° to 158° F (-10° to 70° C) Non-operating -40° to 176° F (-40° to 80° C)
Humidity	Operating 10% to 90% (non-condensing) Non-operating 5% to 95% (non-condensing)
Altitude	Operating 0 to 10,000 ft (3,048 m)

Technical Specifications

LED Activity	Non-operating 0 to 50,000 ft (15,240 m) LED Amber – Radio OFF; LED OFF – Radio ON
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HP Integrated Module with Bluetooth 4.0/4.1/4.2/5.0 Wireless Technology

Bluetooth Specification	4.0/4.1/4.2/5.0 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.
Power Consumption	Peak (Tx): 330 mW Peak (Rx): 230 mW Selective Suspend: 17 mW
Bluetooth Software Supported Link Topology	Microsoft Windows Bluetooth Software
Power Management	Microsoft Windows ACPI, and USB Bus Support
Certifications	FCC (47 CFR) Part 15C, Section 15.247 & 15.249
Power Management Certifications	ETS 300 328, ETS 300 826 Low Voltage Directive IEC950 UL, CSA, and CE Mark
Bluetooth 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)

Technical Specifications

1. Wireless access point and internet service required and sold separately. Availability of public wireless access points limited. Wi-Fi 5 (802.11 ac) is backwards compatible with prior 802.11 specs
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

<p>Qualcomm WCN6856</p> <p>Wi-Fi 6E + Bluetooth® 5.2 (802.11ax 2x2, AMD AIM-T AME, supporting gigabit file transfer speeds)^{1,4}</p>	<p>Wireless LAN Standards</p> <p>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> <p>Interoperability Frequency Band</p> <p>Wi-Fi certified</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>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
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Technical Specifications

	<ul style="list-style-type: none"> • 802.11n/ac/ax (HT20/VHT20/HE20) : +16dBm • 802.11n/ac/ax (HT40/VHT40/HE40) : +12.5dBm
	5GHz (MIMO, typical):
	<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 • 802.11ac/ax (VHT80/HE80): +11.5dBm • 802.11ax HE160: +11.5dBm
	6GHz LPI mode (MIMO, typical):
	<ul style="list-style-type: none"> • 802.11a: 0dBm • 802.11ax HE20: +1dBm • 802.11ax HE40: +4dBm • 802.11ax HE80: +7dBm • 802.11ax HE160: +7.5dBm
Power Consumption	<ul style="list-style-type: none"> • 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 Sensitivity³	2.4GHz (SISO): <ul style="list-style-type: none"> • 802.11b, 11Mbps : -82dBm maximum • 802.11g, 54Mbps : -71 dBm maximum • 802.11n, MCS7 : -64dBm maximum • 802.11ac, MCS9 : -52dBm maximum • 802.11ax, MCS11(HT40): -49dBm maximum 5GHz (SISO): <ul style="list-style-type: none"> • 802.11a, 54Mbps : -71 dBm maximum • 802.11n, MCS07 : -64dBm maximum • 802.11ac, MCS9 : -52dBm maximum • 802.11ax, MCS11(HE80/HE160): -46dBm maximum 6GHz (SISO): <ul style="list-style-type: none"> • 802.11a, 54Mbps : -71 dBm 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

Technical Specifications

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 Wireless Technology

Bluetooth Specification	4.0/4.1/4.2/5.0/5.1/5.2 Compliant
Frequency Band	2402 to 2480 MHz
Number of Available Channels	Legacy: 0~79 (1 MHz/CH) BLE: 0~39 (2 MHz/CH)
Data Rates and Throughput	Legacy: 3 Mbps data rate; throughput up to 2.17 Mbps BLE: 1 Mbps data rate; throughput up to 0.2 Mbps Legacy: Synchronous Connection Oriented links up to 3, 64 kbps, voice channels Legacy: Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)
Transmit Power	The Bluetooth component shall operate as a Class 1.5 Bluetooth device with a maximum transmit power of + 14 dBm and 10 dBm for BR and EDR, respectively.
Power Consumption	Peak (Tx): 330 mW Peak (Rx): 230 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 & 15.407
Power Management Certifications	ETS 300 328 Low Voltage Directive 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

Technical Specifications

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)

1. Wi-Fi 6E requires a Wi-Fi 6E router, sold separately, to function in the 6GHz band. Availability of public wireless access points limited. Wi-Fi 6E is backwards compatible with prior 802.11 specs. And available in countries where Wi-Fi 6E is supported
- 2 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. 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.

Technical Specifications

Mediatek MT7921 Wi-Fi 6 and Bluetooth® 5.2 (802.11ax 2x2, supporting gigabit data rate)^{1,4}	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 <ul style="list-style-type: none"> • 2.402 – 2.482 GHz 802.11a/n/ac/ax <ul style="list-style-type: none"> • 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	<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: max 300Mbps • 802.11ac : max 866.7Mbps • 802.11ax : max 1201Mbps
Modulation	DSSS, OFDM, DBPSK, DQPSK, CCK, 16 QAM, 64 QAM, 256 QAM , 1024 QAM <ul style="list-style-type: none"> • IEEE and WiFi certified 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 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

Technical Specifications

Power Consumption	<ul style="list-style-type: none"> • 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 • 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 Sensitivity³	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
Weight	1. Type 2230: 2.8g
Operating Voltage	3.3v +/- 9%
Temperature	Operating: 14° to 158° F (-10° to 70° C) Non-operating: -40° to 176° F (-40° to 80° C)
Humidity	Operating: 10% to 90% (non-condensing) Non-operating: 5% to 95% (non-condensing)
Altitude	Operating: 0 to 10,000 ft (3,048 m) Non-operating: 0 to 50,000 ft (15,240 m)
HP Integrated Module with Bluetooth 4.0/4.1/4.2/5.0/5.1/5.2 Wireless Technology	
Bluetooth Specification	4.0/4.1/4.2/5.0/5.1/5.2 Compliant
Frequency Band	2402 to 2480 MHz

Technical Specifications

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.
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	ETS 300 328, ETS 300 826
Certifications	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) BT5.1 ESR9/10 Compliance

Technical Specifications

LE Advertisement Extensions
Channel Selection Algo
Limited High Duty Cycle Non-Connectable Advertising
2Mbps LE
LE Long Range

Bluetooth Specification 4.0/4.1/4.2/5.0/5.1/5.2 Compliant

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.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. 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.
-

Technical Specifications

Intel® XMM™ 7360 LTE-Advanced¹	Technology/Operating bands	FDD LTE: LTE: 2100 (Band 1), 1900 (Band 2), 1800 (Band 3), 1700 (Band 4), 850 (Band 5), 2600 (Band 7), 900 (Band 8), 1400 (Band 11), 700 (Band 12), 700 (Band 13) 700 (Band 17), 850 (Band 18), 850 (Band 19), 800 (Band 20), 1450 (Band 21), 850 (Band 26) 700 (Band 28) MHz, 700 (Band 29), 2300 (Band 30), 2100 (Band 66) MHz TDD LTE: 2600 (Band 38), 1900 (Band 39), 2300 (Band 40), 2500 (Band 41) MHz HSPA+: 2100 (Band 1), 1900 (Band 2), 1700 (Band 4), 850 (Band 5), 900 (Band 8) MHz
	Wireless protocol standards	3GPP Release 11 LTE Specification CAT.9, MAX 60MHz aggregation BW WCDMA R99, 3GPP Release 5,6,7 and 8 UMTS Specification
	GPS	Standalone, A-GPS (MS-B and LTO)
	GPS bands	GPS: L1 (1575.42MHz); L5 (1176MHz) GLONASS: L1 (1602MHz) BeidouB1(1561.098MHz) Galileo E1 (1575.42); E5a (1176MHz)
	Maximum data rates	LTE: 450 Mbps (DL 3CA), 50 Mbps (Upload) DC-HSPA+: 42 Mbps (Download), 5.76 Mbps (Upload) HSPA+: 21Mbps (Download), 5.76 Mbps (Upload)
	Maximum output power	LTE: 23 dBm 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

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. 4G LTE not available on all products, in all regions.

NXP NPC300 Near Field Communication Module	Dimensions (L x W x H)	Module 17 x 10 x 2.0 mm
	Chipset	NPC300
	System interface	I2C
	NFC RF standards	ISO/IEC 14443 A ISO/IEC 14443 B ISO/IEC 15693

Technical Specifications

	ISO/IEC 18092
	ECMA-340 NFCIP-1 Target and Initiator
	ECMA-320 NFCIP-2
NFC Forum Support	Tag Type 1, Type 2, Type3 and Type 4, NFCIP-1 and NFCIP-2
Reader (PCD-VCD) Mode¹	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) Mode¹	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	-25°C to 80°C
Storage temperature	-25°C to 125°C
Humidity	10-90% operating
	5-95% non-operating
Supply Operating voltage	2.7 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 ²
Polling	710.93 mW
Detected Test Tag Type 1	152.09 mW
Detected Test Tag Type 2	341.26 mW
Detected Test Tag Type 3	383.76 mW
Detected Test Tag Type 4	312.26 mW
Antenna	Antenna connector, 0.3mm pitch, 7 connector FPC. Antenna matching is external to module.

1. With application or UICC support
2. Actual Power Consumption is dependent on NFC antenna and matching circuit and on the particular polling sequence and period configured.

Technical Specifications

POWER

AC Adapter 45 Watt Smart nPFC Standard Barrel 4.5mm Right Angle 1.0 m	Dimensions	95 x 45 x 26.8mm
	Weight	unit: 200 g +/- 10 g
	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
	Connector	4.5mm Barrel Type
	Environmental Design	
	Operating temperature	32°F to 95°F (0° to 35°C)
	Non-operating (storage) temperature	-4°F to 185°F (-20° to 85°C)
	Altitude	0 to 16,400 ft (0 to 5000m)
	Humidity	20% to 95%
	Storage Humidity	10% to 95%
	EMI and Safety Certifications	Eg: *CE Mark - full compliance with LVD and EMC directives * Worldwide safety standards - IEC60950, EN60950, UL60950, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE. * MTBF - over 200,000 hours at 25°C ambient condition.

AC Adapter 45 Watt Smart nPFC Standard Barrel 4.5mm Right Angle 1.0 m 2prong	Dimensions	95 x 45 x 26.8mm
	Weight	unit: 200 g +/- 10 g
	Input	
	Input Efficiency	87.74 % at 115 Vac and 88.4% at 230Vac
	Input frequency range	47 ~ 63Hz
	Input AC current	Max. 1.4 A at 90 Vac
	Output	
	Output power	45W
	DC output	19.5V
	Hold-up time	5ms at 115 Vac input
	Output current limit	<8.0A
	Connector	4.5mm Barrel Type
	Environmental Design	

Technical Specifications

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, EN60950, UL60950, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE. * MTBF - over 200,000 hours at 25°C ambient condition.

AC Adapter 65 Watt nPFC Slim USB type C Straight 1.0 m

Dimensions	88 x 53.5 x 21mm
Weight	unit: 220 g +/- 10 g
Input	
Input Efficiency	81.5% min at 115 Vac/ 230Vac @ 5V/3A 86.7% min at 115 Vac/ 230Vac @ 9V/3A 88% min at 115 Vac/ 230Vac @ 12V/5A 89% min at 115 Vac/ 230Vac @ 15V/4.33A 89% min at 115 Vac/ 230Vac @ 20V/3.25A
Input frequency range	47 ~ 63 Hz
Input AC current	1.6 A at 90 VAC and maximum load
Output	
Output power	65W
DC output	5V/9V/12V/15V/20V
Hold-up time	5ms at 115 Vac input
Output current limit	<8.0A
Connector	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 5000m)
Humidity	5% to 95%
Storage Humidity	5% to 95%

Technical Specifications

EMI and Safety Certifications

Eg:

*CE Mark - full compliance with LVD and EMC directives

* Worldwide safety standards - IEC60950, EN60950, UL60950, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE.

* MTBF - over 100,000 hours at 25°C ambient condition.

AC Adapter 65 Watt nPFC Standard USB type C Straight 1.0 m

Dimensions

90.0 x 51 x 28.5mm

Weight

unit: 250 g +/- 10 g

Input

Input Efficiency

81.5% min at 115 Vac/ 230Vac @ 5V/3A

86.7% min at 115 Vac/ 230Vac @ 9V/3A

88% min at 115 Vac/ 230Vac @ 12V/5A

89% min at 115 Vac/ 230Vac @ 15V/4.33A

89% min at 115 Vac/ 230Vac @ 20V/3.25A

Input frequency range

47 ~ 63 Hz

Input AC current

1.6 A at 90 VAC and maximum load

Output

Output power

65W

DC output

5V/9V/12V/15V/20V

Hold-up time

5ms at 115 Vac input

Output current limit

8.0A Max.

Connector

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 5000m)

Humidity

20% to 95%

Storage Humidity

10% to 95%

EMI and Safety Certifications

* CE Mark - full compliance with LVD and EMC directives

* Worldwide safety standards -IEC60950, EN60950, UL60950, UL62368, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE.

* MTBF - over 200,000 hours at 25°C ambient condition.

AC Adapter 65 Watt Smart nPFC EM Barrel 4.5mm New EM

Dimensions

102 x 55 x 30 mm

Weight

unit: 250 g +/- 10 g

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

Technical Specifications

Output	
Output power	65W
DC output	19.5V
Hold-up time	5ms at 115 Vac input
Output current limit	<11.0A
Connector	4.5 mm Barrel Type
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, EN60950, UL60950, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE. * MTBF - over 200,000 hours at 25°C ambient condition.

AC Adapter 65 Watt Smart nPFC Standard Barrel 4.5mm Right Angle 1.0 m

Dimensions	90 x 51 x 28.5 mm
Weight	unit: 230g +/- 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
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%

Technical Specifications

EMI and Safety Certifications

Eg:

*CE Mark - full compliance with LVD and EMC directives

* Worldwide safety standards - IEC60950, EN60950, UL60950,
Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN,

EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE.

* MTBF - over 200,000 hours at 25°C ambient condition.

Technical Specifications

Battery CC 3 Cell 53 Wh¹ Long Life -PL Fast Charge	Dimensions	7.3 x 52.9 x 267.11 mm (0.287 x 2.082 x 10.516 in)
	Weight	0.205 kg (0.45 lb)
	Cells/Type	3cell Lithium-Ion Polymer cell / 645180
	Energy	
	Voltage	11.55 V
	Amp-hour capacity	4.59Ah
	Watt-hour capacity	53Wh
	Temperature	32° to 113° F (0° to 45° C)
	Operating (Charging)	32° to 122° F (0° to 50° C)
	Operating (Discharging)	14° to 140° F (-10° to 60° C)
	Fuel Gauge LED	N/A
	Warranty	Depends on system offering
	Optional Travel Battery Available	No

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

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 or TCO Certified Edge • China Energy Conservation Program (CECP) • China State Environmental Protection Administration (SEPA) • Taiwan Green Mark • Korea Eco-label • Japan PC Green label* 		
Sustainable Impact Specifications	<ul style="list-style-type: none"> • Ocean-bound plastic in (part(s)) • 35% post-consumer recycled plastic • External Power Supply 90% Efficiency • Low halogen • Outside Box and corrugated cushions are 100% sustainably sourced and recyclable • Molded Paper Pulp Cushion inside box is 100% sustainably sourced and recyclable • Bulk packaging available 		
System Configuration	<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)	6.02 W	6.34 W	6.22 W
Normal Operation (Long idle)	1.05 W	1.18 W	1.14 W
Sleep	1.05 W	1.18 W	1.14 W
Off	0.35 W	0.37 W	0.35 W
	<p>Note:</p> <p>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</p>		

Technical Specifications

	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 BTU/hr	22 BTU/hr	21 BTU/hr
Normal Operation (Long idle)	4 BTU/hr	4 BTU/hr	4 BTU/hr
Sleep	4 BTU/hr	4 BTU/hr	4 BTU/hr
Off	1 BTU/hr	1 BTU/hr	1 BTU/hr
	*NOTE: Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.		
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)	Sound Power (L _{WAd} , bels)	Sound Pressure (L _{pAm} , decibels)	
Typically Configured – Idle	2.6	14.4	
Fixed Disk – Random writes	2.7	16.8	
Optical Drive – Sequential reads	4.0	33.2	
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 93.8% recycle-able when properly disposed of at end of life. 		

Technical Specifications

Packaging Materials	External:	PAPER/Corrugated	41 g
	Internal:	PLASTIC/polypropylene	4 g
		PLASTIC/Polyethylene low density	14 g
		PAPER/Molded pulp	326 g
	The plastic packaging material contains at least 0% recycled content.		
	The corrugated paper packaging materials contains at least 61% 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 • 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) 		

Technical Specifications

	<ul style="list-style-type: none"> • 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	<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.
End-of-life Management and Recycling	<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>
HP, Inc. Corporate Environmental Information	<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</p> <p>and http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf</p>

Technical Specifications

footnotes	<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.• Fiber cushions made from 100% recycled wood fiber and organic materials.• Plastic cushions are made from >90% recycled plastic.
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Technical Specifications

FINGERPRINT READER

Model: Synaptics Validity VFS7604 touch sensor

Mobile Voltage Operation: 3.0V to 3.6V

Operating Temperature: 0~60°C

Current Consumption Image: 100mA Max

Low Latency Wait For Finger: 260 uA

Capture Rate: <30msec per image

ESD Resistance: IEC 61000-4-2 4B (+/-15KV)

Detection Matrix: 363 dpi / 7.4x6mm sensor area

FRR (False Reject Rate) / FAR (False Acceptance Rate): FRR <1% @ 1:50K FAR

COUNTRY OF ORIGIN

China

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

Category	Description	Part Number
Cases	Prelude Pro Top Load	1X645AA
	Prelude Pro Backpack	1X644AA
Docking	HP USB-C Mini Dock	1PM64AA, 1PM64UT, 1PM64ET
	HP USB-C Travel Dock G2	7PJ38AA, 7PJ38UT, 7PJ38ET
	HP Thunderbolt 120W Dock G2	6HP48AA, 2UK37AA, 2UK37ET
	HP Thunderbolt 120W Dock w/Audio G2	3YE87AA, 2UK37UT, 3YE87ET
	HP Thunderbolt 230W Dock w/Combo Cable G2	3TR87AA, 3TR87UT, 3TR87ET
	HP USB-C 120W G5 Dock	5TW10AA, 5TW10UT, 5TW10ET
	HP USB-C/A 120W Universal Dock G2	5TW13AA, 5TW13UT, 5TW13ET
	HP USB-C Travel Dock	4WX89AA, 4WX89UT, 4WX89ET
Input/Output	HP 125 Wired Mouse	265A9AA, 265A9UT, 265A9ET
	HP Bluetooth Travel Bluetooth Mouse	6SP30AA, 6SP30UT, 6SP30ET
	HP Comfort Grip USB Wireless Mouse	H2L63AA, H2L63UT
	HP Laser 128 Wired Mouse	265D9AA, 265D9UT, 265D9ET
	HP Presenter Bluetooth 4.2 Bluetooth Mouse	2CE30AA, 2CE30UT, 2CE30ET
	HP UltraMobile USB Wireless Mouse	H6F25AA, H6F25UT
	HP USB 320M Wired Mouse	9VA80AA, 9VA80UT, 9VA80ET
	HP USB Premium USB Mouse	1JR32AA, 1JR32UT
	HP USB Premium Wireless Mouse	1JR31AA, 1JR31UT
	HP USB Travel USB Mouse	G1K28AA, G1K28ET
	HP Wireless 2.4GHz X4000 Bluetooth Mouse	H3T50AA, H3T50UT
	HP WL USB Agnes Keyboard	T6U20AA, T6U20UT
	HP Slim Wireless Keyboard and Mouse	T6L04AA, T6L04UT
	HP Wireless USB Premium Keyboard	Z9N41AA, Z9N41AT
	HP Wireless Rechargeable 950MK Mouse and Keyboard	3M165AA, 3M165UT
	HP 235 WL Mouse and Keyboard Combo	1Y4D0AA, 1Y4D0UT
	HP Wired Desktop 320MK Mouse and Keyboard	9SR36AA, 9SR36UT, 9SR36ET
	HP Wired Desktop 320K Keyboard	9SR37AA, 9SR37UT, 9SR37ET
	HP Wired Desktop 320M Mouse	9VA80AA, 9VA80UT, 9VA80ET
	HP 125 Wired Keyboard	266C9AA, 266C9UT, 266C9ET
	HP 225 Wired Mouse and Keyboard Combo	286J4AA, 286J4UT, 286J4ET
	HP Wired Mouse	265A9AA, 265A9UT, 265A9ET
	HP LSR Wired Mouse	265D9AA, 265D9UT, 265D9UT
	HP HDMI to DVI Adapter	F5A28AA
	HP HDMI to VGA Adapter	H4F02AA#ABA, H4F02AA#UUF, H4F02AA#AC3, H4F02UT#ABA, H4F02ET#AC3
	HP USB-C to DisplayPort Adapter	N9K78AA#ABA, N9K78AA#AC3, N9K78UT#ABA
	HP USB to Gig RJ45 Adapter	N7P47AA

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

HP USB-C to RJ45 Adapter

V8Y76AA#ABB, V8Y76AA#UUF,
V8Y76AA#ABL, V7W66AA#ABA,
V7W66AA#AC3, V7W66UT#ABA

DASH capability is supported with an exclusive USB-C to RJ45 dongle that can be purchased via HP Services as 3rd party option. (Available in Q3 2021)

Power	HP 45W 4.5 mm Smart AC Power Adapter	H6Y88AA, H6Y88UT
	HP 45W USB-C G2 AC Power Adapter	1HE07AA, 1HE07UT
	HP 65W 4.5 mm Smart AC Power Adapter	H6Y89AA, H6Y89UT
	HP 65W USB-C AC Power Adapter	X7W50AA, 1HE08AA, 1HE08UT
	HP 65W USB-C LC AC Power Adapter	1P3K6AA, 1P3K6UT
	HP 65W USB-C Travel Slim AC Power Adapter	3PN48AA, PN48UT
	HP USB Power Bank	N9F71AA, N9F71UT
	HP USB-C Essential Power Bank	3TB55AA, 3TB55UT
Storage	HP USB DVD-Writer EXT ODD	Y3T76AA, F2B56AA, F2B56UT, F2B56ET
Memory	HP 4GB DDR4 3200 Memory	286H5AA
	HP 8GB DDR4 3200 Memory	286H8AA
	HP 16GB DDR4 3200 Memory	286J1AA
Security	HP Nano Cable Lock	1AJ39AA, 1AJ39UT
	HP SureKey Standard/Nano/Wedge Cable Lock	6UW42AA, 6UW42UT
UCC	HP Stereo 3.5mm Headset	T1A66AA
	HP Wired USB-A Stereo Headset	T1A67AA

Summary of Changes

Date of change:	Version History:	Updated	Description of change:
April 6, 2021	V1 to V2	Update	Battery Life Disclaimer
April 20, 2021	V2 to V3	Add	Environmental Data/Memory Modules
May 6, 2021	V3 to V4	Add	HP Smart Support
May 26, 2021	V4 to V5	Add	Qualcomm WLAN in Networking section/HP Wolf Pro Security Edition
June 11, 2021	V5 to V6	Remove	HP WorkWell from Software and Security section
July 30, 2021	V6 to V7	Add	WLAN in Networking/Communications section
September 2, 2021	V7 to V8	Add	Wi-Fi 6E feature and disclaimer in At a Glance Section
September 7, 2021	V8 to V9	Update	Techspecs in Networking, Power and Display section
November 11, 2021	V9 to V10	Update	Windows 10 with Free upgrade to Windows 11 when available in OS section and footnote.
December 13, 2021	V10 to V11	Update	OS footnotes and Wi-Fi 6, Wi-Fi 6E footnotes
April 20, 2022	V11 to V12	Added	Reference for USB ports

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Summary of Changes