Overview

HP EliteBook 835 G8 Notebook PC

Left

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

Overview

Right

1. Power Button
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. HP Fingerprint Sensor (select models)

Overview

AT A GLANCE

- Premium ultraslim design with precision-crafted machined aluminum (CNC) chassis for a premium look and feel.
- Preinstall Windows 10 and FreeDOS
- Latest AMD® Ryzen PRO and non-PRO 5000 processors
- Display include your choice of 33.8cm (13") 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)
- Passed 19 MIL-STD 810H testing, plus an additional 120,000 hours of reliability testing through HP's Total Test Process[1]
- Weight starting at 2.80 lb (1.27 kg)
- Battery life up to 19 hours 45 minutes
- 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

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.

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

Technical Specifications

PRODUCT NAME

HP EliteBook 835 G8 Notebook PC

OPERATING SYSTEM

Preinstalled

Windows 10 Pro 64 – HP recommends Windows 10 Pro for business[1]
Windows 10 Pro 64 (National Academic only)[2]
Windows 10 Home 64[1]
Windows 10 Home Single Language 64[1]
Windows 10 Pro (Windows 10 Enterprise available with a Volume Licensing Agreement)[1]
FreeDOS
Windows10 Enterprise 64 (Web Support)[1]

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. Some devices for academic use will automatically be updated to Windows 10 Pro Education with the Windows 10 Anniversary Update. Features vary; see https://aka.ms/ProEducation for Windows 10 Pro Education feature information.

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 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.

Technical Specifications

CHIPSET

Chipset is integrated with processor

GRAPHICS

Integrated

AMD Radeon™ Graphics[6]

Supports

Support HW decode, DX12, HDMI 2.0 and HDCP 2.2

6. HD content required to view HD images.

DISPLAY

Non-Touch

33.8 cm (13.3") diagonal FHD IPS eDP anti-glare WLED-backlit bent, 250 nits, 45% NTSC (1920 x 1080)[7,8,9]

33.8 cm (13.3") diagonal FHD IPS eDP anti-glare WLED-backlit bent, 250 nits, 45% NTSC for HD camera (1920 x 1080)[7,8,9]

33.8 cm (13.3") diagonal FHD IPS eDP anti-glare WLED-backlit bent, 250 nits, 45% NTSC for HD + IR camera (1920 x 1080)[7,8,9]

33.8 cm (13.3") diagonal FHD IPS eDP anti-glare WLED-backlit bent, 250 nits, 45% NTSC for WWAN (1920 x 1080)[7,8,9]

33.8 cm (13.3") diagonal FHD IPS eDP anti-glare WLED-backlit bent, 250 nits, 45% NTSC for HD camera for WWAN (1920 x 1080)[7,8,9]

33.8 cm (13.3") diagonal FHD IPS eDP anti-glare WLED-backlit bent, 250 nits, 45% NTSC for HD + IR camera for WWAN (1920 x 1080)[7,8,9]

33.8 cm (13.3") 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)[7,8,9,10,11]

33.8 cm (13.3") 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)[7,8,9,10,11]

33.8 cm (13.3") 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)[7,8,9,10,11]

33.8 cm (13.3") 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)[7,8,9,10,11]

33.8 cm (13.3") diagonal FHD IPS eDP + PSR anti-glare WLED-backlit bent, 400 nits, 72% NTSC with Ambient Light Sensor and HD + IR camera with Low Power (1920 x 1080)[7,8,9]

33.8 cm (13.3") diagonal FHD IPS eDP + PSR anti-glare WLED-backlit bent, 400 nits, 72% NTSC with Ambient Light Sensor and HD + IR camera for WWAN with Low Power (1920 x 1080)[7,8,9]

Touch

33.8 cm (13.3") diagonal FHD IPS eDP anti-glare On-Cell WLED-backlit bent touch screen, 250 nits, 45% NTSC with HD+IR camera (1920 x 1080)[7,8,9,10,11]

Technical Specifications

33.8 cm (13.3") 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)[7,8,9,11]

HDMI 2.0
Support resolution up to 4K @60 Hz

Display Size
13.3"
33.8 cm (13.3")

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

STORAGE AND DRIVES

Primary Storage
128 GB M.2 PCIe-3 TLC[12]
256 GB PCIe® Gen3x4 NVMe™ TLC Opal 2[12]
256 GB PCIe® Gen3x4 NVMe™ SS TLC[12]
256 GB PCIe® NVMe™ Value[12]
512 GB PCIe® Gen3x4 NVMe™ TLC Opal 2[12]
512 GB PCIe® Gen3x4 NVMe™ M.2 SS TLC[12]
512 GB PCIe® NVMe™ Value [12]
1 TB PCIe® Gen3 x4 NVMe™ SS TLC[12]
2 TB PCIe® Gen3 x4 NVMe™ SS TLC[12]

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

Technical Specifications

MEMORY

Maximum Memory
64 GB DDR4-3200 SDRAM

Memory
64 GB DDR4-3200 SDRAM (2 x 32 GB)[13]
32 GB DDR4-3200 SDRAM (2 x 16 GB) [13]
16 GB DDR4-3200 SDRAM (1 x 16 GB) [13]
16 GB DDR4-3200 SDRAM (2 x 8 GB) [13]
8 GB DDR4-3200 SDRAM (1 x 8 GB) [13]
8 GB DDR4-3200 SDRAM (2 x 4 GB) [13]
4 GB DDR4-3200 SDRAM (1 x 4 GB) [13]

Memory Slots
2 SODIMM
Both slots are customer accessible / upgradeable
DDR4 SODIMMS, system runs at 3200
Supports Dual Channel Memory

13. 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 rates)[14,15]
Realtek RTL8822BE 802.11ac (2x2) and Bluetooth® 5 Combo[16]
Qualcomm WCN6856 Wi-Fi 6E and Bluetooth® 5.2 combo[14,15]
Mediatek MT7921 Wi-Fi CERTIFIED 6™ (2x2) and Bluetooth® 5.2 combo [14,15]

WWAN
Intel® XMM™ 7360 LTE-Advanced Cat 9[17]

NFC
NXP NPC300 Near Field Communication Module

Miracast
Native Miracast Support[18]

14. 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. The specifications for Wi-Fi 6 (802.11ax) are draft and are

not final. If the final specifications differ from the draft specifications, it may affect the ability of the laptop to communicate with other 802.11ax devices.

15. Wi-Fi 5 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.

16. 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.

17. 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.

18. 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[6,8]

720p HD+IR camera[6,8,19]

Sensors

Ambient light sensor (select models only)

Hall Sensor

6. HD content required to view HD images.

8. Sold separately or as an optional feature.

19. 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 Optimizer[20]
HP Hotkey Support
myHP
HP Support Assistant[21]
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 [47]

Manageability Features

HP Driver Packs (download)[22]
HP Manageability Integration Kit Gen4 (download)[23]
HP Client Catalog (download)
HP Client Management Script Library (download)
HP Image Assistant (download)

Security Management

HP Wolf Pro Security Edition[24]
HP Client Security Manager Gen7[25]
HP Sure Sense[26]
HP Sure Click[27]
HP Sure Run Gen4[28]
HP Sure Recover Gen4[29]
HP Sure Start Gen6[30]
HP Sure Admin[31]
HP BIOSphere Gen6[32]
BIOS Update via Network
HP Secure Erase[33]
Absolute Persistence Module[34]
HP Drive Lock & Automatic Drive Lock
TPM 2.0 Embedded Security Chip (Common Criteria EAL4+ Certified) (FIPS 140-2 Level 2 Certified)
HP Fingerprint Sensor[35]

IPv6 Certification

Yes

Technical Specifications

Is the BIOS on this notebook ISO/IEC 19678:2015 (formerly NIST 800-147) compliant? Yes
UEFI version: 2.7
Class: Class 3

20. HP Connection Optimizer requires Windows 10.
21. HP Support Assistant internet access required.
22. HP Driver Packs not preinstalled, however available for download at http://www.hp.com/go/clientmanagement.
23. HP Manageability Integration Kit can be downloaded from http://www8.hp.com/us/en/ads/clientmanagement/overview.html.
24. 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.25. HP Client Security Manager Gen7 requires Windows and is available on the select HP Elite and Pro PCs.
26. HP Sure Sense is available on select HP PCs and is not available with Windows10 Home.
27. HP Sure Click requires Windows 10. See https://bit.ly/2PrLT6A_SureClick for complete details.
28. HP Sure Run Gen4 is available on select HP PCs and requires Windows 10.
29. 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
30. HP Sure Start Gen6 is available on select HP PCs and requires Windows 10.
31. 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.
32. 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.
33. 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™.
34. 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/.
35. HP Fingerprint sensor is an optional feature that must be configured at purchase.
47. 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

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)	0.41x 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 adapter[36]

HP Smart 45 W External AC power adapter, 2-prong (Japan only) [36]

HP Smart 65 W External AC power adapter[36]

HP Smart 65 W EM External AC power adapter[36]

HP Smart 65 W Slim Type-C® adapter[36]

HP Smart 65 W Standard Type-C® adapter[36]

Primary Battery

HP Long Life 3-cell, 53 Wh Li-ion[37,38,39]

Support HP Fast Charge (Up to 50% in 30 minutes with 65W AC Adapter)[38]

Power Cord

2-wire plug - 1.0m[36]

3-wire plug - 1.0m[36]

Battery Life

Up to 19 hours 45 minutes[40]

Battery Weight

0.205 kg (0.45 lb)

36. Availability may vary by country.

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

38. 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.

39. 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.
40. 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 Weight[41]
Non-touch
Starting at 2.80 lb
Starting at 1.27 kg
Touch
Starting at 3.01 lb
Starting at 1.36 kg

Product Dimensions (w x d x h)
Non-Touch, WLAN only
12.11 x 8.05 x 0.70 in
30.78 x 20.46 x 1.78 cm

Touch, WLAN only
12.11 x 8.05 x 0.75 in
30.78 x 20.46 x 1.91 cm

WWAN
12.11 x 8.05 x 0.75 in
30.78 x 20.46 x 1.91 cm

41. Weight will vary by configuration.

Technical Specifications

PORTS

2 SuperSpeed USB Type-A 5Gbps signaling rate (1 charging)
2 SuperSpeed USB Type-C® 10Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4)
1 HDMI 2.0[6]
1 headphone/microphone combo
1 AC power
1 SIM Card slot[42]
1 Smartcard reader (optional)

6. HD content required to view HD images.
42. 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. 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.[43]

43. 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® Gold [44]
Low halogen [45]
TCO 8.0 Certified

44. Based on US EPEAT® registration according to IEEE 1680.1-2018 EPEAT®. Status varies by country. Visit http://www.epeat.net for more information.
45. 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°C to 35° C) (not writing optical)
Non-operating	41° to 95° F (5°C 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 Gold in United States[46]
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

Technical Specifications

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

DISPLAYS[1]

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

Panel LCD 13.3-in FHD (1920 x 1080) Anti-Glare WLED UWVA 45percent cg 250nits eDP 1.2 w/o PSR bent NWBZ	**Outline Dimensions (W x H x D)**	300.56 x 177.77 mm (max) (FPC folding included)
	Active Area	293.76 x 165.24 mm (typ.)
	Weight	260 g (max)
	Diagonal Size	13.3 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 (typ.)
	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
	Viewing Angle	UWVA 85/85/85/85

Panel LCD 13.3-in 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)**	300.56 x 177.77 mm (max)
	Active Area	293.76 x 165.24 mm (typ.)
	Weight	260 g (max)
	Diagonal Size	13.3 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 (typ.)
	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 13.3-in FHD (1920 x 1080) Anti-Glare WLED UWVA sRGB 100percent cg 400nits eDP 1.4+PSR2 bent LP NB2Y	**Outline Dimensions (W x H x D)**	299.06 x 176.54 mm (max) (FPC folding included)
	Active Area	293.76 x 165.24 mm (typ.)
	Weight	175 g (max)
	Diagonal Size	13.3 in
	Thickness	2.0 mm / 3.8 mm (PCB) (max)
	Interface	eDP 1.4 w/ PSRII (2 lane)
	Surface Treatment	Anti-Glare
	Touch Enabled	No
	Contrast Ratio	1500:1(typ.)
	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	8 bits
	Viewing Angle	UWVA 85/85/85/85

Panel LCD 13.3-in FHD (1920 x 1080) Anti-Glare WLED UWVA 72percent cg 1000nits eDP 1.4+PSR Sure View Reflect NB2Y bent	**Outline Dimensions (W x H x D)**	299.06 x 176.54 mm (max)
	Active Area	293.76 x 165.24 mm (typ.)
	Weight	220 g (max)
	Diagonal Size	13.3 in
	Thickness	3.9 mm (max)
	Interface	eDP 1.4 + PSR (4 lane)
	Surface Treatment	Anti-glare (AG)
	Touch Enabled	No
	Contrast Ratio	1500:1 (typ.)
	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

Technical Specifications

STORAGE [1]

1. For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 30GB of system disk is reserved for system recovery software.

SSD 128GB 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
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]

Technical Specifications

	Features	ATA Security; TRIM; L1.2
SSD 256GB 2280 PCIe NVMe Value	**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**	M.2 2280
	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

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

NETWORKING

Intel Wi-Fi 6[1] AX200 + Bluetooth® 5 (802.11ax 2x2, non-vPro, supporting gigabit speeds)[4] 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
	Security[3]	• 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 Power[2]	• 802.11b: +17dBm minimum • 802.11g: +16dBm minimum • 802.11a: +17dBm minimum • 802.11n HT20(2.4GHz): +14dBm minimum • 802.11n HT40(2.4GHz): +13dBm minimum • 802.11n HT20(5GHz): +14dBm minimum • 802.11n HT40(5GHz): +13dBm minimum • 802.11ac VHT80(5GHz): +10dBm minimum • 802.11ac VHT160(5GHz): +10dBm minimum • 802.11ax HE40(2.4GHz): +12dBm minimum • 802.11ax HE80(5GHz): +10dBm minimum • 802.11ax HE160(5GHz): +10dBm minimum"
Power Consumption	• Transmit mode 2.0 W • Receive mode 1.6 W • Idle mode (PSP) 180 mW (WLAN Associated) • Idle mode 50 mW (WLAN unassociated) • Connected Standby 10mW • Radio disabled 8 mW
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity[3]	• 802.11b, 1Mbps: -93.5dBm maximum • 802.11b, 11Mbps: -84dBm maximum • 802.11a/g, 6Mbps: -86dBm maximum • 802.11a/g, 54Mbps: -72dBm maximum • 802.11n, MCS07: -67dBm maximum • 802.11n, MCS15: -64dBm maximum • 802.11ac, MCS0(VHT80): -84dBm maximum • 802.11ac, MCS9(VHT80): -59dBm maximum • 802.11ac, MCS9(VHT160): -58.5dBm maximum • 802.11ax, MCS11(HE40): -57dBm maximum • 802.11ax, MCS11(HE80): -54dBm maximum • 802.11ax, MCS11(HE160): -53.5dBm maximum"
Antenna type	High efficiency antenna with spatial diversity, mounted in the display enclosure Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications
Form Factor	PCI-Express M.2 MiniCard
Dimensions	1. Type 2230: 2.3 x 22.0 x 30.0 mm 2. Type 1216: 1.67 x 12.0 x 16.0 mm
Weight	1. Type 2230: 2.8 g 2. Type 126: 1.3 g
Operating Voltage	3.3v +/- 9%
Temperature	**Operating** 14°F to 158° F (–10°C to 70° C) **Non-operating** –40°F to 176° F (–40°C to 80° C)

Technical Specifications

Humidity	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 95% (non-condensing)
Altitude	Operating	0 to 10,000 ft (3,048 m)
	Non-operating	0 to 50,000 ft (15,240 m)
LED Activity	LED Amber – Radio OFF; LED OFF – Radio ON	

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 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 6 (802.11ax) is backwards compatible with prior 802.11 specs. The specifications for Wi-Fi 6 are draft specifications and are not final. If the final specifications differ from the draft specifications, it may affect the ability of the notebook to communicate with other 802.11ax WLAN devices. Only available in countries where 802.11ax 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 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.

Realtek RTL8822CE 802.11ac[1] 2x2 Wi-Fi + Bluetooth® 5	**Wireless LAN Standards**	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
	Interoperability	Wi-Fi certified modules
	Frequency Band	• 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
	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)
	Modulation	Direct Sequence Spread Spectrum BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM
	Security[3]	• 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

Technical Specifications

	• IEEE 802.11i • WAPI
Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between access points
Output Power[2]	• 802.11b: +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	• 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 Sensitivity[3]	• 802.11b, 1Mbps: -93.5dBm maximum • 802.11b, 11Mbps: -84dBm maximum • 802.11a/g, 6Mbps: -86dBm maximum • 802.11a/g, 54Mbps: -72dBm maximum • 802.11n, MCS07: -67dBm maximum • 802.11n, MCS15: -64dBm maximum • 802.11ac, MCS0: -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	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: 2.8 g 2. Type 126: 1.3 g
Operating Voltage	3.3v +/- 9%
Temperature	Operating 14°F to 158° F (–10°C to 70° C) Non-operating –40°F to 176° F (–40°C to 80° C)
Humidity	Operating 10% to 90% (non-condensing) Non-operating 5% to 95% (non-condensing)
Altitude	Operating 0 to 10,000 ft (3,048 m)

	Non-operating 0 to 50,000 ft (15,240 m)
LED Activity	LED Amber – Radio OFF; LED OFF – Radio ON

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

Qualcomm WCN6856 Wi-Fi 6E and Bluetooth® 5.2 (802.11ax 2x2, AMD AIM-T AME, supporting gigabit file transfer speeds)[1,4]	**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 802.11u IEEE 802.11v IEEE 802.11w
	Interoperability	Wi-Fi certified
	Frequency Band	•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
	Modulation	Direct Sequence Spread Spectrum OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM, 4096QAM
	Security[3]	• 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
	Network Architecture Models	Wi-Fi Direct in Win10 for peer-to-peer connection. Infrastructure (Access Point Required)
	Roaming	IEEE 802.11 compliant roaming between access points
	Output Power[2]	2.4GHz (MIMO, typical): • 802.11b: +18dBm • 802.11g: +16.5dBm

Technical Specifications

	• 802.11n/ac/ax (HT20/VHT20/HE20) : +16dBm • 802.11n/ac/ax (HT40/VHT40/HE40) : +12.5dBm 5GHz (MIMO, typical): • 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): • 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 Sensitivity[3]	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

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)
Security & Manageability	AMD AIM-T AME support with appropriate AMD chipset components

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. The specifications for Wi-Fi 6 are draft specifications and are not final. If the final specifications differ from the draft specifications, it may affect the ability of the notebook to communicate with other 802.11ax WLAN devices. Only available in countries where 802.11ax 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 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

Mediatek MT7921 Wi-Fi 6 and Bluetooth® 5.2 (802.11ax 2x2, supporting gigabit data rate)[1,4]	**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 modules
	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: 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
		• 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 Power[2]	• 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

	• 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	• 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 Sensitivity[3]	802.11b, 1Mbps : -93.5dBm maximum 802.11b, 11Mbps : -84dBm maximum 802.11a/g, 6Mbps : -86dBm maximum 802.11a/g, 54Mbps : -72dBm maximum 802.11n, MCS07 : -67dBm maximum 802.11n, MCS15 : -64dBm maximum 802.11ac, MCS0 : -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 LE Advertisement Extensions

Technical Specifications

		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. The specifications for Wi-Fi 6 are draft specifications and are not final. If the final specifications differ from the draft specifications, it may affect the ability of the notebook to communicate with other 802.11ax WLAN devices. Only available in countries where 802.11ax 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 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.

Intel® XMM™ 7360 LTE-Advanced[1]	**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
	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

Technical Specifications

	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 ISO/IEC 18092 ECMA-340 NFCIP-1 Target and Initiator ECMA-320 NFCIP-2
	NFC Forum Support	Tag Type 1, Type 2, Type3 and Type 4, NFCIP-1 and NFCIP-2
	Reader (PCD-VCD) Mode[1]	ISO/IEC 14443 A ISO/IEC 14443 B ISO/IEC 15693 MIFARE 1K MIFARE 4K MIFARE DESFire FeliCa Jewel and Topaz cards
	Card Emulation (PICC-VICC) Mode[1]	ISO/IEC 14443 A ISO/IEC 14443 B and B' MIFARE FeliCa
	Frequency	13.56 MHz
	NFC Modes Supported	Reader/Writer, Peer-to-Peer
	Raw RF Data Rates	106, 212, 424, 848 kbps
	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

Technical Specifications

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 1.0m	**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°C to 35°C)
	Non-operating (storage) temperature	-4°F to 185°F (-20°C 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 1.0m 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	
	Operating temperature	32°F to 95°F (0°C to 35°C)

Technical Specifications

	Non-operating (storage) temperature	-4°F to 185°F (-20°C 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 1.0m	**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°Fto 95°F (0°C to 35°C)
	Non-operating (storage) temperature	-4°Fto 185°F (-20°C to 85°C)
	Altitude	0 to 16,400 ft (0to 5000m)
	Humidity	5% to 95%
	Storage Humidity	5% to 95%
	EMI and Safety Certifications	Eg: *CE Mark - full compliance with LVD and EMC directives * Worldwide safety standards - IEC60950, 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.

Technical Specifications

AC Adapter 65 Watt nPFC Standard USB type C Straight 1.0m	**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°C to 35°C)
	Non-operating (storage) temperature	-4°F to 185°F (-20°C to 85°C)
	Altitude	0 to 16,400 ft (0 to 5000m)
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
	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°C to 35°C)
	Non-operating (storage) temperature	-4°F to 185°F (-20°C 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.

AC Adapter 65 Watt Smart nPFC Standard Barrel 4.5mm Right Angle 1.0m	**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°C to 35°C)
	Non-operating (storage) temperature	-4°F to 185°F (-20°C 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.

Technical Specifications

Battery CC 3 Cell 53 Wh[1] 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˚F to 113˚ F (0˚C to 45˚ C)
	Operating (Charging)	32˚F to 122˚ F (0˚C to 50˚ C)
	Operating (Discharging)	14˚F to 140˚ F (-10˚C to 60˚ C)
	Fuel Gauge LED	NA
	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	This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks: • IT ECO declaration • US ENERGY STAR® • US Federal Energy Management Program (FEMP) • EPEAT Gold registered in the United States. See http://www.epeat.net for registration status in your country. • TCO 8.0 • China Energy Conservation Program (CECP) • China State Environmental Protection Administration (SEPA) • Taiwan Green Mark • Korea Eco-label • Japan PC Green label*		
Sustainable Impact Specifications	• Ocean-bound plastic in (part(s)) • 40% 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	The configuration used for the Energy Consumption and Declared Noise Emissions data for the Notebook model is based on a “Typically Configured Notebook”.		
Energy Consumption (in accordance with US ENERGY STAR® test method)	**115VAC, 60Hz**	**230VAC, 50Hz**	**100VAC, 50Hz**
Normal Operation (Sort idle)	6.18 W	6.03 W	5.85 W
Normal Operation (Long idle)	1.58 W	1.33 W	1.39 W
Sleep	1.58 W	1.33 W	1.39 W
Off	0.34 W	0.37 W	0.34 W
	Note: Energy efficiency data listed is for an ENERGY STAR® compliant product if offered within the model family. HP computers marked with the ENERGY STAR® Logo are compliant with the applicable U.S.		

Technical Specifications

	Environmental Protection Agency (EPA) ENERGY STAR® specifications for computers. If a model family does not offer ENERGY STAR® compliant configurations, then energy efficiency data listed is for a typically configured PC featuring a hard disk drive, a high efficiency power supply, and a Microsoft Windows® operating system.		
Heat Dissipation*	**115VAC, 60Hz**	**230VAC, 50Hz**	**100VAC, 50Hz**
Normal Operation (Short idle)	21 BTU/hr	21 BTU/hr	20 BTU/hr
Normal Operation (Long idle)	5 BTU/hr	5 BTU/hr	5 BTU/hr
Sleep	5 BTU/hr	5 BTU/hr	5 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	3.1	14.4	
Optical Drive – Sequential reads	4.1	33.9	
Longevity and Upgrading	This product can be upgraded, possibly extending its useful life by several years. Upgradeable features and/or components contained in the Spare parts are available throughout the warranty period and or for up to “5 ” years after the end of production.		

Technical Specifications

Additional Information	• This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC. • This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC. • This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986). • This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold level, see www.epeat.net • Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043. • This product is 95.9% recycle-able when properly disposed of at end of life.		
Packaging Materials	**External:**	PAPER/Corrugated	220 g
	Internal:	PAPER/Molded pulp	140 g
		PLASTIC/Polyethylene low density	14 g
		PLASTIC/polypropylene	3 g
	The plastic packaging material contains at least 0% recycled content.		
	The corrugated paper packaging materials contains at least 63.1% recycled content.		
RoHS Compliance	HP Inc. complies fully with materials regulations. We were among the first companies to extend the restrictions in the European Union (EU) Restriction of Hazardous Substances (RoHS) Directive to our products worldwide through the HP GSE. HP has contributed to the development of related legislation in Europe, as well as China, India, and Vietnam. We believe the RoHS directive and similar laws play an important role in promoting industry-wide elimination of substances of concern. We have supported the inclusion of additional substances—including PVC, BFRs, and certain phthalates—in future RoHS legislation that pertains to electrical and electronics products. We met our voluntary objective to achieve worldwide compliance with the new EU RoHS requirements for virtually all relevant products by July 2013, and we will continue to extend the scope of the commitment to include further restricted substances as regulations continue to evolve. To obtain a copy of the HP RoHS Compliance Statement, see HP RoHS position statement.		
Material Usage	This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html): • Asbestos • Certain Azo Colorants • Certain Brominated Flame Retardants – may not be used as flame retardants in plastics • Cadmium • Chlorinated Hydrocarbons • Chlorinated Paraffins • Bis(2-Ethylhexyl) phthalate (DEHP) • Benzyl butyl phthalate (BBP) • Dibutyl phthalate (DBP) • Diisobutyl phthalate (DIBP) • Formaldehyde		

Technical Specifications

	• Halogenated Diphenyl Methanes • Lead carbonates and sulfates • Lead and Lead compounds • Mercuric Oxide Batteries • Nickel – finishes must not be used on the external surface designed to be frequently handled or carried by the user. • Ozone Depleting Substances • Polybrominated Biphenyls (PBBs) • Polybrominated Biphenyl Ethers (PBBEs) • Polybrominated Biphenyl Oxides (PBBOs) • Polychlorinated Biphenyl (PCB) • Polychlorinated Terphenyls (PCT) • Polyvinyl Chloride (PVC) – except for wires and cables, and certain retail packaging has been voluntarily removed from most applications. • Radioactive Substances • Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)
Packaging Usage	HP follows these guidelines to decrease the environmental impact of product packaging: • Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials. • Eliminate the use of ozone-depleting substances (ODS) in packaging materials. • Design packaging materials for ease of disassembly. • Maximize the use of post-consumer recycled content materials in packaging materials. • Use readily recyclable packaging materials such as paper and corrugated materials. • Reduce size and weight of packages to improve transportation fuel efficiency. • Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.
End-of-life Management and Recycling	HP offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/go/reuse-recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner. The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: http://www.hp.com/go/recyclers. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.
HP, Inc. Corporate Environmental Information	For more information about HP's commitment to the environment: Global Citizenship Report http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html Eco-label certifications http://www8.hp.com/us/en/hp-information/environment/ecolabels.html ISO 14001 certificates: http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842 and

Technical Specifications

	http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf
footnotes	• Percentage of ocean-bound plastic contained in each component varies by product • Recycled plastic content percentage is based on the definition set in the IEEE 1680.1-2018 standard. • External power supplies, WWAN modules, power cords, cables and peripherals excluded. • 100% outer box packaging and corrugated cushions made from sustainably sourced certified and recycled fibers. • Fiber cushions made from 100% recycled wood fiber and organic materials. • Plastic cushions are made from >90% recycled plastic.

FINGERPRINT READER

Model: Synaptics Validity VFS7552 touch sensor

Mobile Voltage Operation: 3.0V to 3.6V

Operating Temperature: 14° – 167°F (-10°-75°C)

Current Consumption Image: 36mA peak

Low Latency Wait for Finger: 950 uA

Capture Rate: 30 cm/sec

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

Detection Matrix: 200*1 (Plus another secondary line) / 508 dpi / 10mm 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	HP Reversible 13.3” Sleeve	7ZE82AA
	Prelude Pro Top Load	1X645AA
	Prelude Pro Backpack	1X644AA
Docking	HP USB-C Travel Dock G2	7PJ38AA, 7PJ38UT, 7PJ38ET
	HP USB-C Mini Dock	1PM64AA, 1PM64UT, 1PM64ET
	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

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

	HP USB to Gig RJ45 Adapter	N7P47AA
	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 Kermit AC Power Adapter	3PN48AA, PN48UT
	HP USB Power Bank	N9F71AA, N9F71UT
	HP USB-C Essential Power Bank	3TB55AA,3TB55UT
Memory	HP 4GB DDR4 3200 Memory	286H5AA
	HP 8GB DDR4 3200 Memory	286H8AA
	HP 16GB DDR4 3200 Memory	286J1AA
Storage	HP USB DVD-Writer EXT ODD	Y3T76AA, F2B56AA, F2B56UT, F2B56ET
Security	HP Nano Cable Lock	1AJ39AA,1AJ39UT
	HP SureKey Standard/Nano/Wedge Cable Lock	6UW42AA, 6UW42UT
UCC	HP Stereo 3.5mm Headsett	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