

### Overview

### HP EliteBook 845 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 (1 charging)
11. Nano Security Lock Slot (Lock sold separately)

### 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

- 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 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 Process<sup>1</sup>
- 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

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.**

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## Technical Specifications

### PRODUCT NAME

HP EliteBook 845 G8 Notebook PC

### OPERATING SYSTEM

**Preinstalled** Windows 10 Pro 64 – HP recommends Windows 10 Pro for business<sup>1</sup>  
Windows 10 Pro 64 (National Academic only)<sup>2</sup>  
Windows 10 Home 64<sup>1</sup>  
Windows 10 Home Single Language 64<sup>1</sup>  
Windows 10 Pro (Windows 10 Enterprise available with a Volume Licensing Agreement)<sup>1</sup>  
FreeDOS  
Windows 10 Enterprise 64 (Web Support)<sup>1</sup>

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<sup>3, 4, 5</sup>

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.

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## Technical Specifications

- 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>.
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### CHIPSET

Chipset is integrated with processor

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### GRAPHICS

#### Integrated

AMD Radeon™ Graphics<sup>6</sup>

#### Supports

Support HW decode, DX12, HDMI 2.0 and HDCP 2.2

- HD content required to view HD images.
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### DISPLAY

#### Non-Touch

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

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

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

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

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)<sup>6,7,8</sup>

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)<sup>6,7,8</sup>

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)<sup>6,7,8,9,10</sup>

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)<sup>6,7,8,9,10</sup>

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)<sup>6,7,8,9,10</sup>

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)<sup>6,7,8,9,10</sup>

35.56 cm (14") 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)<sup>6,7,8</sup>

35.56 cm (14") 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)<sup>6,7,8</sup>

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## Technical Specifications

### 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)<sup>6,7,8,10</sup>

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)<sup>6,7,8,10</sup>

### 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.

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## STORAGE AND DRIVES

### Primary Storage

128 GB M.2 PCIe-3 TLC<sup>11</sup>

256 GB PCIe® Gen3x4 NVMe™ TLC Opal 2<sup>11</sup>

256 GB PCIe® Gen3x4 NVMe™ SS TLC<sup>11</sup>

256 GB PCIe® NVMe™ Value<sup>11</sup>

512 GB PCIe® Gen3x4 NVMe™ TLC Opal 2<sup>11</sup>

512 GB PCIe® Gen3x4 NVMe™ M.2 SS TLC<sup>11</sup>

512 GB PCIe® NVMe™ Value<sup>11</sup>

1 TB PCIe® Gen3 x4 NVMe™ SS TLC<sup>11</sup>

2 TB PCIe® Gen3 x4 NVMe™ SS TLC<sup>11</sup>

11. 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)<sup>12</sup>

32 GB DDR4-3200 SDRAM (2 x 16 GB)<sup>12</sup>

16 GB DDR4-3200 SDRAM (1 x 16 GB)<sup>12</sup>

16 GB DDR4-3200 SDRAM (2 x 8 GB)<sup>12</sup>

8 GB DDR4-3200 SDRAM (1 x 8 GB)<sup>12</sup>

8 GB DDR4-3200 SDRAM (2 x 4 GB)<sup>12</sup>

4 GB DDR4-3200 SDRAM (1 x 4 GB)<sup>12</sup>

##### 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.

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#### NETWORKING/COMMUNICATIONS

##### WLAN

Intel® AX200 Wi-Fi 6 (2x2) and Bluetooth® 5 Combo, non-vPro™ (supporting gigabit data rate)<sup>13,14</sup>

Realtek RTL8822BE 802.11ac (2x2) and Bluetooth® 5 Combo<sup>15</sup>

##### WWAN

Intel® XMM™ 7360 LTE-Advanced Cat 9<sup>16</sup>

##### NFC

NXP NPC300 Near Field Communication Module

##### Miracast

Native Miracast Support<sup>17</sup>

13. 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 notebook to communicate with other 802.11ax devices.

### Technical Specifications

14. 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.
  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.
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### 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<sup>6,7</sup>

720p HD+IR camera<sup>6,7,18</sup>

#### 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.
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### 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

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### Technical Specifications

#### SOFTWARE AND SECURITY

##### Software

HP Connection Optimizer<sup>19</sup>  
HP Hotkey Support  
myHP  
HP Support Assistant<sup>20</sup>  
HP QuickDrop  
HP Noise Cancellation Software  
Touchpoint Customizer for Commercial  
HP Notifications  
HP Privacy Settings  
HP Wireless Button Driver  
HP Power Manager  
HP WorkWell  
HP PC Hardware Diagnostics Windows  
Microsoft Defender  
Buy Microsoft Office (sold separately)

##### Manageability Features

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

##### Security Management

HP Pro Security Edition<sup>23</sup>  
HP Client Security Manager Gen7<sup>24</sup>  
HP Sure Sense<sup>25</sup>  
HP Sure Click<sup>26</sup>  
HP Sure Run Gen4<sup>27</sup>  
HP Sure Recover Gen4<sup>28</sup>  
HP Sure Start Gen6<sup>29</sup>  
HP Sure Admin<sup>30</sup>  
HP BIOSphere Gen6<sup>31</sup>  
BIOS Update via Network  
HP Secure Erase<sup>32</sup>  
Absolute Persistence Module<sup>33</sup>  
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<sup>34</sup>

## Technical Specifications

### IPv6 Certification

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 Pro Security Edition is available preloaded on select HP PCs and includes HP Sure Click Pro and HP Sure Sense Pro. 3-year license required. The HP Pro Security Edition software is licensed under the license terms of the HP End User License Agreement (EULA) that can be found at: [https://h30670.www3.hp.com/ecommerce/common/disclaimer.do#EN\\_US](https://h30670.www3.hp.com/ecommerce/common/disclaimer.do#EN_US) as modified by the following: "7. Term. Unless otherwise terminated earlier pursuant to the terms contained in this EULA, the license for the HP Pro Security Edition (HP Sure Sense Pro and HP Sure Click Pro) is effective upon activation and will continue for thirty-six (36) months thereafter ("Initial Term"). At the end of the Initial Term you may either (a) purchase a renewal license for the HP 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." HP Pro Security Edition is optimized for the SMB environment and ships pre-configured - manageability is optional. The HP Pro Security Edition supports a limited tool set that can be used by the HP Manageability Integration Kit which can be downloaded from <http://www.hp.com/go/clientmanagement>.

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 Windows10 Home.

26. HP Sure Click requires Windows 10. See [https://bit.ly/2PrLT6A\\_SureClick](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:

## Technical Specifications

<https://www.absolute.com/about/legal/agreements/absolute/>.

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

### SMART CARD READER

<b>Smart Card Reader (Optional)</b>	<b>Smart card standard</b>	PC/SC 2.0 for Windows smart card standard
	<b>Dimensions (L x W x H)</b>	0.41 x 0.08 x 0.32 in (10.5 x 2 x 8.2 mm)
	<b>Smart Card support</b>	ISO 7816 Class A and AB smart cards
	<b>Smart Card Interface</b>	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
	<b>Model number</b>	Alcor AU9560
	<b>FIPS 201 Compliant</b>	Yes

### POWER

#### Power Supply

HP Smart 45 W External AC power adapter<sup>35</sup>

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

HP Smart 65 W External AC power adapter<sup>35</sup>

HP Smart 65 W EM External AC power adapter<sup>35</sup>

HP Smart 65 W Slim Type-C<sup>®</sup> adapter<sup>35</sup>

HP Smart 65 W Standard Type-C<sup>®</sup> adapter<sup>35</sup>

#### Primary Battery

HP Long Life 3-cell, 53 Wh Li-ion<sup>36,37,38</sup>

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

#### Power Cord

2-wire plug - 1.0m<sup>35</sup>

3-wire plug - 1.0m<sup>35</sup>

#### Battery Life

Up to 20 hours<sup>39</sup>

#### Battery Weight

0.205 kg (0.45 lb)

### Technical Specifications

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.

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.

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### WEIGHTS & DIMENSIONS

#### Product Weight<sup>40</sup>

##### 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.

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## 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<sup>6</sup>
- 1 headphone/microphone combo
- 1 AC Power
- 1 SIM Card slot<sup>41</sup>
- 1 Smartcard reader (optional)

6. HD content required to view HD images.

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

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### 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> <sup>42</sup>

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.

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### CERTIFICATION AND COMPLIANCE

- ENERGY STAR® certified
- EPEAT® Gold<sup>43</sup>
- Low halogen<sup>44</sup>
- 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)

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

#### Temperature

<b>Operating</b>	32° to 95° F (0° to 35° C) (not writing optical)
<b>Non-operating</b>	41° to 95° F (5° to 35° C) (writing optical)

#### Relative Humidity

<b>Operating</b>	10% to 90%, non-condensing
<b>Non-operating</b>	5% to 95%, 101.6° F (38.7° C) maximum wet bulb temperature

#### Shock

<b>Operating</b>	40 G, 2 ms, half-sine
<b>Non-operating</b>	200 G, 2 ms, half-sine

#### Random Vibration

<b>Operating</b>	0.75 g
<b>Non-operating</b>	1.50 g

#### Altitude (unpressurized)

<b>Operating</b>	-50 to 10,000 ft (-15.24 to 3,048 m)
<b>Non-operating</b>	-50 to 40,000 ft (-15.24 to 12,192 m)

#### Planned Industry Standard Certifications

<b>UL</b>	Yes
<b>CSA</b>	Yes
<b>FCC Compliance</b>	Yes
<b>ENERGY STAR®</b>	Yes
<b>EPEAT</b>	EPEAT Golden in United States <sup>45</sup>
<b>ICES</b>	Yes
<b>Australia /</b>	Yes
<b>NZ A-Tick Compliance</b>	Yes
<b>CCC</b>	Yes
<b>Japan VCCI Compliance</b>	Yes
<b>KC</b>	Yes
<b>BSMI</b>	Yes
<b>CE Marking Compliance</b>	Yes
<b>BNCI or BELUS</b>	Yes
<b>CIT</b>	Yes

### Technical Specifications

<b>GOST</b>	Yes
<b>Saudi Arabian Compliance (ICCP)</b>	Yes
<b>SABS</b>	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

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## Technical Specifications

### DISPLAYS<sup>1</sup>

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

<b>Panel LCD 14 inch FHD (1920 x 1080) Anti-Glare WLED UWVA 45% cg 250 nits eDP 1.2 w/o PSR bent NWBZ</b>	<b>Outline Dimensions (W x H x D)</b>	316.17 x 186.4 mm (max) (w/ PCB)
	<b>Active Area</b>	309.37 x 174.02 mm
	<b>Weight</b>	300 g (max)
	<b>Diagonal Size</b>	14.0 in
	<b>Thickness</b>	3.0 mm/ 5.0 mm (PCB) (max)
	<b>Interface</b>	eDP 1.2 (2lane)
	<b>Surface Treatment</b>	Anti-Glare
	<b>Touch Enabled</b>	No
	<b>Contrast Ratio</b>	600:1
	<b>Refresh Rate</b>	60 Hz
	<b>Brightness</b>	250 nits
	<b>Pixel Resolution</b>	1920 x 1080 (FHD)
	<b>Format</b>	RGB Stripe
	<b>Backlight</b>	LED
	<b>Color Gamut Coverage</b>	NTSC 45%
	<b>Color Depth</b>	6 bits (Hi FRC supportive w/ condition to enable)
	<b>Viewing Angle</b>	UWVA 85/85/85/85

<b>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</b>	<b>Outline Dimensions (W x H x D)</b>	316.17 x 186.4 mm (max) (w/ PCB)
	<b>Active Area</b>	309.37 x 174.02 mm
	<b>Weight</b>	305 g (max)
	<b>Diagonal Size</b>	14.0 in
	<b>Thickness</b>	3.0 mm/ 5.0 mm (PCB) (max)
	<b>Interface</b>	eDP 1.2
	<b>Surface Treatment</b>	Anti-Glare On-cell
	<b>Touch Enabled</b>	Yes
	<b>Contrast Ratio</b>	600:1
	<b>Refresh Rate</b>	60 Hz
	<b>Brightness</b>	250 nits
	<b>Pixel Resolution</b>	1920 x 1080 (FHD)
	<b>Format</b>	RGB Stripe
	<b>Backlight</b>	LED
	<b>Color Gamut Coverage</b>	NTSC 45%
	<b>Color Depth</b>	6 bits (Hi FRC supportive w/ condition to enable)
	<b>Viewing Angle</b>	UWVA 85/85/85/85

### Technical Specifications

<b>Panel LCD 14 inch FHD (1920 x 1080) Anti-Glare WLED UWVA sRGB 100percent cg 400nits eDP 1.4+PSR2 bent LP NB2X</b>	<b>Outline Dimensions (W x H x D)</b>	315.07 x 186.6 mm (max)
	<b>Active Area</b>	309.37 X 174.02 mm
	<b>Weight</b>	200 g (max)
	<b>Diagonal Size</b>	14.0 in
	<b>Thickness</b>	2.0 mm / 4.0 mm (PCB) (max)
	<b>Interface</b>	eDP 1.4
	<b>Surface Treatment</b>	Anti-Glare
	<b>Touch Enabled</b>	No
	<b>Contrast Ratio</b>	1200:1
	<b>Refresh Rate</b>	60 Hz
	<b>Brightness</b>	400 nits
	<b>Pixel Resolution</b>	1920 x 1080 (FHD)
	<b>Format</b>	RGB Stripe
	<b>Backlight</b>	LED
	<b>Color Gamut Coverage</b>	sRGB 100% (NTSC 72%)
	<b>Color Depth</b>	6 bits
	<b>Viewing Angle</b>	UWVA 85/85/85/85

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

## Technical Specifications

STORAGE <sup>1</sup>

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

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

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

<b>SSD 256GB 2280 M2 PCIe-3x4 SS NVMe TLC</b>	<b>Form Factor</b>	M.2 2280
	<b>Capacity</b>	256 GB
	<b>NAND Type</b>	TLC
	<b>Height</b>	0.09 in (2.3 mm)
	<b>Width</b>	0.87 in (22 mm)
	<b>Weight</b>	0.02 lb (10 g)
	<b>Interface</b>	PCIe NVMe Gen3X4
	<b>Maximum Sequential Read</b>	Up to 2800 ~ 3500 MB/s
	<b>Maximum Sequential Write</b>	Up to 1600 ~ 2200 MB/s
	<b>Logical Blocks</b>	500,118,192
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]

### Technical Specifications

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

### Technical Specifications

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

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

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

### Technical Specifications

#### NETWORKING

<p><b>Intel Wi-Fi 6<sup>1</sup> AX200 + Bluetooth 5 (802.11ax 2x2, non-vPro, supporting gigabit data rate <sup>4</sup>speeds) non-vPro</b></p>	<p><b>Wireless LAN Standards</b></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 802.11v</p>
	<p><b>Interoperability Frequency Band</b></p>	<p>Wi-Fi certified</p> <ul style="list-style-type: none"> <li>• 802.11b/g/n/ax 2.402 – 2.482 GHz</li> <li>• 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</li> </ul>
	<p><b>Data Rates</b></p>	<ul style="list-style-type: none"> <li>• 802.11b: 1, 2, 5.5, 11 Mbps</li> <li>• 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</li> <li>• 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</li> <li>• 802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz)</li> <li>• 802.11ac: MCS0 ~ MCS9, (1SS, and 2SS) (20MHz, 40MHz, ,80MHz &amp; 160MHz)</li> <li>• 802.11ax: MCS0 ~ MCS11, (1SS and 2SS) (20MHz, 40MHz, ,80MHz &amp; 160MHz)</li> </ul>
	<p><b>Modulation</b></p>	<p>Direct Sequence Spread Spectrum OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM</p>
	<p><b>Security<sup>3</sup></b></p>	<ul style="list-style-type: none"> <li>• IEEE and WiFi compliant 64 / 128-bit WEP encryption for a/b/g mode only</li> <li>• AES-CCMP: 128-bit in hardware</li> <li>• 802.1x authentication</li> <li>• WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.</li> <li>• WPA2 certification</li> <li>• WPA3 certification</li> <li>• IEEE 802.11i</li> <li>• WAPI</li> </ul>
	<p><b>Network Architecture Models</b></p>	<p>Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)</p>

## Technical Specifications

<b>Roaming</b>	IEEE 802.11 compliant roaming between access points
<b>Output Power<sup>2</sup></b>	<ul style="list-style-type: none"> <li>• 802.11b: +17dBm minimum</li> <li>• 802.11g: +16dBm minimum</li> <li>• 802.11a: +17dBm minimum</li> <li>• 802.11n HT20(2.4GHz): +14dBm minimum</li> <li>• 802.11n HT40(2.4GHz): +13dBm minimum</li> <li>• 802.11n HT20(5GHz): +14dBm minimum</li> <li>• 802.11n HT40(5GHz): +13dBm minimum</li> <li>• 802.11ac VHT80(5GHz): +10dBm minimum</li> <li>• 802.11ac VHT160(5GHz): +10dBm minimum</li> <li>• 802.11ax HE40(2.4GHz): +12dBm minimum</li> <li>• 802.11ax HE80(5GHz): +10dBm minimum</li> <li>• 802.11ax HE160(5GHz): +10dBm minimum"</li> </ul>
<b>Power Consumption</b>	<ul style="list-style-type: none"> <li>• Transmit mode 2.0 W</li> <li>• Receive mode 1.6 W</li> <li>• Idle mode (PSP) 180 mW (WLAN Associated)</li> <li>• Idle mode 50 mW (WLAN unassociated)</li> <li>• Connected Standby 10mW</li> <li>• Radio disabled 8 mW</li> </ul>
<b>Power Management</b>	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
<b>Receiver Sensitivity<sup>3</sup></b>	<ul style="list-style-type: none"> <li>• 802.11b, 1Mbps: -93.5dBm maximum</li> <li>• 802.11b, 11Mbps: -84dBm maximum</li> <li>• 802.11a/g, 6Mbps: -86dBm maximum</li> <li>• 802.11a/g, 54Mbps: -72dBm maximum</li> <li>• 802.11n, MCS07: -67dBm maximum</li> <li>• 802.11n, MCS15: -64dBm maximum</li> <li>• 802.11ac, MCS0(VHT80): -84dBm maximum</li> <li>• 802.11ac, MCS9(VHT80): -59dBm maximum</li> <li>• 802.11ac, MCS9(VHT160): -58.5dBm maximum</li> <li>• 802.11ax, MCS11(HE40): -57dBm maximum</li> <li>• 802.11ax, MCS11(HE80): -54dBm maximum</li> <li>• 802.11ax, MCS11(HE160): -53.5dBm maximum"</li> </ul>
<b>Antenna type</b>	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
<b>Form Factor</b>	PCI-Express M.2 MiniCard
<b>Dimensions</b>	<ol style="list-style-type: none"> <li>1. Type 2230: 2.3 x 22.0 x 30.0 mm</li> <li>2. Type 1216: 1.67 x 12.0 x 16.0 mm</li> </ol>
<b>Weight</b>	<ol style="list-style-type: none"> <li>1. Type 2230: 2.8 g</li> <li>2. Type 126: 1.3 g</li> </ol>
<b>Operating Voltage</b>	3.3v +/- 9%
<b>Temperature</b>	<b>Operating</b> 14° to 158° F (-10° to 70° C)

### Technical Specifications

<b>Humidity</b>	<b>Non-operating</b>	−40° to 176° F (−40° to 80° C)
	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 95% (non-condensing)
<b>Altitude</b>	Operating	0 to 10,000 ft (3,048 m)
	Non-operating	0 to 50,000 ft (15,240 m)
<b>LED Activity</b>	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

<b>Bluetooth Specification</b>	4.0/4.1/4.2/5.0/5.1 Compliant
<b>Frequency Band</b>	2402 to 2480 MHz
<b>Number of Available Channels</b>	Legacy: 0~79 (1 MHz/CH) BLE: 0~39 (2 MHz/CH)
<b>Data Rates and Throughput</b>	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)
<b>Transmit Power</b>	The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 9.5 dBm for BR and EDR.
<b>Power Consumption</b>	Peak (Tx): 330 mW
<b>Bluetooth Software Supported Link Topology</b>	Microsoft Windows Bluetooth Software
<b>Power Management</b>	Microsoft Windows ACPI, and USB Bus Support
<b>Certifications</b>	FCC (47 CFR) Part 15C, Section 15.247 & 15.249
<b>Power Management Certifications</b>	ETS 300 328, ETS 300 826 Low Voltage Directive IEC950 UL, CSA, and CE Mark
<b>Bluetooth Profiles Supported</b>	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)

### Technical Specifications

Hands Free Profile (HFP)  
Advanced Audio Distribution Profile (A2DP)

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<sup>1</sup> 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<sup>3</sup>

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

## Technical Specifications

	<ul style="list-style-type: none"> <li>• 802.1x authentication</li> <li>• WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.</li> <li>• WPA2 certification</li> <li>• WPA3 certification</li> <li>• IEEE 802.11i</li> <li>• WAPI</li> </ul>
<b>Network Architecture Models</b>	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
<b>Roaming</b>	IEEE 802.11 compliant roaming between access points
<b>Output Power<sup>2</sup></b>	<ul style="list-style-type: none"> <li>• 802.11b: +18.5dBm minimum</li> <li>• 802.11g: +17.5dBm minimum</li> <li>• 802.11a: +18.5dBm minimum</li> <li>• 802.11n HT20(2.4GHz): +15.5dBm minimum</li> <li>• 802.11n HT40(2.4GHz): +14.5dBm minimum</li> <li>• 802.11n HT20(5GHz): +15.5dBm minimum</li> <li>• 802.11n HT40(5GHz): +14.5dBm minimum</li> <li>• 802.11ac VHT80(5GHz): +11.5dBm minimum</li> </ul>
<b>Power Consumption</b>	<ul style="list-style-type: none"> <li>• Transmit mode: 2.0 W</li> <li>• Receive mode: 1.6 W</li> <li>• Idle mode (PSP) 180 mW (WLAN Associated)</li> <li>• Idle mode: 50 mW (WLAN unassociated)</li> <li>• Connected Standby/Modern Standby: 10mW</li> <li>• Radio disabled: 8 mW</li> </ul>
<b>Power Management</b>	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
<b>Receiver Sensitivity<sup>3</sup></b>	<ul style="list-style-type: none"> <li>• 802.11b, 1Mbps: -93.5dBm maximum</li> <li>• 802.11b, 11Mbps: -84dBm maximum</li> <li>• 802.11a/g, 6Mbps: -86dBm maximum</li> <li>• 802.11a/g, 54Mbps: -72dBm maximum</li> <li>• 802.11n, MCS07: -67dBm maximum</li> <li>• 802.11n, MCS15: -64dBm maximum</li> <li>• 802.11ac, MCS0: -84dBm maximum</li> <li>• 802.11ac, MCS9: -59dBm maximum</li> </ul>
<b>Antenna type</b>	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
<b>Form Factor</b>	PCI-Express M.2 MiniCard
<b>Dimensions</b>	<ol style="list-style-type: none"> <li>1. Type 2230: 2.3 x 22.0 x 30.0 mm</li> <li>2. Type 1216: 1.67 x 12.0 x 16.0 mm</li> </ol>
<b>Weight</b>	<ol style="list-style-type: none"> <li>1. Type 2230: 2.8 g</li> <li>2. Type 126: 1.3 g</li> </ol>
<b>Operating Voltage</b>	3.3v +/- 9%

### Technical Specifications

<b>Temperature</b>	Operating	14° to 158° F (–10° to 70° C)
	Non-operating	–40° to 176° F (–40° to 80° C)
<b>Humidity</b>	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 95% (non-condensing)
<b>Altitude</b>	Operating	0 to 10,000 ft (3,048 m)
	Non-operating	0 to 50,000 ft (15,240 m)
<b>LED Activity</b>	LED Amber – Radio OFF; LED OFF – Radio ON	

### HP Integrated Module with Bluetooth 4.0/4.1/4.2/5.0 Wireless Technology

<b>Bluetooth Specification</b>	4.0/4.1/4.2/5.0 Compliant
<b>Frequency Band</b>	2402 to 2480 MHz
<b>Number of Available Channels</b>	Legacy: 0~79 (1 MHz/CH) BLE: 0~39 (2 MHz/CH)
<b>Data Rates and Throughput</b>	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)
<b>Transmit Power</b>	The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 4 dBm for BR and EDR.
<b>Power Consumption</b>	Peak (Tx): 330 mW Peak (Rx): 230 mW Selective Suspend: 17 mW
<b>Bluetooth Software Supported Link Topology</b>	Microsoft Windows Bluetooth Software
<b>Power Management</b>	Microsoft Windows ACPI, and USB Bus Support
<b>Certifications</b>	FCC (47 CFR) Part 15C, Section 15.247 & 15.249
<b>Power Management Certifications</b>	ETS 300 328, ETS 300 826 Low Voltage Directive IEC950 UL, CSA, and CE Mark
<b>Bluetooth Profiles Supported</b>	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

### Technical Specifications

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. 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

<b>Intel® XMM™ 7360 LTE-Advanced<sup>1</sup></b>	<b>Technology/Operating bands</b>	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
	<b>Wireless protocol standards</b>	3GPP Release 11 LTE Specification CAT.9, MAX 60MHz aggregation BW WCDMA R99, 3GPP Release 5,6,7 and 8 UMTS Specification
	<b>GPS</b>	Standalone, A-GPS (MS-B and LTO)
	<b>GPS bands</b>	GPS: L1 (1575.42MHz); L5 (1176MHz) GLONASS: L1 (1602MHz) BeidouB1(1561.098MHz) Galileo E1 (1575.42); E5a (1176MHz)
	<b>Maximum data rates</b>	LTE: 450 Mbps (DL 3CA), 50 Mbps (Upload) DC-HSPA+: 42 Mbps (Download), 5.76 Mbps (Upload) HSPA+: 21Mbps (Download), 5.76 Mbps (Upload)
	<b>Maximum output power</b>	LTE: 23 dBm HSPA+: 23.5 dBm
	<b>Maximum power consumption</b>	LTE: 1,200 mA (peak); 900 mA (average) HSPA+: 1,100 mA (peak); 800 mA (average)
	<b>Form Factor</b>	M.2, 3042-S3 Key B
	<b>Weight</b>	6 g
	<b>Dimensions (Length x Width x Thickness)</b>	42 x 30 x 2.3 mm

## Technical Specifications

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

<b>NXP NPC300 Near Field Communication Module</b>	<b>Dimensions (L x W x H)</b>	Module 17 x 10 x 2.0 mm
	<b>Chipset</b>	NPC300
	<b>System interface</b>	I2C
	<b>NFC RF standards</b>	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
	<b>NFC Forum Support</b>	Tag Type 1, Type 2, Type3 and Type 4, NFCIP-1 and NFCIP-2
	<b>Reader (PCD-VCD) Mode<sup>1</sup></b>	ISO/IEC 14443 A
		ISO/IEC 14443 B
		ISO/IEC 15693
		MIFARE 1K
		MIFARE 4K
MIFARE DESFire		
FeliCa Jewel and Topaz cards		
<b>Card Emulation (PICC-VICC) Mode<sup>1</sup></b>	ISO/IEC 14443 A	
	ISO/IEC 14443 B and B'	
	MIFARE	
	FeliCa	
<b>Frequency</b>	13.56 MHz	
<b>NFC Modes Supported</b>	Reader/Writer, Peer-to-Peer	
<b>Raw RF Data Rates</b>	106, 212, 424, 848 kbps	
<b>Operating temperature</b>	-25°C to 80°C	
<b>Storage temperature</b>	-25°C to 125°C	
<b>Humidity</b>	10-90% operating	
	5-95% non-operating	
<b>Supply Operating voltage</b>	2.7 to 5.5 Volts	
<b>I/O Voltage</b>	1.8V or 3.3V	

### Power Consumption (Booster enable, VBAT= 3.3V, VCC\_BOOST = 5V)

Mode	Power Consumption, Typical <sup>2</sup>
Polling	710.93 mW

### Technical Specifications

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

<b>AC Adapter 45 Watt Smart nPFC Standard Barrel 4.5mm Right Angle 1.0 m</b>	<b>Dimensions</b>	95 x 45 x 26.8mm
	<b>Weight</b>	unit: 200 g +/- 10 g
	<b>Input</b>	
	<b>Input Efficiency</b>	87.74 % at 115 Vac and 88.4 % at 230Vac
	<b>Input frequency range</b>	47 ~ 63 Hz
	<b>Input AC current</b>	Max. 1.4 A at 90 Vac
	<b>Output</b>	
	<b>Output power</b>	45W
	<b>DC output</b>	19.5V
	<b>Hold-up time</b>	5ms at 115 Vac input
	<b>Output current limit</b>	<8.0A
	<b>Connector</b>	4.5mm Barrel Type
	<b>Environmental Design</b>	
	<b>Operating temperature</b>	32°F to 95°F (0° to 35°C)
	<b>Non-operating (storage) temperature</b>	-4°F to 185°F (-20° to 85°C)
	<b>Altitude</b>	0 to 16,400 ft (0 to 5000m)
	<b>Humidity</b>	20% to 95%
	<b>Storage Humidity</b>	10% to 95%
	<b>EMI and Safety Certifications</b>	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.

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

### Technical Specifications

<b>Operating temperature</b>	32°F to 95°F (0° to 35°C)
<b>Non-operating (storage) temperature</b>	-4°F to 185°F (-20° to 85°C)
<b>Altitude</b>	0 to 16,400 ft (0 to 5000m)
<b>Humidity</b>	20% to 95%
<b>Storage Humidity</b>	10% to 95%
<b>EMI and Safety Certifications</b>	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

<b>Dimensions</b>	88 x 53.5 x 21mm
<b>Weight</b>	unit: 220 g +/- 10 g
<b>Input</b>	
<b>Input Efficiency</b>	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
<b>Input frequency range</b>	47 ~ 63 Hz
<b>Input AC current</b>	1.6 A at 90 VAC and maximum load
<b>Output</b>	
<b>Output power</b>	65W
<b>DC output</b>	5V/9V/12V/15V/20V
<b>Hold-up time</b>	5ms at 115 Vac input
<b>Output current limit</b>	<8.0A
<b>Connector</b>	USB Type C
<b>Environmental Design</b>	
<b>Operating temperature</b>	32°F to 95°F (0° to 35°C)
<b>Non-operating (storage) temperature</b>	-4°F to 185°F (-20° to 85°C)
<b>Altitude</b>	0 to 16,400 ft (0 to 5000m)
<b>Humidity</b>	5% to 95%
<b>Storage Humidity</b>	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

<b>Output</b>	
<b>Output power</b>	65W
<b>DC output</b>	19.5V
<b>Hold-up time</b>	5ms at 115 Vac input
<b>Output current limit</b>	<11.0A
<b>Connector</b>	4.5 mm Barrel Type
<b>Operating temperature</b>	32°F to 95°F (0° to 35°C)
<b>Non-operating (storage) temperature</b>	
	-4°F to 185°F (-20° to 85°C)
<b>Altitude</b>	0 to 16,400 ft (0 to 5000m)
<b>Humidity</b>	20% to 95%
<b>Storage Humidity</b>	10% to 95%
<b>EMI and Safety Certifications</b>	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

<b>Dimensions</b>	90 x 51 x 28.5 mm
<b>Weight</b>	unit: 230g +/- 10g
<b>Input</b>	
<b>Input Efficiency</b>	88.0 % at 115 Vac and 89.0 % at 230Vac
<b>Input frequency range</b>	47 ~ 63 Hz
<b>Input AC current</b>	Max. 1.7 A at 90 Vac
<b>Output</b>	
<b>Output power</b>	65W
<b>DC output</b>	19.5V
<b>Hold-up time</b>	5ms at 115 Vac input
<b>Output current limit</b>	<11.0A
<b>Connector</b>	4.5mm Barrel Type
<b>Operating temperature</b>	32°F to 95°F (0° to 35°C)
<b>Non-operating (storage) temperature</b>	
	-4°F to 185°F (-20° to 85°C)
<b>Altitude</b>	0 to 16,400 ft (0 to 5000m)
<b>Humidity</b>	20% to 95%
<b>Storage Humidity</b>	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.

#### Battery CC 3 Cell 53 Wh<sup>1</sup> 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** 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<sup>®</sup> 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**

- 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** 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)	6.02 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

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	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.

### 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](http://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.

#### Packaging Materials

<b>External:</b>	PAPER/Corrugated	41 g
<b>Internal:</b>	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

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](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)

## Technical Specifications

- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- Nickel – finishes must not be used on the external surface designed to be frequently handled or carried by the user.
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Biphenyl Ethers (PBBEs)
- Polybrominated Biphenyl Oxides (PBBOs)
- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) – except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.
- Radioactive Substances
- Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

### Packaging Usage

HP follows these guidelines to decrease the environmental impact of product packaging:

- Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.
- Eliminate the use of ozone-depleting substances (ODS) in packaging materials.
- Design packaging materials for ease of disassembly.
- Maximize the use of post-consumer recycled content materials in packaging materials.
- Use readily recyclable packaging materials such as paper and corrugated materials.
- Reduce size and weight of packages to improve transportation fuel efficiency.
- Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.

### End-of-life Management and Recycling

HP offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: <http://www.hp.com/go/reuse-recycle> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: <http://www.hp.com/go/recyclers>. 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.

### Technical Specifications

**HP, Inc. Corporate Environmental Information** For more information about HP's commitment to the environment:

Global Citizenship Report

<http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html>

Eco-label certifications

<http://www8.hp.com/us/en/hp-information/environment/ecolabels.html>

ISO 14001 certificates:

<http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842>

and

<http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf>

#### footnotes

- 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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#### 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: Image transmitter output frequency 9.6MHz

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

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#### COUNTRY OF ORIGIN

China

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

Category	Description	Part Number
<b>Cases</b>	Prelude Pro Top Load	1X645AA
	Prelude Pro Backpack	1X644AA
<b>Docking</b>	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
<b>Input/Output</b>	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)

<b>Power</b>	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
<b>Storage</b>	HP USB DVD-Writer EXT ODD	Y3T76AA, F2B56AA, F2B56UT, F2B56ET
<b>Memory</b>	HP 4GB DDR4 3200 Memory	286H5AA
	HP 8GB DDR4 3200 Memory	286H8AA
	HP 16GB DDR4 3200 Memory	286J1AA
<b>Security</b>	HP Nano Cable Lock	1AJ39AA, 1AJ39UT
	HP SureKey Standard/Nano/Wedge Cable Lock	6UW42AA, 6UW42UT
<b>UCC</b>	HP Stereo 3.5mm Headset	T1A66AA
	HP Wired USB-A Stereo Headset	T1A67AA

### Summary of Changes

<b>Date of change:</b>	<b>Version History:</b>	<b>Updated</b>	<b>Description of change:</b>
April 6, 2021	V1 to V2	Update	Battery Life Disclaimer
April 20, 2021	V2 to V3	Add	Environmental Data/Memory Modules
	V3 to V4		

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