

### Overview

#### HP EliteBook 840 Aero G8 Notebook PC



#### Left

- |                                    |   |
|------------------------------------|---|
| 1. Ambient Light Sensor (Optional) | 7. Glass Clickpad   |
| 2. Internal Microphones (2)        | 8. Smartcard Reader (Optional)                              |
| 3. Webcam LED (Optional)           | 9. Audio Combo Jack   |
| 4. Camera Shutter                  | 10. SuperSpeed USB Type-A 5Gbps signaling rate              |
| 5. IR Camera (Optional)            | 11. SuperSpeed USB Type-A 5Gbps signaling rate (1 Charging) |
| 6. IR Camera LEDs (Optional)       | 12. Nano Security Lock Slot (Lock sold separately)          |

### Overview



#### Right

1. Power Button Key
2. Power Connector
3. HDMI 2.0b Port (Cable not included)
4. Thunderbolt™ 4 with USB4™ Type-C® 40Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4) <sup>1</sup>
5. Thunderbolt™ 4 with USB4™ Type-C® 40Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4) <sup>1</sup>
6. SIM Card Slot (Optional)
7. Touch Fingerprint Sensor (Select models)

1. SuperSpeed USB 20Gbps is not available with Thunderbolt™ 4.

### Overview

#### AT A GLANCE

- Windows 11 Pro, other Windows OS or FreeDOS preinstalled
- Starting at less than 2.50 lbs (1.13 kg)<sup>1</sup> you can take the HP EliteBook 840 Aero anywhere without feeling weighed down
- Premium ultraslim design with precision-crafted and recycled magnesium chassis for a premium look and feel
- 11th Generation Intel® Core™ i5, i7 Processors up to four-core
- Designed to support all HP docking options including the HP Universal Dock G5 (Sold separately)
- Featuring the redesigned quiet HP Keyboard with the HP Programmable key and backlit options
- Innovative world-facing third mic improves inbound ambient noise cancellation while 360-degree mic pick-up allows everyone to clearly hear and be heard
- Optional ultrabright displays with ambient light sensor
- Choice of displays:
  - 35.6 cm (14") diagonal FHD IPS Anti-Glare LED-backlit, 250 nits, 45% NTSC
  - 35.6 cm (14") diagonal FHD IPS Anti-Glare LED-backlit non-touch 400 nits, 72% NTSC
  - 35.6cm (14") diagonal FHD IPS Anti-Glare LED-backlit non-touch, 1000 nits, 100% sRGB with HP Sure View Reflect
  - 35.6cm (14") diagonal FHD IPS Anti-Glare On-Cell LED-backlit touch, 250 nits, 45% NTSC
- Enterprise grade security with HP Sure Sense, HP Sure Start Gen 6, HP Privacy Camera, HP Sure View Reflect, HP Sure Run Gen4, HP Sure Recover Gen4 with Embedded Reimaging, HP Sure Click, SmartCard Reader and Touch Fingerprint reader
- Connectivity with optional Intel® XMM™ 7360 LTE-Advanced Cat 9, Qualcomm® Snapdragon™ X55 5G ModemCat 20 and Thunderbolt™ Docking (Dock sold separately)
- Supports fast charging (50% in 30 minutes) with no impact on battery recharge cycles
- Choice of solid state drives up to 2 TB and DDR4 memory up to 64 GB
- Undergoes MIL-STD 810H tests<sup>2</sup>
- Intel® Iris® Xe Graphics

1. WWAN, SureView Reflect, 250n panel, 2xDIMMs, Smart Card Slot and EMMC not available on configurations starting at less than 2.5 lbs on HP EliteBook 840 Aero G8.

2. 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 840 Aero G8 Notebook PC

#### OPERATING SYSTEM

<b>Preinstalled</b>	Windows 11 Pro <sup>2</sup>
	Windows 11 Pro Education <sup>2</sup>
	Windows 11 Home – HP recommends Windows 11 Pro for business <sup>2</sup>
	Windows 11 Home Single Language – HP recommends Windows 11 Pro for business <sup>2</sup>
	Windows 11 Pro (Windows 11 Enterprise available with a Volume Licensing Agreement) <sup>2</sup>
	Windows 10 Pro <sup>1,2</sup>
	Windows 10 Pro Education <sup>1,2</sup>
	Windows 10 Home – HP recommends Windows 11 Pro for business <sup>1,2</sup>
	Windows 10 Home Single Language – HP recommends Windows 11 Pro for business <sup>1,2</sup>
	Windows 10 Pro (Windows 10 Enterprise available with a Volume Licensing Agreement) <sup>1,2</sup>
	FreeDOS

1. Device comes with Windows 10 and a free Windows 11 upgrade or may be preloaded with Windows 11. Upgrade timing may vary by device. Features and app availability may vary by region. Certain features require specific hardware (see Windows 11 Specifications).

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

#### PROCESSORS

Intel® Core™ i7-1165G7 processor (Up to 4.7 GHz with Intel® Turbo Boost Technology, 12 MB L3 cache, 4 cores) <sup>3,4,5,6</sup>  
 Intel® Core™ i7-1185G7 (Up to 4.8 GHz with Intel® Turbo Boost Technology, 12 MB L3 cache, 4 cores), supports Intel® vPro® Technology <sup>3,4,5,6</sup>  
 Intel® Core™ i5-1135G7 (2.4 GHz base frequency, up to 4.2 GHz with Intel® Turbo Boost Technology, 8 MB L3 cache, 4 cores) <sup>3,4,5,6</sup>  
 Intel® Core™ i5-1145G7 (Up to 4.4 GHz with Intel® Turbo Boost Technology, 8 MB L3 cache, 4 cores), supports Intel® vPro® Technology <sup>3,4,5,6</sup>

##### Processor Family

11th Generation Intel® Core™ i7 processor (i7-1165G7)<sup>6</sup>  
 11th Generation Intel® Core™ i7 processor (i7-1185G7)<sup>6</sup>  
 11th Generation Intel® Core™ i5 processor (i5-1135G7)<sup>6</sup>  
 11th Generation Intel® Core™ i5 processor (i5-1145G7)<sup>6</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. Intel's numbering, branding and/or naming is not a measurement of higher performance.

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

5. Intel® Turbo Boost performance varies depending on hardware, software and overall system configuration. See

### Technical Specifications

<http://www.intel.com/technology/turboboost> for more information.

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

### CHIPSET

Chipset is integrated with processor.

### GRAPHICS

#### Integrated

Intel® Iris® Xe Graphics<sup>7</sup>

#### Supports

Support HD decode, DX12, HDMI 2.0b, HDCP 2.3<sup>8</sup>

7. Intel® Iris® Xe Graphics capabilities require system to be configured with Intel® Core™ i5 or i7 processors and dual channel memory. Intel® Iris® Xe Graphics with Intel® Core™ i5 or 7 processors and single channel memory will only function as UHD graphics.

8. HDMI cable sold separately.

### DISPLAY

#### Non-Touch

35.56 cm (14") diagonal FHD bent, anti-glare UMA eDP, 250 nits, 45% NTSC for HD + IR Camera for WWAN 4G (1920 x 1080) <sup>9,10</sup>

35.56 cm (14") diagonal FHD bent, anti-glare UMA eDP, 250 nits, 45% NTSC for HD + IR Camera for WWAN 5G (1920 x 1080) <sup>9,10</sup>

35.56 cm (14") diagonal FHD bent, anti-glare UMA eDP+PSR, 400 nits, 100% sRGB, Low Power Ambient Light Sensor for HD + IR Camera (1920 x 1080) <sup>9,10</sup>

35.56 cm (14") diagonal FHD bent, anti-glare UMA eDP+PSR, 400 nits, 100% sRGB, Low Power Ambient Light Sensor for HD + IR Camera for WWAN 4G (1920 x 1080) <sup>9,10</sup>

35.56 cm (14") diagonal FHD bent, anti-glare UMA eDP+PSR, 400 nits, 100% sRGB, Low Power Ambient Light Sensor for HD + IR Camera for WWAN 5G (1920 x 1080) <sup>9,10</sup>

35.56 cm (14") diagonal FHD bent, anti-glare UMA eDP+PSR, 1000 nits, 100% sRGB with HP Sure View Reflect integrated privacy screen, Ambient Light Sensor for HD + IR Camera (1920 x 1080) <sup>9,10,11,12</sup>

35.56 cm (14") diagonal FHD bent, anti-glare UMA eDP+PSR, 1000 nits, 72% NTSC with HP Sure View Reflect integrated privacy screen, Ambient Light Sensor for HD + IR Camera for WWAN 4G (1920 x 1080) <sup>9,10,11,12</sup>

35.56 cm (14") diagonal FHD bent, anti-glare UMA eDP+PSR, 1000 nits, 72% NTSC with HP Sure View Reflect integrated privacy screen, Ambient Light Sensor for HD + IR Camera for WWAN 5G (1920 x 1080) <sup>9,10,11,12</sup>

#### Touch

35.56 cm (14") diagonal FHD bent, anti-glare UMA eDP, 250 nits, 45% NTSC for HD + IR Camera for WWAN 4G Touch on Panel (1920 x 1080) <sup>9,10,11,12</sup>

### Technical Specifications

#### HDMI 2.0<sup>13</sup>

Support resolution up to 4K @60 Hz

9. FHD/HD content required to view FHD/HD images.

10. Resolutions are dependent upon monitor capability, and resolution and color depth settings.

11. HP Sure View integrated privacy screen is an optional feature that must be configured at purchase and is designed to function in landscape orientation.

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

13. HDMI cable sold separately.

Docking station model (Sold separately)	Total number of supported displays (incl. the notebook display)	Max resolutions supported for DP 1.4 hosts with DSC	Dock Connectors	Technical limitations / additional information For more details refer to HP Dock QuickSpecs <a href="http://h20195.www2.hp.com/v2/GetDocument.aspx?docname=c04168358">http://h20195.www2.hp.com/v2/GetDocument.aspx?docname=c04168358</a>  All information below applies to platforms running DP 1.4 with DSC
HP Thunderbolt Dock G2	Max number of displays = 4	Dual 8K@ 60Hz in high res mode	2xDP, 1xVGA, 1xTB, 1xUSB-C alt-mode	Max displays = 4 with max resolution of 5K@ 30Hz running Thunderbolt host  Max resolution possible is dual 8K displays @ 60Hz running Thunderbolt host or running a non-Thunderbolt host in High Resolution mode  The highest resolution for dual displays running a non-Thunderbolt host in Multi-function mode is one 5K dual cable (using both DP ports) + one 4K on USB-C DP port
HP USB-C Dock G5	3	Dual 5K@ 30Hz + 1 4K UHD (multi-function mode)	1xHDMI, 2xDP	Three maximum displays supported are two 5K@ 30 Hz on DP ports plus one 4K UHD@ 30 Hz on HDMI in Multi-function mode  Highest resolution with dual displays is two 8K@ 60Hz host in High Resolution mode  The highest resolution for running a non-Thunderbolt host in Multi-function mode is a single 5K dual cable (using both DP ports) + one 4K on HDMI port

### Technical Specifications

HP USB-C/A Universal Dock G2	3	Triple 4K UHD@ 60Hz	1xHDMI, 2xDP	<p>In High Resolution, mode the max available is one display. This dock's best use case is triple display.</p> <p>The best resolution for dual display is two 4K UHD@ 60Hz</p> <p>Highest triple displays resolution available is three 4KUHD @60Hz using both DP and 1 HDMI port.</p> <p>Best single display is with High Resolution mode using HDMI port.</p>
HP USB-C Travel Dock G2	1	Single 4K@ 30 Hz 4960 x 2160 (via HDMI)	1xHDMI, 1xVGA	Single external display using either HDMI or VGA

### STORAGE AND DRIVES

#### Primary M.2 Storage

2 TB PCIe® Gen3x4 NVMe™ M.2 SSD TLC<sup>14</sup>

1 TB PCIe® Gen3x4 NVMe™ M.2 SSD TLC<sup>14</sup>

512 GB PCIe® Gen3x4 NVMe™ M.2 SSD TLC<sup>14</sup>

256 GB PCIe® Gen3x4 NVMe™ M.2 SSD TLC<sup>14</sup>

512 GB PCIe® NVMe™ Value M.2 SSD<sup>14</sup>

256 GB PCIe® NVMe™ Value M.2 SSD<sup>14</sup>

512 GB PCIe® Gen 3x4 NVMe™ M.2 SED TLC OPAL2<sup>14</sup>

256 GB PCIe® Gen3x4 NVMe™ M.2 SED TLC OPAL2<sup>14</sup>

512 GB Intel® PCIe® NVMe™ QLC M.2 SSD with 32 GB Intel® Optane™ memory H10<sup>14,15</sup>

<sup>14</sup> For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 30 GB (for Windows 10 and 11) is reserved for system recovery software.

<sup>15</sup> Intel® Optane™ H10 memory system acceleration does not replace or increase the DRAM in your system. Requires 8th Gen or higher Intel® Core™ processor, BIOS version with Intel® Optane™ supported, Windows 10 64-bit, and an Intel® Rapid Storage Technology (Intel® RST) driver.

### Technical Specifications

#### MEMORY

**Maximum Memory**

64 GB DDR4-3200 SDRAM<sup>16</sup>

**Memory**

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

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

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

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

8 GB DDR4-3200 SDRAM (1 x 8 GB)<sup>16</sup>

**Memory Slots**

2 SODIMM

DDR4 SODIMMS, system runs at 3200

Supports Dual Channel Memory

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



### Technical Specifications

#### NETWORKING/COMMUNICATIONS

##### WLAN

Intel® Dual Band Wi-Fi® 6 AX201 802.11a/b/g/n/ac/ax (2x2) WLAN and Bluetooth® 5 Combo, vPro®<sup>17, 18</sup>

Intel® Dual Band Wi-Fi® 6 AX201 802.11a/b/g/n/ac/ax (2x2) WLAN and Bluetooth® 5 Combo, non-vPro®<sup>17</sup>

##### WWAN

Intel® XMM™ 7360 LTE-Advanced Cat 9<sup>19</sup>

Qualcomm® Snapdragon™ X55 5G ModemCat 20<sup>20</sup>

##### Miracast

Native Miracast Support<sup>21</sup>

Near Field Communications (NFC) Module<sup>22</sup>

HP Module with NXP NFC Controller NPC300 12C NCI

17. 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.

18. For full Intel® vPro™ functionality, Windows, a vPro supported processor, vPro enabled chipset, vPro enabled WLAN card and discrete TPM 2.0 are required. See <https://www.intel.com/content/www/us/en/architecture-and-technology/vpro/vpro-platform-general.html>

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

20. 5G module is an optional feature that must be configured at purchase. AT&T and T-Mobile networks supported in the U.S. Module designed for 5G networks as carriers deploy Evolved-Universal Terrestrial Radio Access New Radio Dual Connectivity (ENDC) with both 100Mhz of 5G NR and LTE channel bandwidth, using 256QAM 4x4 as defined by 3GPP, requires activation and separately purchased service contract. Check with service provider for coverage and availability in your area. Connection, upload and download speeds will vary due to network, location, environment, network conditions, and other factors. 5G not available on all products, in all regions. Backwards compatible to 4G LTE and 3G HSPA technologies. 5G module planned to be available in select countries, where carrier supported.

21. Miracast is a wireless technology your PC can use to project your screen to TVs, projectors, and streaming.

22. Sold separately or as an optional feature.

### Technical Specifications

#### AUDIO/MULTIMEDIA

**Audio**

Audio by Bang & Olufsen

2 Integrated stereo speakers

Integrated microphone (3-Mic Array)

World- Facing microphone

**Speaker Power**

2W/4ohm Per speaker

**Camera**

720p HD+IR camera<sup>9,22</sup>

**Sensors**

Ambient light sensor

Hall Sensor

HP Tamper Lock<sup>23</sup>

9. FHD/HD content required to view FHD/HD images.

22. Sold separately or as an optional feature.

23. HP Tamper Lock must be enabled by the customer or your administrator.

---

#### KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS

**Keyboard <sup>24</sup>**

HP Premium Keyboard – spill-resistant, backlit keyboard

**Pointing Device**

Clickpad with multi-touch gesture support, 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)

### Technical Specifications

#### Hidden Function Keys

Fn+R - Break

Fn+S - Sys Rq

Fn+C - Scroll Lock

24. Keyboards are made from up to 50% post-consumer recycled plastic.

### SOFTWARE AND SECURITY

#### Preinstalled Software

##### BIOS

HP BIOSphere Gen6<sup>25</sup>

HP Drive Lock & Automatic Drive Lock

BIOS Update via Network

HP Secure Erase<sup>26</sup>

Absolute Persistence Module<sup>27</sup>

HP LAN-Wireless Protection

USB enable/disable (via BIOS)

##### Software

HP Easy Clean<sup>55</sup>

HP Connection Optimizer<sup>28</sup>

HP Hotkey Support

myHP

HP Support Assistant<sup>29</sup>

HP QuickDrop<sup>30</sup>

HP Noise Cancellation Software

Touchpoint Customizer for Commercial

HP Notifications

HP Privacy Settings

HP Wireless Button Driver

HP Power Manager

Tile App<sup>31</sup>

HP PC Hardware Diagnostics Windows

Microsoft Defender<sup>32</sup>

Buy Microsoft Office (Sold separately)

HP Smart Support<sup>56</sup>

#### Manageability Features

HP Driver Packs (download)<sup>33</sup>

HP Manageability Integration Kit Gen4 (download)<sup>34</sup>

HP System Software Manager (SSM) (download)

HP Client Catalog (download)

HP Client Management Script Library (download)

HP Image Assistant (download)

### Technical Specifications

#### Security Management

HP Client Security Manager Gen7<sup>35</sup>

Pre-boot Authentication

HP Wolf Pro Security Edition<sup>36</sup>

HP Sure Click<sup>37</sup>

HP Sure Start Gen 6<sup>38</sup>

HP Sure Sense<sup>39</sup>

HP Sure Admin<sup>40</sup>

HP Sure Recover Gen4<sup>41</sup>

HP Sure Run Gen4<sup>42</sup>

Touch Fingerprint Sensor (Select models) <sup>43</sup>

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

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

UEFI version: 2.7

Class: Class 3

25. HP BIOSphere Gen6 is available on select HP Pro and Elite PCs. Features may vary depending on the platform and configurations.

26. 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™.

27. 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/>

28. HP Connection Optimizer requires Windows 10.

29. HP Support Assistant requires Windows and Internet access.

30. HP Quick Drop requires Internet access and Windows 10 PC preinstalled with HP QuickDrop app and either an Android device (phone or tablet) running Android 7 or higher with the Android HP QuickDrop app, and /or an iOS device (phone or tablet) running iOS 12 or higher with the iOS HP QuickDrop app.

31. Tile is an optional feature that must be configured at the factory and requires Windows 10. Some features require optional subscription to Tile Premium. Tile application for Windows 10 available for download from the Windows Store. Mobile phone app available for download from App Store and Google Play. Requires iOS 11 and greater or Android 6.0 and greater see <https://support.thetileapp.com/hc/en-us/articles/200424778> for more information. HP Tile will function as long as the PC has battery power.

32. Windows Defender Opt in and internet connection required for updates.

33. HP Driver Packs not preinstalled, however available for download at <http://www.hp.com/go/clientmanagement>.

34. HP Manageability Integration Kit can be downloaded from <http://www8.hp.com/us/en/ads/clientmanagement/overview.html>.

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

36. 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](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

### Technical Specifications

#### Support.

37. HP Sure Click requires Windows 10 Pro or Enterprise. See [https://bit.ly/2PrLT6A\\_SureClick](https://bit.ly/2PrLT6A_SureClick) for complete details

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

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

40. 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.

41. HP Sure Recover Gen4 is available on select HP PCs and requires an open network connection. You must back up important files, data, photos, videos, etc. before using HP Sure Recover to avoid loss of data.

42. HP Sure Run Gen4 is available on select Windows 10 based HP Pro, Elite and Workstation PCs with select Intel® or AMD processors.

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

55. HP Easy Clean requires Windows 10 RS3 and will disable the keyboard, touchscreen, and clickpad only. Ports are not disabled. See user guide for cleaning instructions. Expected availability March 2020.

56. 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)	0.41 x 0.08 x 0.32 in (10.5 x 2 x 8.2 mm)
	Smart Card support	ISO 7816 Class A and AB smart cards
	Smart Card Interface	Smart Card Interface with T = 0 and T = 1 support Support I2C memory card, SLE4418, SLE4428, SLE4432, SLE4442, SLE4436, SLE5536, SLE6636, AT88SC1608, AT45D041 card and AT45DB041 card via external EEPROM

#### POWER

##### Power Supply

- HP Smart 65 W External AC power adapter<sup>56</sup>
- HP Smart 65 W EM External AC power adapter<sup>56</sup>
- HP Smart 65 W USB Type-C adapter<sup>56</sup>
- HP Smart 45 W External AC power adapter<sup>56</sup>
- HP Smart 45 W External AC power adapter, 2-prong (Japan only) <sup>56</sup>

##### Power Cord

- 2-wire plug - 1.0m
- 3-wire plug - 1.0m

##### Primary Battery

- HP Long Life 3-cell, 53 Wh Polymer<sup>44,45</sup>
- Supports HP Fast Charge (Up to 50% in 30 minutes)<sup>46</sup>

##### Battery Life

- Up to 14 hours and 45 minutes<sup>47</sup>

##### Battery Weight

- 0.45 lb
- 0.205 kg

56. Availability may vary by country.

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

45. 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.

46. 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.

47. 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.

### Technical Specifications

#### WEIGHTS & DIMENSIONS

**Product Weight****Non-Touch**

Starting at 2.48 lb (1.13 kg)<sup>48</sup>

**Touch**

Starting at 2.88 lb (1.31 kg)<sup>48</sup>

**Product Dimensions (W x D x H)**

12.73 x 8.45 x 0.71in

323.37 x 214.59 x 17.95mm

<sup>48</sup>. Weight will vary by configuration.

---

#### PORTS/SLOTS

**Ports**

2 Thunderbolt™ 4 with USB4™ Type-C® 40Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4) <sup>54</sup>

2 SuperSpeed USB Type-A 5Gbps signaling rate (1 Charging)

1 HDMI 2.0b<sup>49</sup>

1 Headphone/microphone combo

1 4.5 mm AC power

1 nano SIM card slot<sup>50</sup>

1 Smartcard reader (Optional)

1 Nano Security Lock Slot (Lock sold separately)

<sup>49</sup>. HDMI cable sold separately.

<sup>50</sup>. All units have a SIM card slot and icon but units that do not support WWAN are shipped with a non-removable SIM slot plug.

<sup>54</sup>. SuperSpeed USB 20Gbps is not available with Thunderbolt™ 4.

### Technical Specifications

#### SERVICE AND SUPPORT

1-year and 3-year limited warranties and 90 day software limited warranty options depending on country. Batteries have a default one year limited warranty except for HP Long Life batteries which will follow the one or three year warranty of the platform. Refer to <http://www.hp.com/support/batterywarranty/> for additional battery information. On-site service and extended coverage is also available. HP Care Pack Services are optional extended service contracts that go beyond the standard limited warranties. To choose the right level of service for your HP product, use the HP Care Pack Services Lookup Tool at: <http://www.hp.com/go/cpc>.<sup>51</sup>

51. 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.



### Technical Specifications

#### SYSTEM UNIT

Nominal Operating Voltage	19.5V
Average Operating Power	1.825W
Integrated graphics	Yes
Discrete Graphics	N/A
Max Operating Power	UMA < 45W
Temperature Operating	32° to 95° F (0° to 35° C)
Non-operating	41° to 95° F (5° to 35° C) (writing optical)
Relative Humidity Operating	10% to 90%, non-condensing
Non-operating Shock	5% to 95%, 101.6° F (38.7° C) maximum wet bulb temperature
Operating	40 G, 2 ms, half-sine
Non-operating Random Vibration	200 G, 2 ms, half-sine
Operating	0.75 grms
Non-operating Altitude (unpressurized)	1.50 grms
Operating	-50 to 10,000 ft (-15.24 to 3,048 m)
Non-operating Planned Industry Standard Certifications	-50 to 40,000 ft (-15.24 to 12,192 m)
UL	Yes
CSA	Yes
FCC Compliance	Yes
ENERGY STAR®	ENERGY STAR® Select models <sup>52</sup>
EPEAT®	EPEAT® Gold in United States <sup>53</sup>
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
EAC (Russia)	Yes
Saudi Arabian Compliance (ICCP)	Yes
SABS	Yes

<sup>52</sup>. Configurations of the HP EliteBook 840 Aero G8 Notebook PC that are ENERGY STAR® qualified are identified as HP EliteBook 840 Aero G8 Notebook PC ENERGY STAR® on HP websites and on <http://www.energystar.gov>.

### Technical Specifications

53. 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. Actual brightness will be lower with touchscreen or Sure View.

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

**Panel LCD 14 inch FHD  
(1920x1080) Anti-Glare WLED  
UWVA 45percent cg 250nits  
eDP 1.2 w/o PSR bent NWBZ**

#### Outline Dimensions (W x H)

**Active Area**

316.17 x 186.4 mm (max) (w/ PCB)

**Weight**

309.37 x 174.02 mm

**Diagonal Size**

300 g (max)

**Thickness**

14.0 inch

**Interface**

3.0 mm/ 5.0 mm (PCB) (max)

**Surface Treatment**

eDP 1.2

**Touch Enabled**

Anti-Glare

**Contrast Ratio**

No

**Refresh Rate**

600:1

**Brightness**

60 Hz

**Pixel Resolution**

250 nits

**Format**

1920 x 1080 (FHD)

**Backlight**

RGB Stripe

**Color Gamut Coverage**

LED

**Color Depth**

NTSC 45%

**Viewing Angle**

6 bits (Hi FRC supportive w/ condition to enable)

UWVA 85/85/85/85

**Panel LCD 14 inch FHD  
(1920x1080) Anti-Glare WLED  
UWVA 45percent cg 250nits eDP  
1.2 w/o PSR bent Touch on  
Panel NWBZ**

#### Outline Dimensions (W x H)

**Active Area**

316.17 x 186.4 mm (max) (w/ PCB)

**Weight**

309.37 x 174.02 mm

**Diagonal Size**

305 g (max)

**Thickness**

14.0 inch

**Interface**

3.0 mm/ 5.0 mm (PCB) (max)

**Surface Treatment**

eDP 1.2

**Touch Enabled**

Anti-Glare On-cell

**Contrast Ratio**

Yes

**Refresh Rate**

600:1

**Brightness**

60 Hz

**Pixel Resolution**

250 nits<sup>1</sup>

**Format**

1920 x 1080 (FHD)

**Backlight**

RGB Stripe

**Color Gamut Coverage**

LED

**Color Depth**

NTSC 45%

**Viewing Angle**

6 bits (Hi FRC supportive w/ condition to enable)

UWVA 85/85/85/85

### Technical Specifications

**Panel LCD 14 inch FHD  
(1920x1080) Anti-Glare WLED  
UWVA sRGB 100percent cg  
400nits eDP  
1.4+PSR2 bent LP NB2X**

<b>Outline Dimensions (W x H)</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 inch
<b>Thickness</b>	2.0 mm/4.0 mm (w/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>	8 bits
<b>Viewing Angle</b>	UWVA 85/85/85/85

**Panel LCD 14-in FHD (1920x1080)  
Anti-Glare WLED UWVA 100% sRGB  
1000nits eDP 1.4+PSR HP Sure View  
Reflect NB2Y bent**

<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"
<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 <sup>1</sup>
<b>Pixel Resolution</b>	1920 x 1080 (FHD)
<b>Format</b>	RGB
<b>Backlight</b>	LED
<b>Color Gamut Coverage</b>	100% sRGB
<b>Color Depth</b>	8 bits
<b>Viewing Angle</b>	UWVA 85/85/85/85

### Technical Specifications

#### STORAGE

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

SSD 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]
	Features	ATA Security; TRIM; L1.2

### Technical Specifications

<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>	
	<b>Maximum Sequential Write</b>	Up to 2800 ~ 3500 MB/s
	<b>Logical Blocks</b>	Up to 1663 ~ 2200 MB/s
	<b>Operating Temperature</b>	500,118,192
	<b>Features</b>	32° to 158°F (0° to 70°C) [ambient temp]
		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

### Technical Specifications

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

#### 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 2100 ~ 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

### Technical Specifications

SSD 512GB 2280 PCIe-3x2x2 NVMe+SSD 32GB 3D Xpoint	Form Factor	M.2 2280
	Capacity	512 GB
	NAND Type	QLC+3D XPoint
	Height	0.09 in (2.3 mm)
	Width	0.87 in (22 mm)
	Weight	0.02 lb (10 g)
	Interface	PCIe NVMe Gen3X2X2
	Maximum Sequential Read	
		Up to 2400 MB/s
	Maximum Sequential Write	
		Up to 1300 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-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

<b>Intel® Wi-Fi 6<sup>1</sup> AX201 and Bluetooth® 5 (802.11ax 2x2, vPro®, supporting gigabit file transfer speeds)<sup>5</sup> (vPro®)</b>	<b>Wireless LAN Standards</b>	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
	<b>Interoperability</b> <b>Frequency Band</b>	Features Wi-Fi 6 technology •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
	<b>Data Rates</b>	• 802.11b: 1, 2, 5.5, 11 Mbps • 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11n: max 300Mbps • 802.11ac : 1733Mbps • 802.11ax : max 2.4Gbps
	<b>Modulation</b>	Direct Sequence Spread Spectrum OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM
	<b>Security<sup>3</sup></b>	• 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
	<b>Network Architecture</b> <b>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>	• 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



### Technical Specifications

	<ul style="list-style-type: none"> <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/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>4</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 with CNVi Interface
<b>Dimensions</b>	1. Type 2230: 2.3 x 22.0 x 30.0 mm 2. Type 1216: 1.67 x 12.0 x 16.0 mm
<b>Weight</b>	1. Type 2230: 2.8 g 2. Type 126: 1.3 g
<b>Operating Voltage</b>	3.3v +/- 9%
<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 White – Radio ON

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

<b>Bluetooth Specification</b>	4.0/4.1/4.2/5.0/5.1/5.2 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>Signaling Data Rate</b>	Legacy: 3 Mbps signaling data rate <sup>1</sup> 2.17 Mbps BLE: 1 Mbps signaling data rate <sup>1</sup> 0.2 Mbps <a href="#">1. Actual throughput may vary.</a>

### Technical Specifications

	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 Peak (Rx) 230 mW Selective Suspend 17 mW
<b>Bluetooth Software Supported</b>	Microsoft Windows Bluetooth Software
<b>Link Topology</b>	
<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) Hands Free Profile (HFP) Advanced Audio Distribution Profile (A2DP) BT5.2 ESR9/10 Compliance LE Advertisement Extensions Channel Selection Algo Limited High Duty Cycle Non-Connectable Advertising 2Mbps LE LE Long Range
<b>Security &amp; Manageability</b>	Intel® vPro® support with appropriate Intel® 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.
2. The FCC has declared as of September 1, 2014 products that utilize passive scanning on channel 12/13 and are capable of transmitting must fully comply with requirements of 15.247 or otherwise disable those channels.
3. Check latest software/driver release for updates on supported security features.
4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).
5. 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

<b>Intel® Wi-Fi 6<sup>1</sup> AX201 and Bluetooth® 5 (802.11ax 2x2, non-vPro®, supporting gigabit file transfer speeds)<sup>5</sup> non-vPro®</b>	<b>Wireless LAN Standards</b>	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
	<b>Interoperability Frequency Band</b>	Features Wi-Fi 6 technology •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
	<b>Data Rates</b>	• 802.11b: 1, 2, 5.5, 11 Mbps • 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11n: max 300Mbps • 802.11ac : 1733Mbps • 802.11ax : max 2.4Gbps
	<b>Modulation</b>	Direct Sequence Spread Spectrum OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM
	<b>Security<sup>3</sup></b>	• 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
	<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>	• 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

### Technical Specifications

	<ul style="list-style-type: none"> <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>4</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 with CNVi Interface
<b>Dimensions</b>	1. Type 2230: 2.3 x 22.0 x 30.0 mm 2. Type 1216: 1.67 x 12.0 x 16.0 mm
<b>Weight</b>	1. Type 2230: 2.8 g 2. Type 126: 1.3 g
<b>Operating Voltage</b>	3.3v +/- 9%
<b>Temperature</b>	<b>Operating</b> 14° to 158° F (–10° to 70° C) <b>Non-operating</b> –40° to 176° F (–40° to 80° C)
<b>Humidity</b>	<b>Operating</b> 10% to 90% (non-condensing) <b>Non-operating</b> 5% to 95% (non-condensing)
<b>Altitude</b>	<b>Operating</b> 0 to 10,000 ft (3,048 m) <b>Non-operating</b> 0 to 50,000 ft (15,240 m)
<b>LED Activity</b>	LED Amber – Radio OFF LED Off – Radio ON

### Technical Specifications

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

<b>Bluetooth Specification</b>	4.0/4.1/4.2/5.0/5.1/5.2 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>Signaling Data Rate</b>	Legacy: 3 Mbps signaling data rate <sup>1</sup> 2.17 Mbps BLE: 1 Mbps signaling data rate <sup>1</sup> 0.2 Mbps <a href="#">1. Actual throughput may vary.</a>
	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 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 Software 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) Hands Free Profile (HFP) Advanced Audio Distribution Profile (A2DP) BT5.2 ESR9/10 Compliance LE Advertisement Extensions Channel Selection Algo Limited High Duty Cycle Non-Connectable Advertising 2Mbps LE LE Long Range

1. Wireless access point and Internet service required and sold separately. Availability of public wireless access points limited. Wi-Fi 6 (802.11ax) is backwards compatible with prior 802.11 specs. 2. The FCC has declared as of September 1, 2014 products that

### Technical Specifications

utilize passive scanning on channel

12/13 and are capable of transmitting must fully comply with requirements of 15.247 or otherwise disable those channels.

3. Check latest software/driver release for updates on supported security features.

4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).

5. 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

Qualcomm®  
Snapdragon™ X55  
5G Modem <sup>1</sup>

Technology/  
Operating bands

WCDMA/HSDPA/HSUPA/HSPA+ operating bands:  
Band 1: 1920 to 1980 MHz (UL), 2110 to 2170 MHz (DL)  
Band 2: 1850 to 1910 MHz (UL), 1930 to 1990 MHz (DL)  
Band 4: 1710 to 1755 MHz (UL), 2110 to 2155 MHz (DL)  
Band 5: 824 to 849 MHz (UL), 869 to 894 MHz (DL)  
Band 6: 830 to 840 MHz (UL), 875 to 885 MHz (DL)  
Band 8: 880 to 915 MHz (UL), 925 to 960 MHz (DL)  
Band 9: 1750 to 1785 MHz (UL), 1845 to 1880 MHz (DL)  
Band 19: 830 to 845 MHz (UL), 875 to 890 MHz (DL)  
LTE FDD/TDD operating bands:  
Band 1: 1920 to 1980 MHz (UL), 2110 to 2170 MHz (DL)  
Band 2: 1850 to 1910 MHz (UL), 1930 to 1990 MHz (DL)  
Band 3: 1710 to 1785 MHz (UL), 1805 to 1880 MHz (DL)  
Band 4: 1710 to 1755 MHz (UL), 2110 to 2155 MHz (DL)  
Band 5: 824 to 849 MHz (UL), 869 to 894 MHz (DL)  
Band 7: 2500 to 2570 MHz (UL), 2620 to 2690 MHz (DL)  
Band 8: 880 to 915 MHz (UL), 925 to 960 MHz (DL)  
Band 12: 699 to 716 MHz (UL), 729 to 746 MHz (DL)  
Band 13: 777 to 787 MHz (UL), 746 to 756 MHz (DL)  
Band 14: 788 to 798 MHz (UL), 758 to 768 MHz (DL)  
Band 17: 704 to 716 MHz (UL), 734 to 746 MHz (DL)  
Band 18: 815 to 830 MHz (UL), 860 to 875 MHz (DL)  
Band 19: 830 to 845 MHz (UL), 875 to 890 MHz (DL)  
Band 20: 832 to 862 MHz (UL), 791 to 821 MHz (DL)  
Band 25: 1850 to 1915 MHz (UL), 1930 to 1995 MHz (DL)  
Band 26: 814 to 849 MHz (UL), 859 to 894 MHz (DL)  
Band 28: 703 to 748 MHz (UL), 758 to 803 MHz (DL)  
Band 29: 717 to 728 MHz (DL)  
Band 30: 2305 to 2315 MHz (UL) 2350 to 2360 MHz (DL)  
Band 34: 2010 to 2025 MHz (UL/DL)  
Band 38: 2570 to 2620 MHz (UL/DL)  
Band 39: 1880 to 1920 MHz (UL/DL)  
Band 40: 2300 to 2400 MHz (UL/DL)  
Band 41: 2496 to 2690 MHz (UL/DL)  
Band 42: 3400 to 3600 MHz (UL/DL)  
Band 46: 5150 to 5925 MHz (DL)  
Band 48: 3550 to 3700 MHz (UL/DL)  
Band 66: 1710 to 1800 MHz (UL), 2110 to 2200 MHz (DL)  
5GNR Sub 6GHz:  
n1: 1920 to 1980 MHz (UL), 2110 to 2170 MHz (DL)  
n2: 1850 to 1910 MHz (UL), 1930 to 1990 MHz (DL)  
n3: 1710 to 1785 MHz (UL), 1805 to 1880 MHz (DL)  
n5: 824 to 849 MHz (UL), 869 to 894 MHz (DL)  
n7: 2500 to 2570 MHz (UL), 2620 to 2690 MHz (DL)  
n8: 880 to 915 MHz (UL), 925 to 960 MHz (DL)  
n12: 699 to 716 MHz (UL), 729 to 746 MHz (DL)  
n20: 832 to 862 MHz (UL), 791 to 821 MHz (DL)  
n28: 703 to 748 MHz (UL), 758 to 803 MHz (DL)  
n41: 2496 to 2690 MHz (UL/DL)  
n66: 1710 to 1800 MHz (UL), 2110 to 2200 MHz (DL)  
n77: 3300 to 4200 MHz (UL/DL)  
n78: 3300 to 3800 MHz (UL/DL)  
n79: 4400 to 5000 MHz (UL/DL)

### Technical Specifications

<b>Wireless protocol standards</b>	5G NR Air Interface 3GPP Rel15 5G NR sub-6 LTE Rel14 20 layers and 2 Gbps downlink (DL) throughput – 4 × 4 MIMO across 5x CA 200 Mbps uplink (UL) throughput – 40 MHz ULCA and 256 QAM WCDMA R99, 3GPP Release 5, 6, 7 and 8 UMTS Specification
<b>GPS</b>	Standalone, A-GPS (MS-A, MS-B)
<b>GPS bands</b>	GPS: L1 (1575.42MHz) GLONASS: L1 (1602MHz) BeidouB1(1561.098MHz) Galileo E1 (1575.42)
<b>Maximum data rates</b>	5G sub 6G : 3.8 Gbps LTE: ue-CategoryDL 20, (DL: 2 Gbps) ue-CategoryUL 18, (UL: 200Mbps) DC-HSPA+: 42 Mbps (Download), 5.76 Mbps (Upload) HSPA+: 21Mbps (Download), 5.76 Mbps (Upload)
<b>Maximum output power</b>	LTE: 23 dBm in all band except B41 LTE B41 HPUE = 26dBm HSPA+: 23.5 dBm
<b>Maximum power consumption</b>	5G Sub 6 : 2500 mA LTE: 1,300 mA (peak); 1100 mA (average) HSPA+: 1,100 mA (peak); 800 mA (average)
<b>Form Factor</b>	M.2, 3042-S3 Key B
<b>Weight</b>	8 g
<b>Dimensions (Length x Width x Thickness)</b>	42 mm × 30 mm × 2.6 mm

1. 5G module is an optional feature that must be configured at purchase. AT&T and T-Mobile networks supported in the U.S. Module designed for 5G networks as carriers deploy Evolved-Universal Terrestrial Radio Access New Radio Dual Connectivity (ENDC) with both 100Mhz of 5G NR and LTE channel bandwidth, using 256QAM 4x4 as defined by 3GPP, requires activation and separately purchased service contract. Check with service provider for coverage and availability in your area. Connection, upload and download speeds will vary due to network, location, environment, network conditions, and other factors. 5G not available on all products, in all regions. Backwards compatible to 4G LTE and 3G HSPA technologies. 5G module planned to be available in select countries, where carrier supported.



### Technical Specifications

<b>Intel® XMM™ 7360 LTE-Advanced CAT9 <sup>1</sup></b>	<b>Technology/Operating bands</b>	FDD LTE: 2100 (Band 1), 1900 (Band 2), 1800 (Band 3), 1700/2100 (Band 4), 850 (Band 5), 2600 (Band 7), 900 (Band 8), 1400 (Band 11), 700 (Band 12 lower), 700 (Band 13 upper), 700 (Band 17 lower), 850 (Band 18 lower), 850 (Band 19 upper), 800 (Band 20), 1400 (Band 21), 850 (Band 26), 700 (Band 28), 700 (Band 29 RX only), 2300 (Band 30), 1700/2100 (Band 66). TDD LTE: 2600 (Band 38), 1900 (Band 39), 2400 (Band 40), 2500 (Band 41). HSPA+: 2100 (Band 1), 1900 (Band 2), 1700/2100 (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-A, MS-B)
	<b>GPS bands</b>	GPS 1575.42 MHz ± 1.023 MHz, GLONASS 1596-1607MHz, Beidou 1561.098 ± 2.046 MHz
	<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>	6.2 g
	<b>Dimensions (Length x Width x Thickness)</b>	42 x 30 x 2.3 mm

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

### Technical Specifications

<b>NXP NPC300 Near Field Communication Module</b>	<b>Dimensions (L x W x H)</b>	Module 17 mm by 10 mm by 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 Reader (PCD-VCD) Mode<sup>1</sup></b>	Tag Type 1, Type 2, Type3 and Type 4, NFCIP-1 and NFCIP-2  ISO/IEC 14443 A ISO/IEC 14443 B ISO/IEC 15693 MIFARE 1K MIFARE 4K MIFARE DESFire FeliCa Jewel and Topaz cards
	<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>	0°C to 70°C
	<b>Storage temperature</b>	-20°C to 125°C
	<b>Humidity</b>	10-90% operating 5-95% non-operating
	<b>Supply Operating voltage</b>	2.97 to 5.5 Volts
	<b>I/O Voltage</b>	1.8V or 3.3V
	<b>Power Consumption (Booster enable, VBAT= 3.3V, VCC_BOOST = 5V)</b>	
	<b>Mode</b>	Power Consumption, Typical <sup>2</sup>
	<b>Polling</b>	7.3 mA
	<b>Detected Test Tag Type 1</b>	32.9 mA
	<b>Detected Test Tag Type 2</b>	70.7 mA

## Technical Specifications

Detected Test Tag Type 3	79.2 mA
Detected Test Tag Type 4	64.9 mA
Antenna	Antenna connector, 0.5mm pitch, 7 connector FPC. Antenna matching is external to module.

- 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 1.0m</b>	<b>Dimensions</b>	95x40x26.8mm
	<b>Weight</b>	unit: 200g +/- 10g
	<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>	
	<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 - IEC60950-1 and/or IEC62368-1, EN60950-1 and/or EN62368-1, UL60950-1 and/or UL62368-1 , Class1, SELV; Agency approvals - C-UL-US, DENAN, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC, NOM-001 NYCE. * MTBF - over 200,000 hours at 25°C ambient condition.

### Technical Specifications

AC Adapter 45 Watt  
Smart nPFC Standard  
Barrel 4.5mm Right  
Angle 1.0m 2prong

<b>Dimensions</b>	95x40x26.8mm
<b>Weight</b>	unit: 200g +/- 10g
<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>	
<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>Non-operating (storage) temperature</b>	
<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</b>	Eg:
<b>Certifications</b>	*CE Mark - full compliance with LVD and EMC directives * Worldwide safety standards - IEC60950-1 and/or IEC62368-1, EN60950-1 and/or EN62368-1, UL60950-1 and/or UL62368-1 , Class1, SELV; Agency approvals - C-UL-US, DENAN, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC, NOM-001 NYCE. * MTBF - over 200,000 hours at 25°C ambient condition.

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

<b>Dimensions</b>	88x53.5x21mm
<b>Weight</b>	unit: 220g +/- 10g
<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

### Technical Specifications

Hold-up time	5ms at 115 Vac input
Output current limit	<8.0A
Connector	
Connector	USB Type C
Environmental Design	
Operating temperature	32°F to 95°F (0° to 35°C)
Non-operating (storage) temperature	-4°F to 185°F (-20° to 85°C)
Non-operating (storage) temperature	
Altitude	0 to 16,400 ft (0 to 5000m)
Humidity	5% to 95%
Storage Humidity	5% to 95%
EMI and Safety	Eg:
Certifications	*CE Mark - full compliance with LVD and EMC directives * Worldwide safety standards - IEC60950-1 and/or IEC62368-1, EN60950-1 and/or EN62368-1, UL60950-1 and/or UL62368-1, Class1, SELV; Agency approvals - C-UL-US, DENAN, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC, NOM-001 NYCE. * MTBF - over 200,000 hours at 25°C ambient condition.

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

Dimensions	90.0x51x28.5mm
Weight	unit: 250g +/- 10g
Input	
Input Efficiency	81.5% min at 115 Vac/ 230Vac @ 5V/3A 86.7% min at 115 Vac/ 230Vac @ 9V/3A 88% min at 115 Vac/ 230Vac @ 12V/5A 89% min at 115 Vac/ 230Vac @ 15V/4.33A 89% min at 115 Vac/ 230Vac @ 20V/3.25A
Input frequency range	47 ~ 63 Hz
Input AC current	1.6 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	
Connector	USB TYPE C
Environmental Design	
Operating temperature	32°F to 95°F (0° to 35°C)
Non-operating (storage) temperature	-4°F to 185°F (-20° to 85°C)

### Technical Specifications

#### Non-operating (storage) temperature

**Altitude** 0 to 16,400 ft (0 to 5000m)

**Humidity** 20% to 95%

**Storage Humidity** 10% to 95%

#### EMI and Safety Certifications

Eg:

\*CE Mark - full compliance with LVD and EMC directives

\* Worldwide safety standards - IEC60950-1 and/or IEC62368-1, EN60950-1 and/or EN62368-1, UL60950-1 and/or UL62368-1, Class1, SELV;

Agency approvals - C-UL-US, DENAN, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC, NOM-001 NYCE.

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

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

#### Dimensions

102x55x30mm

#### Weight

unit: 250g +/- 10g

#### Input

#### Input Efficiency

88.0 % at 115 Vac and 89.0 % at 230Vac

#### Input frequency range

47 ~ 63 Hz

#### Input AC current

Max. 1.7 A at 90 Vac

#### Output

#### Output power

65W

#### DC output

19.5V

#### Hold-up time

5ms at 115 Vac input

#### Output current limit

<11.0A

#### Connector

#### Connector

4.5mm Barrel Type

#### Environmental Design

#### Operating temperature

32°F to 95°F (0°to 35°C)

#### Non-operating (storage) temperature

-4°F to 185°F (-20°to 85°C)

#### Non-operating (storage) temperature

#### Non-operating (storage) temperature

#### Altitude

0 to 16,400 ft (0 to 5000m)

#### Humidity

20% to 95%

#### Storage Humidity

10% to 95%

#### EMI and Safety Certifications

Eg:

\*CE Mark - full compliance with LVD and EMC directives

\* Worldwide safety standards - IEC60950-1 and/or IEC62368-1, EN60950-1 and/or EN62368-1, UL60950-1 and/or UL62368-1, Class1, SELV;

Agency approvals - C-UL-US, DENAN, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC, NOM-001 NYCE.

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

### Technical Specifications

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

<b>Dimensions</b>	90x51x28.5mm
<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>	
<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>Non-operating (storage) temperature</b>	
<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>	<p>Eg:</p> <p>*CE Mark - full compliance with LVD and EMC directives</p> <p>* Worldwide safety standards - IEC60950-1 and/or IEC62368-1, EN60950-1 and/or EN62368-1, UL60950-1 and/or UL62368-1 , Class1, SELV;</p> <p>Agency approvals - C-UL-US, DENAN, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC, NOM-001 NYCE.</p> <p>* MTBF - over 200,000 hours at 25°C ambient condition.</p>



### Technical Specifications

<b>Battery CC 3 Cell 53 Wh<sup>1</sup> 53 Long Life -PL Fast Charge</b>	<b>Dimensions (H x W x L)</b>	7.3 x 52.9 x 267.11mm (0.287 x 2.082 x 10.516 inch)
	<b>Weight</b>	0.205 kg (0.45 lb)
	<b>Cells/Type</b>	3cell Lithium-Ion Polymer cell
	<b>Energy</b>	
	<b>Voltage</b>	11.55V
	<b>Amp-hour capacity</b>	4.59Ah
	<b>Watt-hour capacity<sup>1</sup></b>	53Wh
	<b>Temperature</b>	
	<b>Operating (Charging)</b>	32° to 113° F (0° to 45° C)
	<b>Operating (Discharging)</b>	14° to 140° F (-10° to 60° C)
	<b>Fuel Gauge LED</b>	N/A
	<b>Warranty</b>	Depends on system offering
	<b>Optional Travel Battery Available</b>	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.

### FINGERPRINT READER

Model:  
Synaptics Validity VFS7604 touch sensor  
Mobile Voltage Operation:  
3.0V to 3.6V  
Operating Temperature:  
0~60°C  
Current Consumption Image:  
100mA Max  
Low Latency Wait For Finger:  
260 uA  
Capture Rate:  
<30msec per image  
ESD Resistance:  
IEC 61000-4-2 4B (+/-15KV)  
Detection Matrix:  
363 dpi / 7.4x6mm sensor area  
  
FRR (False Reject Rate) / FAR (False Acceptance Rate):  
FRR <1% @ 1:50K FAR

### Technical Specifications

#### ENVIRONMENTAL DATA

<b>Eco-Label Certifications &amp; declarations</b>	<p>This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:</p> <ul style="list-style-type: none"> <li>• IT ECO declaration</li> <li>• US ENERGY STAR®</li> <li>• US Federal Energy Management Program (FEMP)</li> <li>• EPEAT® Gold registered in the United States. See <a href="http://www.epeat.net">http://www.epeat.net</a> for registration status in your country.</li> <li>• TCO certified</li> <li>• China Energy Conservation Program (CECP)</li> <li>• China State Environmental Protection Administration (SEPA)</li> <li>• Taiwan Green Mark</li> <li>• Korea Eco-label</li> <li>• Japan PC Green label*</li> </ul>		
<b>Sustainable Impact Specifications</b>	<ul style="list-style-type: none"> <li>• Ocean-bound plastic in Speaker box</li> <li>• 30% post-consumer recycled plastic</li> <li>• External Power Supply 90% Efficiency</li> <li>• Low halogen</li> <li>• Outside Box and corrugated cushions are 100% sustainably sourced and recyclable</li> <li>• Molded Paper Pulp Cushion inside box is 100% sustainably sourced and recyclable</li> <li>• Bulk packaging available</li> </ul>		
<b>System Configuration</b>	The configuration used for the Energy Consumption and Declared Noise Emissions data for the Notebook model is based on a “Typically Configured Notebook”.		
<b>Energy Consumption (in accordance with US ENERGY STAR® test method)</b>	<b>115VAC, 60Hz</b>	<b>230VAC, 50Hz</b>	<b>100VAC, 50Hz</b>
Normal Operation (Sort idle)	6.36 W	6.53 W	6.61 W
Normal Operation (Long idle)	1.25 W	1.15 W	1.11 W
Sleep	1.25 W	1.15 W	1.11 W
Off	0.29 W	0.31 W	0.29 W
	<p>Note:</p> <p>Energy efficiency data listed is for an ENERGY STAR® compliant product if offered within the model family. HP computers marked with the ENERGY STAR® Logo are compliant with the applicable U.S. Environmental Protection Agency (EPA) ENERGY STAR® specifications for computers. If a model family does not offer ENERGY STAR® compliant configurations, then energy efficiency data listed is for a typically configured PC featuring a hard disk drive, a high efficiency power supply, and a Microsoft Windows® operating system.</p>		

### Technical Specifications

Heat Dissipation*	115VAC, 60Hz	230VAC, 50Hz	100VAC, 50Hz
Normal Operation (Short idle)	22 BTU/hr	22 BTU/hr	23 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 <sub>WAd</sub> , bels)	Sound Pressure (L <sub>pAm</sub> , decibels)	
Typically Configured – Idle	2.5	15.8	
Fixed Disk – Random writes	2.5	24.4	
Optical Drive – Sequential reads	2.7	15.5	
Longevity and Upgrading	This product can be upgraded, possibly extending its useful life by several years. Upgradeable features and/or components contained in the		
	spare parts are available throughout the warranty period and or for up to “5” years after the end of production.		
Additional Information	<ul style="list-style-type: none"><li>This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC.</li><li>This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.</li><li>This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).</li><li>This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold level, see <a href="http://www.epeat.net">http://www.epeat.net</a></li><li>Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.</li><li>This product is 95.2% recycle-able when properly disposed of at end of life.</li></ul>		
Packaging Materials	External:	PAPER/Corrugated	41 g
	Internal:	PAPER/Molded pulp	163 g
		PLASTIC/Polyethylene low density	14 g
		PAPER/paperboard	220 g
	The plastic packaging material contains at least 0% recycled content.		
	The corrugated paper packaging materials contains at least 0% recycled content.		

### Technical Specifications

<b>RoHS Compliance</b>	<p>HP Inc. complies fully with materials regulations. We were among the first companies to extend the restrictions in the European Union (EU) Restriction of Hazardous Substances (RoHS) Directive to our products worldwide through the HP GSE. HP has contributed to the development of related legislation in Europe, as well as China, India, and Vietnam.</p> <p>We believe the RoHS directive and similar laws play an important role in promoting industry-wide elimination of substances of concern. We have supported the inclusion of additional substances—including PVC, BFRs, and certain phthalates—in future RoHS legislation that pertains to electrical and electronics products.</p> <p>We met our voluntary objective to achieve worldwide compliance with the new EU RoHS requirements for virtually all relevant products by July 2013, and we will continue to extend the scope of the commitment to include further restricted substances as regulations continue to evolve.</p> <p>To obtain a copy of the HP RoHS Compliance Statement, see <a href="#">HP RoHS position statement</a>.</p>
<b>Material Usage</b>	<p>This product does not contain any of the following substances in excess of regulatory limits (refer to the <a href="#">HP General Specification for the Environment</a> at <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html">http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html</a>):</p> <ul style="list-style-type: none"> <li>• Asbestos</li> <li>• Certain Azo Colorants</li> <li>• Certain Brominated Flame Retardants – may not be used as flame retardants in plastics</li> <li>• Cadmium</li> <li>• Chlorinated Hydrocarbons</li> <li>• Chlorinated Paraffins</li> <li>• Bis(2-Ethylhexyl) phthalate (DEHP)</li> <li>• Benzyl butyl phthalate (BBP)</li> <li>• Dibutyl phthalate (DBP)</li> <li>• Diisobutyl phthalate (DIBP)</li> <li>• Formaldehyde</li> <li>• Halogenated Diphenyl Methanes</li> <li>• Lead carbonates and sulfates</li> <li>• Lead and Lead compounds</li> <li>• Mercuric Oxide Batteries</li> <li>• Nickel – finishes must not be used on the external surface designed to be frequently handled or carried by the user.</li> <li>• Ozone Depleting Substances</li> <li>• Polybrominated Biphenyls (PBBs)</li> <li>• Polybrominated Biphenyl Ethers (PBBEs)</li> <li>• Polybrominated Biphenyl Oxides (PBBOs)</li> <li>• Polychlorinated Biphenyl (PCB)</li> <li>• Polychlorinated Terphenyls (PCT)</li> <li>• Polyvinyl Chloride (PVC) – except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.</li> <li>• Radioactive Substances</li> <li>• Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)</li> </ul>

### Technical Specifications

<b>Packaging Usage</b>	<p>HP follows these guidelines to decrease the environmental impact of product packaging:</p> <ul style="list-style-type: none"> <li>• Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.</li> <li>• Eliminate the use of ozone-depleting substances (ODS) in packaging materials.</li> <li>• Design packaging materials for ease of disassembly.</li> <li>• Maximize the use of post-consumer recycled content materials in packaging materials.</li> <li>• Use readily recyclable packaging materials such as paper and corrugated materials.</li> <li>• Reduce size and weight of packages to improve transportation fuel efficiency.</li> <li>• Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.</li> </ul>
<b>End-of-life Management and Recycling</b>	<p>HP offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: <a href="http://www.hp.com/go/reuse-recycle">http://www.hp.com/go/reuse-recycle</a> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.</p> <p>The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: <a href="http://www.hp.com/go/recyclers">http://www.hp.com/go/recyclers</a>. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.</p>
<b>HP, Inc. Corporate Environmental Information</b>	<p>For more information about HP's commitment to the environment:</p> <p>Global Citizenship Report  <a href="http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html">http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html</a></p> <p>Eco-label certifications  <a href="http://www8.hp.com/us/en/hp-information/environment/ecolabels.html">http://www8.hp.com/us/en/hp-information/environment/ecolabels.html</a></p> <p>ISO 14001 certificates:  <a href="http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842">http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842</a></p> <p>and  <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf">http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf</a></p>
<b>footnotes</b>	<ul style="list-style-type: none"> <li>• Percentage of ocean-bound plastic contained in each component varies by product</li> <li>• Recycled plastic content percentage is based on the definition set in the IEEE 1680.1-2018 standard.</li> <li>• External power supplies, WWAN modules, power cords, cables and peripherals excluded.</li> <li>• 100% outer box packaging and corrugated cushions made from sustainably sourced certified and recycled fibers.</li> <li>• Fiber cushions made from 100% recycled wood fiber and organic materials.</li> <li>• Plastic cushions are made from &gt;90% recycled plastic.</li> </ul>

### Technical Specifications

#### COUNTRY OF ORIGIN

China

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

Category	Description	Part Number
Cases	HP Exec 15.6 Backpack	6KD07AA
	HP Exec 15.6 Top Load Case	6KD06AA
	HP Executive Slim 14.1 Top Load Case	6KD04AA
Docking	HP Thunderbolt Dock 120W G2	2UK37AA
	HP TB Dock w/ Combo Cable (230W)	3TR87AA
	HP Thunderbolt 120W Dock w/Audio G2	3YE87AA
	HP USB-C Mini Dock	1PM64AA
	HP USB-C Dock G5	5TW10AA
	HP USB-C/A Universal Dock G2	5TW13AA
Input/Output	HP Wireless Rechargeable 950MK Mouse and Keyboard	3M165AA
	HP Wireless Premium Keyboard	Z9N41AA
	HP Bluetooth Fingerprint Reader USB Mouse	4TS44AA
	HP Comfort Grip Wireless Mouse	H2L63AA
	HP X4000b Bluetooth Mouse	H3T50AA
	HP USB Travel Mouse	G1K28AA
	HP Bluetooth Travel Mouse	6SP30AA
	HP Wireless Premium Mouse	1JR31AA
	HP USB Premium Mouse	1JR32AA
	HP USB Laser 3 Button USB Mouse	H4B81AA
	HP Elite Presenter Mouse	2CE30AA
	HP Stereo USB Headset	T1A67AA
	HP WL USB Keyboard	T6U20AA
	HP Slim Wireless Keyboard and Mouse	T6L04AA
	HP 235 WL Mouse and Keyboard Combo	1Y4D0AA
	HP 125 Wired Keyboard	266C9AA
	HP 225 Wired Mouse and Keyboard Combo	286J4AA
	HP USB-C to VGA	N9K76AA
	HP HDMI to VGA	H4F02AA
	HP USB-C to HDMI 2.0 Adapter	1WC36AA
	HP USB-C to RJ45 Adapter	V7W66AA
	HP USB to Gig RJ45 Adapter	N7P47AA
	HP USB-C Travel Hub G2	7PJ38AA
	HP Elite USB-C Hub	4WX89AA
Power	HP 45W USB-C LC Dali AC Power Adapter	1MZ01AA
	HP 45W USB-C Power Adapter	1HE07AA
	HP 65W USB-C Power Adapter	1HE08AA
	65W USB-C Slim Power Adapter	3PN48AA
	HP USB-C Essential Power Bank	3TB55AA

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

Memory	HP 4GB DDR4 3200 Memory	286H5AA
	HP 8GB DDR4 3200 Memory	286H8AA
	HP 16GB DDR4 3200 Memory	286J1AA
Security	HP Nano Keyed Cable Lock	1AJ39AA
	HP Sure Key Cable Lock	6UW42AA



### Summary of Changes

Date of change:	Version History:	Updated	Description of change:
March 25, 2021	V1 to V2	Update	Battery Life
April 19, 2021	V2 to V3	Updated	Memory Section and Input/ Output Section Updated
April 23, 2021	V3 to V4	Added	BIOS information in Software section
May 6, 2021	V4 to V5	Removed	Processors base frequency/Added HP Smart Support
May 20, 2021	V5 to V6	Removed	HP Thunderbolt Dock 230W G2
May 27, 2021	V6 to V7	Update	HP Pro Security Edition to HP Wolf Pro Security Edition
June 11, 2021	V7 to V8	Removed	HP WorkWell from Software and Security section
September 2, 2021	V8 to V9	Added	Environmental Data
September 7, 2021	V9 to V10	Updated	Techspecs in Networking, Storage and Power section
September 16, 2021	V10 to V11	Updated	Environmental Data
November 11, 2021	V11 to V12	Updated	Windows 10 with Free upgrade to Windows 11 when available in OS section and footnote.
December 9, 2021	V12 to V13	Updated	OS footnotes and Wi-Fi 6 footnotes
December 14, 2021	V13 to V14	Updated	Windows OS section

Copyright © 2021 HP Development Company, L.P. The only warranties for HP products are set forth in the express limited warranty statements accompanying such products. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.

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