

### Overview

#### HP ProBook 650 G4



#### Right

- |                               |  |
|-------------------------------|--|
| 1. Webcam (Select models)     | 9. HDMI port (Cable not included)      |
| 2. Webcam LED (Select models) | 10. USB 3.1 Gen 1 port                 |
| 3. Internal microphones (2)   | 11. USB 3.1 Gen 1 charging port        |
| 4. Power connector            | 12. USB Type-C™ charging port          |
| 5. MicroSD card slot          | 13. Audio combo jack                   |
| 6. Docking connector          | 14. HDD LED indicator                  |
| 7. VGA port                   | 15. Fingerprint reader (Select models) |
| 8. Ethernet port              | 16. Clickpad                           |

### Overview



#### Left

- |                                      |                       |
|--------------------------------------|-----------------------|
| 1. Smart Card Reader (Select models) | 3. Security lock slot |
| 2. Optical drive (Select models)     | 4. Power button       |

### Overview

#### AT A GLANCE

- Windows 10 versions, or FreeDOS 2.0
- Precision-crafted slim design with fingerprint resistant modern, fresh and comfortable natural silver finish
- Choice of 8th Generation Intel® Core™ processors, with integrated graphics or optional AMD RX540 128 bit Discrete Graphics
- HP Advanced keyboard, spill resistant with optional backlit design
- Large Clickpad with gestures support
- Enhanced security features including TPM2.0, HP Privacy Camera, optional Smart Card Reader, optional Finger Print Reader, and HP Sure Start Gen4.
- LED-backlit display
- 39.6 cm (15.6") diagonal HD and FHD or Touch FHD with camera and with WWAN
- HDMI port for connecting to high-resolution displays
- Optional Integrated ODD
- Optional HD webcam with dual-microphone array for video conferencing
- Two USB 3.1 Gen1 ports (1 charging) and one USB-C port (PD+DP, Gen1)
- VGA or Serial Port
- Flexible wireless connectivity options
- Battery hours up to 14.5 hours with fast charging technology
- Dual storage combines SSD fast boot up and app access with cost effective HDD mass storage
- Passed MIL-STD 810G testing<sup>1</sup>

1. MIL STD 810G testing is not intended to demonstrate fitness for U.S. Department of Defense contract requirements or for military use. Test results are not a guarantee of future performance under these test conditions. Damage under the MIL STD test conditions or any 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.**

## Features

### PRODUCT NAME

HP ProBook 650 G4

### OPERATING SYSTEM

<b>Preinstalled</b>	Windows 10 Pro 64 <sup>1</sup> Windows 10 Pro (National Academic only) <sup>1,2</sup> Windows 10 Home 64 <sup>1</sup> Windows 10 Home Single Language 64 <sup>1</sup> FreeDOS 2.0
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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

Intel® Core™ i7 8650U with Intel® UHD graphics 620 (1.9 GHz base frequency, up to 3.9 GHz with Intel® Turbo Boost Technology, 8 MB cache, 4 cores)<sup>3,4,5</sup>

Intel® Core™ i7 8550U with Intel® UHD graphics 620 (1.8 GHz base frequency, up to 4 GHz with Intel® Turbo Boost Technology, 8 MB cache, 4 cores)<sup>3,4,5</sup>

Intel® Core™ i5 8350U with Intel® UHD Graphics 620 (1.7 GHz base frequency, up to 3.6 GHz with Intel® Turbo Boost Technology, 6 MB cache, 4 cores)<sup>3,4,5</sup>

Intel® Core™ i5 8250U with Intel® UHD Graphics 620 (1.6 GHz base frequency, up to 3.4 GHz with Intel® Turbo Boost Technology, 6 MB cache, 4 cores)<sup>3,4,5</sup>

Intel® Core™ i5 7300U with Intel® HD Graphics 620 (2.6 GHz base frequency, up to 3.5 GHz with Intel® Turbo Boost Technology, 3 MB cache, 2 cores)<sup>3,4,5</sup>

Intel® Core™ i5 7200U with Intel® HD Graphics 620 (2.5 GHz base frequency, up to 3.1 GHz with Intel® Turbo Boost Technology, 3 MB cache, 2 cores)<sup>3,4,5</sup>

Intel® Core™ i3 8130U with Intel® HD Graphics 620 (2.2 GHz, 4 MB cache, 2 cores)<sup>3,4,5</sup>

Intel® Core™ i7 8850H vPro™ processor with Intel® UHD Graphics 630 (2.6 GHz base frequency, up to 4.3 GHz with Intel® Turbo Boost Technology, 9 MB L3 cache, 6 cores)<sup>3,4,5</sup>

Intel® Core™ i7+ 8850H vPro™ processor (Core i7 and 16 GB Intel® Optane™ memory) with Intel® UHD Graphics 630 (2.6 GHz base frequency, up to 4.3 GHz with Intel® Turbo Boost Technology, 9 MB L3 cache, 6 cores)<sup>3,4,5, 6, 7</sup>

Intel® Core™ i7+ 8850H vPro™ processor (Core i7 and 118 GB Intel® Optane™ SSD) with Intel® UHD Graphics 630 (2.6 GHz base frequency, up to 4.3 GHz with Intel® Turbo Boost Technology, 9 MB L3 cache, 6 cores)<sup>3,4,5, 6, 7</sup>

#### Processor Family

8th Generation Intel® Core™ i7+ processor (i7+ 8850H model)<sup>5</sup>

8th Generation Intel® Core™ i7 processor (i7 8850H, i7 8650U, i7 8550U models)<sup>5</sup>

8th Generation Intel® Core™ i5 processor (i5 8350U, i5 8250U models)<sup>5</sup>

8th Generation Intel® Core™ i3 processor (i3 8130U model)<sup>5</sup>

7th Generation Intel® Core™ i5 processor (i5 7300U, i5 7200U models)<sup>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

## Features

- 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. 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>.
  6. Intel® Optane™ memory system acceleration does not replace or increase the DRAM in your system.
  7. Intel® Turbo Boost performance varies depending on hardware, software and overall system configuration. See <http://www.intel.com/technology/turboboost> for more information.
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## CHIPSET

Chipset is integrated with processor

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## GRAPHICS

### Integrated

- Intel® UHD Graphics 630 <sup>8</sup>
- Intel® UHD Graphics 620 <sup>8</sup>
- Intel® HD Graphics 620 <sup>8</sup>

### Discrete

AMD Radeon™ RX540 (2 GB GDDR5 dedicated) (Not available with H series CPUs)

8. HD content required to view HD images.
  9. AMD Dynamic Switchable Graphics technology requires an Intel processor, plus an AMD Radeon™ discrete graphics configuration and is not available on FreeDOS and Linux OS. With AMD Dynamic Switchable Graphics technology, full enablement of all discrete graphics video and display features may not be supported on all systems (e.g. OpenGL applications will run on the integrated GPU or the APU as the case may be).
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### Features

#### DISPLAY

##### Non-Touch HD

39.6 cm (15.6") diagonal HD SVA eDP anti-glare LED-backlit, 220 cd/m<sup>2</sup>, 45% sRGB (1366 x 768) <sup>8,10,11</sup>

39.6 cm (15.6") diagonal HD SVA eDP anti-glare LED-backlit, 220 cd/m<sup>2</sup>, 45% sRGB, for camera (1366 x 768) <sup>8,10,11</sup>

39.6 cm (15.6") diagonal HD SVA eDP anti-glare LED-backlit, 220 cd/m<sup>2</sup>, 45% sRGB, for WWAN (1366 x 768) <sup>8,10,11</sup>

39.6 cm (15.6") diagonal HD SVA eDP anti-glare LED-backlit, 220 cd/m<sup>2</sup>, 45% sRGB, for camera and WWAN (1366 x 768) <sup>8,10,11</sup>

##### Non-Touch FHD

39.6 cm (15.6") diagonal FHD IPS eDP anti-glare LED-backlit, 220 cd/m<sup>2</sup>, 45% sRGB (1920 x 1080) <sup>8,10,11</sup>

39.6 cm (15.6") diagonal FHD IPS eDP anti-glare LED-backlit, 220 cd/m<sup>2</sup>, 45% sRGB, for camera (1920 x 1080) <sup>8,10,11</sup>

39.6 cm (15.6") diagonal FHD IPS eDP anti-glare LED-backlit, 220 cd/m<sup>2</sup>, 45% sRGB, for WWAN (1920 x 1080) <sup>8,10,11</sup>

39.6 cm (15.6") diagonal FHD IPS eDP anti-glare LED-backlit, 220 cd/m<sup>2</sup>, 45% sRGB, for camera and WWAN (1920 x 1080) <sup>8,10,11</sup>

##### Touch FHD

39.6 cm (15.6") diagonal FHD IPS eDP LED-backlit touch screen, 220 cd/m<sup>2</sup>, 45% sRGB, for camera and WWAN (1920 x 1080) <sup>7,9</sup>

8. HD content required to view HD images.

9. Sold separately or as an optional feature.

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

11. Sold separately or as an optional feature.

Docking station model	Total number of supported displays (incl. the notebook display)	Max. resolutions supported	Dock Connectors	Technical limitations
HP UltraSlim Docking Station	3	Dual 2.5K @ 60Hz	2xDP, 1xVGA	Dual 2.5k only with both displays into DP
HP Thunderbolt Dock G2	3	Single 2.5K @60Hz (2560 x 1440)	2xDP, 1xVGA, 1xTB, 1xUSB-C alt-mode	System will perform at USB 3.0 Gen1 speeds when connected to the dock (5Gbits) Thunderbolt port will function as a USB 2.0 port with data and power out (15W) only.
HP USB-C Dock G4	3	Dual 2K @ 60Hz Single 4K @ 60Hz (3840 x 1440)	1xHDMI, 2xDP	
HP USB-C Universal Dock	3	Dual 4K @ 60Hz Single 5K @ 60Hz	2xDP	
HP USB-C Travel Dock	2	Single 2K @ 60Hz	1xHDMI, 1xVGA	Single external display Only HDMI or VGA at the time
HP USB-C Mini Dock	2	Single 4K @ 30Hz	1xHDMI, 1xVGA	Single external display Only HDMI or VGA at the time

### Features

#### STORAGE AND DRIVES

##### Primary Storage

500 GB 7200 rpm SATA<sup>12</sup>

500 GB 7200 rpm SATA FIPS 140-2 SED<sup>12,13</sup>

1 TB 7200 rpm SATA<sup>12</sup>

##### Primary M.2 Storage

16 GB Intel® Optane™ memory<sup>45</sup>

118 GB Intel® Optane™ SSD<sup>12</sup>

128 GB SATA-3 SS TLC<sup>12</sup>

256 GB SATA-3 TLC OPAL2<sup>12</sup>

256 GB PCIe NVMe SS Value<sup>12</sup>

256 GB PCIe Gen3x4 NVMe SS TLC<sup>12</sup>

360 GB Intel PCIe Gen3x4 NVMe SS TLC<sup>12</sup>

512 GB SATA SS TLC (FIPS)<sup>12</sup>

512 GB PCIe Gen3x4 NVMe SS TLC<sup>12</sup>

1 TB PCIe Gen3x4 NVMe SS TLC<sup>12</sup>

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

13. Not available with Intel® Optane™ Memory or Intel® Optane™ SSD.

45. Intel® Optane™ memory system acceleration does not replace or increase the DRAM in your system.

### Features

#### MEMORY

**Maximum Memory**

32 GB DDR4-2400 SDRAM<sup>14</sup>

**Memory**

4 GB Total System Memory (4 GB x 1)<sup>14</sup>

8 GB Total System Memory (4 GB x 2)<sup>14</sup>

8 GB Total System Memory (8 GB x 1)<sup>14</sup>

12 GB Total System Memory (8 GB + 4 GB)<sup>14</sup>

16 GB Total System Memory (16 GB x 1)<sup>14</sup>

16 GB Total System Memory (8 GB x 2)<sup>14</sup>

32 GB Total System Memory (16 GB x 2)<sup>14</sup>

**Memory Slots**

2 SODIMM

Both slots are customer accessible / upgradeable

DDR4 PC4 SODIMMS - System supports run rate at 2133 in 7th Gen Processor, 2400 in 8th Gen processor

Supports Dual Channel Memory

14. 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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### Features

#### NETWORKING/COMMUNICATIONS

##### WLAN

Intel® Dual Band Wireless-AC 3168 802.11a/b/g/n/ac (1x1) Wi-Fi® and Bluetooth® 4.2 Combo, non-vPro™ <sup>15,16</sup>

Intel® Dual Band Wireless-AC 8265 802.11a/b/g/n/ac (2x2) Wi-Fi® and Bluetooth® 4.2 Combo, vPro™ <sup>15,16</sup>

Intel® Dual Band Wireless-AC 8265 802.11a/b/g/n/ac (2x2) Wi-Fi® and Bluetooth® 4.2 Combo, non-vPro™ <sup>15,16</sup>

Intel® Dual Band Wireless-AC 9560 802.11a/b/g/n/ac (2x2) Wi-Fi® and Bluetooth® 5 Combo, vPro™ <sup>15,16</sup>

Realtek RTL8822BE 802.11ac 2x2 Wi-Fi + Bluetooth® 4.2 Combo Adapter <sup>15,16</sup>

Realtek RTL8821CE 802.11ac 1x1 Wi-Fi + Bluetooth® 4.2 Combo Adapter <sup>15,16</sup>

##### WWAN

LTE CAT4: Huawei HP It4132, LTE/HSPA+ w/GPS M.2 <sup>17</sup>

LTE CAT9: Fibocom Intel(R) XMM(TM) 7360 LTE-Advanced It4210 LTE/HSPA+ w/GPS <sup>17</sup>

##### NFC

NXP NPC300 Near Field Communication Module <sup>11</sup>

##### WPAN Bluetooth®

BT 4.2 supported via all supported WLAN modules <sup>15</sup>

##### Ethernet

Intel® Ethernet Connection I219-LM 10/100/1000 (vPro™) <sup>18</sup>

Intel® Ethernet Connection I219-V 10/100/1000 (Non-vPro™) <sup>18</sup>

11. Sold separately or as an optional feature.

15. Wireless access point and Internet service required and sold separately. Availability of public wireless access points limited. The specifications for the 802.11ac WLAN 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 802.11ac WLAN devices.

16. Dynamic Regulatory Solution will auto-change AC WLAN to abgn by passive scan when entering Indonesia.

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

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

## Features

### AUDIO/MULTIMEDIA

#### Audio

2 Integrated stereo speakers  
Integrated dual array microphone

#### Webcam

720p HD HP Privacy Camera <sup>8,11,19</sup>

#### Optical Drive

DVD-ROM (Defeatured combo) <sup>20</sup>  
DVD Writer SATA <sup>20</sup>

8. HD content required to view HD images.

11. Sold separately or as an optional feature.

19. Internet access required.

20. DVD-Writer does not support DVD RAM. Don't copy copyright protected materials.

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## KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS

#### Keyboard

HP Advanced Keyboard with Numeric Keypad

#### Pointing Device

ClickPad, Spill-resistant with drain  
ClickPad, Spill-resistant with drain, DuraKeys & Backlit  
Dual Point, Spill-resistant with drain, DuraKeys & Backlit  
Dual Point, Spill-resistant with drain, DuraKeys & Backlit Privacy

#### Function Keys

ESC: system information  
F1 - Display Switching  
F2 - Blank or Privacy  
F3 - Brightness Down  
F4 - Brightness Up  
F5 - Speaker Mute  
F6 - Volume Down  
F7 - Volume Up  
F8 - Mic Mute  
F9 - Backlight Toggle (for backlit keyboard) or Blank  
F10 - Blank  
F11 - Wifi Toggle  
F12 - Sleep

#### Clickpad requirements:

On/off control by driver  
Taps enabled as default

#### Gestures:

(Win 10):  
Disabled by default:  
3 Finger Flick  
2 Finger Rotate  
Momentum Motion

## Features

- 1 Finger Vertical Scroll
- Win 10:
  - Support PTP with Miniport driver
  - Settings enabled by default by MSFT:
- 2 Finger Scrolling
- 2 Finger Zoom (Pinch)
- OSD (enable/disable)
- 3 finger tap - Cortana
- 3 finger flick –App switch
- 4 finger tap – Action Center

## SOFTWARE AND SECURITY

### Preinstalled Software

#### BIOS

- HP BIOSphere Gen4<sup>21</sup>
- HP DriveLock & Automatic DriveLock
- BIOS Update via Network
- Master Boot Record Security
- Power On Authentication
- Secure Erase<sup>22</sup>
- Absolute Persistence Module<sup>23</sup>
- Pre-boot Authentication
- HP Wireless Wakeup

#### Software

- HP Native Miracast Support<sup>20</sup>
- HP LAN-Wireless Protection
- HP Velocity
- HP 3D DriveGuard
- HP ePrint Driver + JetAdvantage<sup>24</sup>
- HP Hotkey Support - CMIT
- HP Recovery Manager
- HP Jumpstart
- HP Support Assistant<sup>25</sup>
- HP Noise Cancellation Software
- HP Host Based MAC Address Manager
- HP PhoneWise<sup>32</sup>
- Buy Office (Sold separately)

## Features

### Manageability Features

HP Driver Packs<sup>26</sup>  
HP System Software Manager (SSM)  
HP BIOS Config Utility (BCU)  
HP Client Catalog  
HP Manageability Integration Kit Gen2<sup>27</sup>  
Ivanti Management Suite<sup>28</sup>

### Client Security Software

HP Client Security Suite Gen4 including:<sup>29</sup>  
HP Security Manager<sup>30</sup> (including Credential Manager, HP Password Manager, HP Spare Key)  
Power On Authentication  
HP Fingerprint Sensor<sup>33</sup>  
HP Device Access Manager  
Microsoft Defender<sup>31</sup>

### Security Management

Secure Erase<sup>22</sup>  
TPM 2.0 Embedded Security Chip shipped with Windows 10 (Common Criteria EAL4+ Certified)  
SATA 0,1 port disablement (viaBIOS)  
RAID configurations<sup>34</sup>  
Serial, USB enable/disable (viaBIOS)  
Power-on password (viaBIOS)  
Setup password (viaBIOS)  
Support for chassis padlocks and cable lock devices  
Integrated hood sensor  
HP Sure Click<sup>35</sup>  
HP Sure Start Gen4<sup>36</sup>

### Security

#### TPM

Model: TPM SLB9670 VQ2.0 FW7.62 913310-002  
Version: TPM 2.0  
Revision: 1.16  
FIPS 140-2 Compliant: No

#### Smartcard Reader

Model number: Alcor AU9560  
FIPS 201 Compliant: Yes

#### IPv6 Certification

No

### Features

#### MD5 Hash

Please follow the instructions below to access MD5 Hash.

Log-on to <http://hp.com/support>, enter your product name, select software and drivers, select OS, select driver. After selecting the driver, click on "Associated files" and then click on "Download". When opening the file, under "Purpose" you should see the appropriate "SOFTPAQ MD5:" Field

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

Yes

UEFI version: 2.5 or 2.6 (for Intel Hexa-core processor)

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

21. HP BIOSphere Gen4 features may vary depending on the PC platform and configurations requires 8th Gen Intel® processors.

22. Secure Erase for the methods outlined in the National Institute of Standards and Technology Special Publication 800-88 "Clear" sanitation method.

23. Absolute agent is shipped turned off, and will be activated when customers activate a purchased subscription.

Subscriptions can be purchased for terms ranging multiple years. Service is limited, check with Absolute for availability outside the U.S. The Absolute Recovery Guarantee is a limited warranty. Certain conditions apply. For full details visit: <http://www.absolute.com/company/legal/agreements/computrace-agreement>. Data Delete is an optional service provided by Absolute Software. If utilized, the Recovery Guarantee is null and void. In order to use the Data Delete service, customers must first sign a Pre-Authorization Agreement and either obtain a PIN or purchase one or more RSA SecurID tokens from Absolute Software.

24. HP ePrint Driver requires an Internet connection to HP web-enabled printer and HP ePrint account registration (for a list of eligible printers, supported documents and image types and other HP ePrint details, see [www.hp.com/go/eprintcenter](http://www.hp.com/go/eprintcenter)). Print times and connection speeds may vary.

25. HP Support Assistant requires Windows and Internet access.

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

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

28. Ivanti Management Suite subscription required.

29. HP Client Security Suite Gen 4 requires Windows and Intel® or AMD 8th generation processors.

30. HP Password Manager requires Internet Explorer or Chrome or FireFox. Some websites and applications may not be supported. User may need to enable or allow the add-on / extension in the internet browser.

31. Microsoft Defender Opt in and internet connection required for updates.

32. HP PhoneWise Client may not be available with HP Workwise. For supported platforms and HP PhoneWise system requirements see <http://www.hp.com/go/HPPhoneWise>.

33. HP Fingerprint Sensor sold separately or as an optional feature.

34. RAID configuration is optional and does require a second hard drive.

35. HP Sure Click is available on select HP platforms and supports Microsoft® Internet Explorer, Google Chrome, and Chromium™. Supported attachments include Microsoft Office (Word, Excel, PowerPoint) and PDF files in read only mode. Check <http://h20195.www2.hp.com/v2/GetDocument.aspx?docname=4AA7-0922ENW> for all compatible platforms as they become available.

36. HP Sure Start Gen4 is available on HP EliteBook products equipped with Intel® 8th generation processors.

## Features

### POWER

#### Power Supply

HP Smart 45 W right angle 4.5 mm AC Adapter<sup>37</sup>

HP Smart 90 W External AC power adapter <sup>36,38</sup>

HP Smart 90 W External AC power adapter w/Dongle <sup>36,38</sup>

HP Smart 65 W right angle 4.5 mm AC Adapter<sup>37</sup>

HP Smart 45 W right angle 4.5 mm AC Adapter 2-prong (Japan only)<sup>37</sup>

HP Smart 65 W USB Type-C™ adapter<sup>37</sup>

HP Smart 45 W USB Type-C™ adapter<sup>37</sup>

90 W USB Type-C™ adapter<sup>37,38</sup>

HP Smart 90 W External AC power adapter<sup>37,38</sup>

HP Smart 90 W External AC power adapter w/Dongle<sup>37,38</sup>

#### Primary Battery

HP Long Life 3-cell, 48 Wh Li-ion<sup>38,39</sup>

HP Fast Charge Technology - 90% in 90 minutes<sup>41</sup>

#### Power Cord

3-wire plug (C5), 1.8 m, Sticker, Conventional<sup>37</sup>

3-wire plug (C5), 1 m, Sticker, Conventional<sup>37</sup>

2-wire plug (C5), 1 m, Sticker, Conventional (Japan only)<sup>37</sup>

#### Battery Life

Up to 14 hours 15 mins (With Intel® 7th Gen CPU) (with SSD)<sup>40</sup>

Up to 14 hours and 30 minutes With Intel® 8th Gen CPU (with SSD)<sup>40</sup>

Up to 10 hours (With 8th Gen Intel® Hexa-Core processor)<sup>40</sup>

37. Availability may vary by country.

38. Supports HP Fast Charging.

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

40. Windows 10 MM14 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.

41. Recharges the battery up to 90% within 90 minutes when the system is off or in standby mode when used with the power adapter provided with the notebook. After charging has reached 90% capacity, charging speed will return to normal. Charging time may vary +/-10% due to System tolerance.

## Features

### WEIGHTS & DIMENSIONS

#### Weight

Starting at 4.8 lb (non-touch); Starting at 5.29 lb (touch)<sup>42</sup>  
Starting at 2.18 kg (non-touch); Starting at 2.37 kg (touch)<sup>42</sup>

#### Dimensions (W x D x H)

##### Non-touch

14.85 x 10.12 x 0.95 in  
37.7 x 25.7 x 2.395 cm

##### Touch

14.85 x 10.12 x 0.99 in  
37.7 x 25.7 x 2.495 cm

[42. Weight will vary by configuration.](#)

### PORTS/SLOTS

#### Ports

- 1 USB 3.1 Type-C™ Gen 1 (Power delivery, DisplayPort™)
- 1 USB 3.1 Gen 1 (charging)
- 1 USB 3.1
- 1 HDMI 1.4<sup>43</sup>
- 1 RJ-45
- 1 VGA or Serial Port
- 1 headphone/microphone combo
- 1 AC power

#### Expansion Slots

- 1 docking connector
- 1 microSD (multi-format digital media reader)

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

### SERVICE AND SUPPORT

HP Services offers 3 year and 1 year limited warranties and 90 day support options depending on country. Long Life batteries will have the same 1-year or 3-year limited warranty as the platform. 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>44</sup>

[44. 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 \[www.hp.com/go/cpc\]\(http://www.hp.com/go/cpc\). 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.](#)

### Features

#### **CERTIFICATION AND COMPLIANCE**

ENERGY STAR® certified

EPEAT® Gold<sup>45</sup>

45. EPEAT® registered where applicable. EPEAT registration varies by country. See <http://www.epeat.net> for registration status by country. Search keyword generator on HP's 3rd party option store for solar generator accessories at <http://www.hp.com/go/options>.

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### Technical Specifications

#### DISPLAYS

**15.6" diagonal FHD UWVA anti-glare flat LED backlit non-touch; 220 cd/m<sup>2</sup>; 45% sRGB (1920 x 1080)**

<b>Outline Dimensions (W x H x D)</b>	360.0 x 224.3mm max
<b>Active Area</b>	344.16 x 193.59
<b>Weight</b>	360g max.
<b>Diagonal Size</b>	15.6 (inch)
<b>Thickness</b>	3.2mm max
<b>Interface</b>	eDP 1.2
<b>Surface Treatment</b>	Anti-Glare (AG)
<b>Touch Enabled</b>	None
<b>Contrast Ratio</b>	600:1 (typical)
<b>Refresh Rate</b>	60Hz
<b>Brightness</b>	220 nits
<b>Pixel Resolution</b>	1920 x 1080 (FHD)
<b>Format</b>	RGB
<b>Backlight</b>	LED
<b>Color Gamut Coverage</b>	45%
<b>Color Depth</b>	6 bits + FRC
<b>Viewing Angle</b>	UWVA 85/85/85/85

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

### Technical Specifications

<b>15.6" diagonal FHD UWVA anti-glare flat LED backlit touch; 220 cd/m<sup>2</sup>; 45% sRGB (1920 x 1080)</b>	<b>Outline Dimensions (W x H x D)</b>	360.0 x 224.3mm max
	<b>Active Area</b>	344.16 x 193.59
	<b>Weight</b>	360g max.
	<b>Diagonal Size</b>	15.6 (inch)
	<b>Thickness</b>	3.2mm max
	<b>Interface</b>	eDP 1.2
	<b>Surface Treatment</b>	BV
	<b>Touch Enabled</b>	Yes
	<b>Contrast Ratio</b>	600:1 (typical)
	<b>Refresh Rate</b>	60Hz
	<b>Brightness</b>	220 nits
	<b>Pixel Resolution</b>	1920 x 1080 (FHD)
	<b>Format</b>	RGB
	<b>Backlight</b>	LED
	<b>Color Gamut Coverage</b>	45%
	<b>Color Depth</b>	6 bits + FRC
<b>Viewing Angle</b>	UWVA 85/85/85/85	

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

### Technical Specifications

<b>15.6" diagonal HD SVA anti-glare LED-backlit non-touch; 220 cd/m<sup>2</sup>; 45% sRGB (1366 x 768)</b>	<b>Outline Dimensions (W x H x D)</b>	360 x 224.3 (mm) max
	<b>Active Area</b>	344.2 x 193.5 (mm)
	<b>Weight</b>	370 g max
	<b>Diagonal Size</b>	15.6 (inch)
	<b>Thickness</b>	3.2 (mm) max
	<b>Interface</b>	eDP 1.2
	<b>Surface Treatment</b>	Anti-Glare (AG)
	<b>Touch Enabled</b>	None
	<b>Contrast Ratio</b>	300:1 (typical)
	<b>Refresh Rate</b>	60 Hz
	<b>Brightness</b>	220 nits
	<b>Pixel Resolution</b>	1366 x 768 (HD)
	<b>Format</b>	RGB
	<b>Backlight</b>	LED
	<b>Color Gamut Coverage</b>	45%
<b>Color Depth</b>	6 bits + Hi FRC	
<b>Viewing Angle</b>	SVA 45/45/25/35	

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

### Technical Specifications

#### STORAGE

<b>HDD 500 GB 7200 RPM 7mm SATA</b>	<b>Drive Weight</b>	0.21 lbs (95 g)
	<b>Rotation speed</b>	7200 RPM
	<b>Cache Buffer</b>	Up to 32MB
	<b>Height</b>	0.28 in (7 mm)
	<b>Width</b>	2.75 in (69.85 mm)
	<b>Interface</b>	ATA-8, SATA 3.0
	<b>Transfer Rate</b>	600 MB/s
	<b>Seek Time</b>	Single Track: 2 ~ 1.5 ms; Average: 11 ~ 13 ms; Maximum: 18 ~ 22 ms
	<b>Logical Blocks</b>	976,773,168
	<b>Operating Temperature</b>	32° to 140°F (0° to 60°C) [ambient temp]
	<b>Security Features</b>	ATA Security
	<b>Features</b>	S.M.A.R.T., NCQ, Ultra DMA

**NOTE:** 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.

<b>HDD 500 GB 7200 RPM 7mm FIPS SATA Opal2</b>	<b>Drive Weight</b>	0.21 lbs (95 g)
	<b>Rotation speed</b>	7200 RPM
	<b>Cache Buffer</b>	Up to 32MB
	<b>Height</b>	0.28 in (7 mm)
	<b>Width</b>	2.75 in (69.85 mm)
	<b>Interface</b>	ATA-8, SATA 3.0
	<b>Transfer Rate</b>	600 MB/s
	<b>Seek Time</b>	Single Track: 2 ~ 1.5 ms; Average: 11 ~ 13 ms; Maximum: 18 ~ 22 ms
	<b>Logical Blocks</b>	976,773,168
	<b>Operating Temperature</b>	32° to 140°F (0° to 60°C) [ambient temp]
	<b>Security Features</b>	ATA Security; TCG Opal 2.x, FIPS
	<b>Features</b>	S.M.A.R.T., NCQ, Ultra DMA

**NOTE:** 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

<b>HDD 1TB 7200 RPM 7mm SATA 2.5in</b>	<b>Drive Weight</b>	90g
	<b>Rotation speed</b>	7200 RPM
	<b>Cache Buffer</b>	128 MB
	<b>Height</b>	7.2mm Max.
	<b>Width</b>	69.85mm
	<b>Interface</b>	ATA-8, SATA 3.0
	<b>Transfer Rate</b>	600 MB/s
	<b>Seek Time</b>	Single Track: 1.5 ms; Average: 13 ms; Maximum: 32 ms
	<b>Logical Blocks</b>	1,953,525,168
	<b>Operating Temperature</b>	0~60°C
	<b>Security Features</b>	ATA Security
	<b>Features</b>	S.M.A.R.T., NCQ, Ultra DMA, TRIM

**NOTE:** 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.

<b>SSD 128 GB 2280 M2 SATA-3 TLC</b>	<b>Drive Weight</b>	0.02 lb (10 g)
	<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>Interface</b>	ATA-8, SATA 3.0
	<b>Maximum Sequential Read</b>	Up To 520 MB/s
	<b>Maximum Sequential Write</b>	Up To 450 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>	DIPM; TRIM; DEVSLP

**NOTE:** 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

<b>SSD 256 GB 2280 M2 PCIe-3x4 SS NVMe TLC</b>	<b>Drive Weight</b>	0.02 lb (10 g)
	<b>Capacity</b>	256GB
	<b>NAND Type</b>	TLC
	<b>Height</b>	0.09 in (2.3 mm)
	<b>Width</b>	0.87 in (22 mm)
	<b>Interface</b>	PCIe NVMe Gen3X4
	<b>Maximum Sequential Read</b>	Up To 2600 MB/s
	<b>Maximum Sequential Write</b>	Up To 900 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>	TRIM; L1.2	

**NOTE:** 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.

<b>SSD 256 GB 2280 M2 SATA-3 Self Encrypted OPAL2 TLC</b>	<b>Drive Weight</b>	0.02 lb (10 g)
	<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>Interface</b>	ATA-8, SATA 3.0
	<b>Maximum Sequential Read</b>	Up To 530 MB/s
	<b>Maximum Sequential Write</b>	Up To 515 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>	DIPM; TRIM; DEVSLP	

**NOTE:** 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

<b>256 GB 2280 PCIe NVMe Value Solid State Drive</b>	<b>Drive Weight</b>	0.02 lb (10 g)
	<b>Capacity</b>	256 GB
	<b>NAND Type</b>	MLC
	<b>Height</b>	0.09 in (2.3 mm)
	<b>Width</b>	0.87 in (22 mm)
	<b>Interface</b>	PCIe NVMe Gen3X4
	<b>Maximum Sequential Read</b>	Up To 1700 MB/s
	<b>Maximum Sequential Write</b>	Up To 600 MB/s
	<b>Logical Blocks</b>	703,282,608
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]
	<b>Features</b>	TRIM; L1.2

**NOTE:** 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.

<b>SSD 512 GB 2280 M2 PCIe-3x4 NVMe TLC</b>	<b>Drive Weight</b>	0.02 lb (10 g)
	<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>Interface</b>	PCIe NVMe Gen3X4
	<b>Maximum Sequential Read</b>	Up To 2600 MB/s
	<b>Maximum Sequential Write</b>	Up To 1400 MB/s
	<b>Logical Blocks</b>	1,000,215,216
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]
	<b>Features</b>	TRIM; L1.2

**NOTE:** 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

<b>SSD 512 GB 2280 M2 SATA-3 TLC FIPS</b>	<b>Drive Weight</b>	0.02 lb (10 g)
	<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>Interface</b>	ACS-3, SATA 3.2
	<b>Maximum Sequential Read</b>	Up To 530 MB/s
	<b>Maximum Sequential Write</b>	Up To 400 MB/s
	<b>Logical Blocks</b>	1,000,215,216
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]
	<b>Features</b>	DIPM; TRIM; DEVSLP

**NOTE:** 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.

<b>SSD 1 TB 2280 PCIe-3x4 NVMe TLC SS</b>	<b>Drive Weight</b>	0.02 lb (10 g)
	<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>Interface</b>	PCIe NVMe Gen3X4
	<b>Maximum Sequential Read</b>	2900
	<b>Maximum Sequential Write</b>	2000
	<b>Logical Blocks</b>	2,000,409,263
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]
	<b>Features</b>	TRIM; L1.2

**NOTE:** 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.



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 Technical Specifications

<b>Intel® Optane™ Memory (SSD 16 GB 2280 PCI3-3x2 NVMe 3D Xpoint )</b>	<b>Form Factor</b>	M.2 2280
	<b>Capacity</b>	16 GB
	<b>NAND Type</b>	Xpoint
	<b>Height</b>	0.09 in (2.3 mm)
	<b>Width</b>	0.87 in (22 mm)
	<b>Interface</b>	PCIe NVMe Gen3X2
	<b>Maximum Sequential Read</b>	1400
	<b>Maximum Sequential Write</b>	300
	<b>Logical Blocks</b>	28,181,188
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]
	<b>Features</b>	L1.2

**NOTE:** 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.

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<b>SSD 360 GB 2280 PCIe-3x4 NVMe Three Layer Cell</b>	<b>Form Factor</b>	M.2 2280
	<b>Capacity</b>	360GB
	<b>NAND Type</b>	TLC
	<b>Height</b>	0.09 in (2.3 mm)
	<b>Width</b>	0.87 in (22 mm)
	<b>Interface</b>	PCIe NVMe Gen3X4
	<b>Maximum Sequential Read</b>	1700
	<b>Maximum Sequential Write</b>	600
	<b>Logical Blocks</b>	703,282,608
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]
	<b>Features</b>	TRIM; L1.2

**NOTE:** 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.

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### Technical Specifications

<b>Intel® Optane™ Memory (SSD 118GB 2280 PCIe-3x2 NVMe 3D Xpoint)</b>	<b>Form Factor</b>	M.2 2280
	<b>Capacity</b>	118GB
	<b>NAND Type</b>	Xpoint
	<b>Height</b>	0.09 in (2.3 mm)
	<b>Width</b>	0.87 in (22 mm)
	<b>Interface</b>	PCIe NVMe Gen3X2
	<b>Maximum Sequential Read</b>	1200 MB/s
	<b>Maximum Sequential Write</b>	600 MB/s
	<b>Logical Blocks</b>	231,270,400
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) (ambient temp)
	<b>Features</b>	L1.2

**NOTE:** 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

#### NETWORKING

<b>Intel Jefferson Peak 9560 802.11a/b/g/n/ac (2x2) WiFi and Bluetooth® 5.0 Combo vPro™</b>	
<b>Wireless LAN Standards</b>	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11ac
<b>Interoperability</b>	Wi-Fi certified
<b>Frequency Band</b>	802.11b/g/n • 2.402 – 2.482 GHz 802.11a/n • 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: MCS 0 ~ MCS 15, (20MHz, and 40MHz) • 802.11ac : MCS0 ~ MCS9, (1SS, and 2SS) (20MHz, 40MHz, ,80MHz & 160MHz)
<b>Modulation</b>	Direct Sequence Spread Spectrum BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM
<b>Security<sup>1</sup></b>	<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>• IEEE 802.11i</li> <li>• Cisco Certified Extensions, all versions through CCX4 and CCX Lite</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> <li>• 802.11ac VHT160(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 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>	802.11b, 1Mbps: -93.5dBm maximum 802.11b, 11Mbps: -84dBm maximum 802.11a/g, 6Mbps: -86dBm maximum 802.11a/g, 54Mbps: -72dBm maximum

### Technical Specifications

	802.11n, MCS07 : -67dBm maximum 802.11n, MCS15 : -64dBm maximum 802.11ac, MCS0 : -84dBm maximum 802.11ac, MCS9 : -59dBm maximum	
<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>	Type 2230: 2.3 x 22.0 x 30.0 mm	
<b>Weight</b>	Type 2230: 2.8g	
<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	
	<ul style="list-style-type: none"> <li>• Check latest software/driver release for updates on supported security features.</li> <li>• Maximum output power may vary by country according to local regulations.</li> <li>• 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).</li> </ul>	
<b>HP Integrated Module with Bluetooth® 4.0/4.1/4.2/5.0 Wireless Technology</b>		
<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	
<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>Range</b>	Legacy Up to 33 ft (10 m) BLE Up to 99 ft (30 m)	
<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 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	

### Technical Specifications

	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)
<b>Security &amp; Manageability</b>	Intel® vPro™ support with appropriate Intel® chipset components
<b>NOTE:</b> Wireless access point and Internet service is required. Availability of public wireless access point is limited. The specifications for the 802.11ac WLAN 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 802.11ac WLAN devices	

### POWER

<b>AC Adapter 65 Watt nPFC USB type C</b>	<b>Dimensions</b>	74x74x28.5mm
	<b>Weight</b>	unit: 245g +/- 10g
<b>Output</b>	<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 @ 10V/5A
		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>
	1.7 A at 90 VAC and maximum load	
<b>Connector</b>	<b>Output power</b>	65W
	<b>DC output</b>	5V/9V/10V/12V/15V/20V
	<b>Hold-up time</b>	5ms at 115 Vac input
	<b>Output current limit</b>	<8.0A
		Duck head / duck head power cord, without Smart ID DC connector
<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%
<b>EMI and Safety Certifications</b>	CE Mark - full compliance with LVD and EMC directives Worldwide safety standards - IEC60950, EN60950, UL60950, Class 1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE. MTBF - over 100,000 hours at 25°C ambient condition.	

### Technical Specifications

<b>AC Adapter 45 Watt nPFC USB type C</b>	<b>Dimensions</b>	62.0x62.0x28.5mm	
	<b>Weight</b>	unit: 220g +/- 10g	
<b>Output</b>	<b>Input</b>	<b>Input Efficiency</b> Average Efficiency of 25%, 50%, 75%, 100% load condition with 115Vac/230Vac Spec:5V : 81.5%9V : 86.7%10V : 87.5%12V : 87.8%15V : 87.8%20V : 87.8%	
		<b>Input frequency range</b> 47 ~ 63Hz	
		<b>Input AC current</b> Max. 1.4 A at 90 Vac	
		<b>Output power</b> 5V / 15W 9V / 27W 10V / 37.5W 12V / 45W 15V / 45W 20V / 45W	
		<b>DC output</b> 5V / 9V / 10V / 12V / 15V / 20V	
		<b>Hold-up time</b> 5ms at 115 Vac input	
		<b>Output current limit</b> <5.0A	
	<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>		20% to 95%	
<b>Safety Certifications</b>	<b>Storage Humidity</b>	10% to 95%	
	CE Mark - full compliance with LVD and EMC directives* Worldwide safety standards - IEC60950, EN60950, UL60950, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE. * MTBF - over 200,000 hours at 25°C ambient condition.		

### Technical Specifications

<b>HP 45W Smart AC adapter</b>	<b>Dimensions</b>	3.74 x 1.57 x 1.04 in (9.5 x 4.0 x 2.65 cm)	
	<b>Weight</b>	0.386 lb (175g) max	
	<b>Input</b>		90 to 265 VAC
		<b>Input Efficiency</b>	87.74% at 115Vac and 88.4% at 230Vac
		<b>Input frequency range</b>	47 to 63 Hz
	<b>Output</b>	<b>Input AC current</b>	1.4 A at 90 VAC
		<b>Output power</b>	45W
		<b>DC output</b>	19.5V
		<b>Hold-up time</b>	5 msec at 115 VAC input
		<b>Output current limit</b>	<8.0A
	<b>Connector</b>	4.5mm Barrel Type, 3 pin/grounded, mates with interchangeable cords	
	<b>Environmental Design</b>	<b>Operating temperature</b>	32° to 95° F (0° to 35° C)
		<b>Non-operating (storage) temperature</b>	-4° to 185° F (-20° to 85° C)
<b>Altitude</b>		0 to 16,400 ft (0 to 5,000 m)	
<b>Humidity</b>		20% to 95%	
<b>Storage Humidity</b>		10% to 95%	
<b>Safety Certifications</b>	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.		

<b>HP 65W Smart AC adapter</b>	<b>Dimensions</b>	107.0x47.0x30.0mm	
	<b>Weight</b>	unit: 250g +/- 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>Output</b>	<b>Input AC current</b>	Max. 1.7 A at 90 Vac
		<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>Environmental Design</b>	<b>Operating temperature</b>	32° to 95° F (0° to 35° C)
		<b>Non-operating (storage) temperature</b>	-4° 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>Safety Certifications</b>	CE Mark - full compliance with LVD and EMC directives Worldwide safety standards - IEC60950, EN60950, UL60950, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE. MTBF - over 200,000 hours at 25°C ambient condition.		

### Technical Specifications

<b>HP 65W EM Smart AC adapter</b>	<b>Dimensions</b>	102x55x30mm	
	<b>Weight</b>	270g +/- 10g	
	<b>Input</b>	<b>Input Efficiency</b>	87% min at 115V/230V
		<b>Input frequency range</b>	47 to 63 Hz
		<b>Input AC current</b>	1.7 A at 90 VAC and maximum load
	<b>Output</b>	<b>Output power</b>	
		<b>DC output</b>	65W(19.5V/3.33A)
		<b>Hold-up time</b>	5 ms at 115 VAC input
		<b>Output current limit</b>	<11A, Over voltage protection- 29V max automatic shutdown
		<b>Connector</b>	4.5mm Barrel Type, 3 pin/grounded, mates with interchangeable cords
	<b>Environmental Design</b>	<b>Operating temperature</b>	0° to 35° C
		<b>Non-operating (storage) temperature</b>	-20° to 85° C
		<b>Altitude</b>	0 to 5,000 m
		<b>Humidity</b>	0% to 95%
<b>Storage Humidity</b>		0% to 95%	
<b>Safety Certifications</b>	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.		

<b>HP 65W Watt Smart Travel Adapter</b>	<b>Dimensions</b>	120.0x57.6x16.7mm	
	<b>Weight</b>	unit: 250g +/- 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/5V
		<b>Hold-up time</b>	5ms at 115 Vac input
		<b>Output current limit</b>	<11.0A
		<b>Connector</b>	4.5mm/7.4mm tips
	<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>Safety Certifications</b>	CE Mark - full compliance with LVD and EMC directives Worldwide safety standards - IEC60950, EN60950, UL60950, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE. MTBF - over 200,000 hours at 25°C ambient condition.		



### Technical Specifications

<b>Battery CD 3 Cell WHr 48 Long Life -PR+PL Fast Charge</b>	<b>Dimensions (H x W x L)</b>	8.05. x185.15x95 mm	
	<b>Weight</b>	0.26 kg	
	<b>Cells/Type</b>	3cell Lithium-Ion Polymer cell / 606072	
	<b>Energy</b>	<b>Voltage</b>	11.4V
		<b>Amp-hour capacity</b>	4.212Ah /4.0Ah
		<b>Watt-hour capacity</b>	48Wh
	<b>Temperature</b>	<b>Operating (Charging)</b>	32° to 113° F (0° to 45° C)
		<b>Operating (Discharging)</b>	14° to 122° F (-10° to 60° C)
	<b>Warranty</b>	3 years	
	<b>Optional Travel Battery Available</b>	No	
<hr/>			
<b>AC Adapter 90 Watt Smart PFC Standard Barrel 4.5mm Right Angle 1.8m</b>	<b>Dimensions</b>	127.0x51.0x30.0mm	
	<b>Weight</b>	unit: 350g +/- 10g	
	<b>Input</b>	<b>Input Efficiency</b>	88% min at 115V and 89% min at 230V
		<b>Input frequency range</b>	47 ~ 63 Hz
		<b>Input AC current</b>	1.5 A at 90 VAC and maximum load
	<b>Output</b>	<b>Output power</b>	90W
		<b>DC output</b>	19.5V
		<b>Hold-up time</b>	5ms at 115 Vac input
		<b>Output current limit</b>	<11.0A Over voltage protection- 29V max automatic shutdown
		<b>Connector</b>	4.5mm Barrel Type, 3 pin/grounded, mates with interchangeable cords
	<b>Environmental Design</b>	<b>Operating temperature</b>	32oF to 95oF (0oto 35oC)
		<b>Non-operating (storage) temperature</b>	-4oF to 185oF (-20oto 85oC)
		<b>Altitude</b>	0 to 16,400 ft (0 to 5000m)
		<b>Humidity</b>	5% to 95%
		<b>Storage Humidity</b>	5% to 95%
<b>Safety Certifications</b>	*CE Mark - full compliance with LVD and EMC directives * Worldwide safety standards - IEC60950, EN60950, UL60950, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE. * MTBF - over 100,000 hours at 25°C ambient condition.		

### Technical Specifications

<b>AC Adapter 90 Watt nPFC USB type C™</b>	<b>Dimensions</b>	129.5x65.5x28.5mm
	<b>Weight</b>	unit: 320g +/- 10g
<b>Output</b>	<b>Input</b>	<b>Input Efficiency</b> 5V: 81.5% , 9V: 86.7% , 10V: 88% , 12V: 88% , 15V: 89% , 20V: 89%
		<b>Input frequency range</b> 47 ~ 63 Hz
		<b>Input AC current</b> 1.8 A at 90 VAC and maximum load
		<b>Output power</b> 90W
		<b>DC output</b> 5V/9V/10V/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>	32oFto 95oF (0oto 35oC)
	<b>Non-operating (storage) temperature</b>	-4oFto 185oF (-20oto 85oC)
	<b>Altitude</b>	0 to 16,400 ft (0 to 5000m)
	<b>Humidity</b>	5% to 95%
<b>Safety Certifications</b>	<b>Storage Humidity</b>	5% to 95%
	*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.

### COUNTRY OF ORIGIN

China

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

Type	Description	Part #
<b>Cases</b>	HP 15.6 Business Top Load	2SC66AA
	HP Slim Top Load	F3W15AA
	HP Slim Backpack	F3W16AA
<b>Docking</b>	HP 2013 UltraSlim Docking Station	D9Y32AA
	HP USB-C Dock G4	3FF69AA
	HP USB-C Universal Dock	1MK33AA
<b>Input/Output</b>	HP Slim USB Keyboard and Mouse	T6T83AA
	HP Slim Wireless Keyboard and Mouse	T6L04AA
	HP Ultra Mobile Wireless Mouse	H6F25AA
	HP Comfort Grip Wireless Mouse	H2L63AA
	HP Wireless Premium Mouse	1JR31AA
	HP Slim Bluetooth® Mouse	F3J92AA
	HP USB Premium Mouse	1JR32AA
	HP USB Travel Mouse	G1K28AA
	HP Elite Presenter Mouse	2CE30AA
	HP HDMI to DVI Adapter	F5A28AA
	HP HDMI to VGA	H4F02AA
	HP USB-C to DP	N9K78AA
	HP USB-C to USB-A Hub	Z6A00AA
	HP USB-C to VGA	N9K76AA
	HP Stereo 3.5mm Headset	T1A66AA
HP Stereo USB Headset	T1A67AA	
<b>Power</b>	HP 45W Smart AC Adapter	H6Y88AA
	HP 65W Smart AC Adapter	H6Y89AA
	HP 45W USB-C Power Adapter	1HE07AA
	HP 65W USB-C Power Adapter	1HE08AA
	HP USB-C Notebook Power Bank	2NA10AA
<b>Storage</b>	HP External USB Optical Drive	F2B56AA
	HP 128GB TLC M.2 SATA-3	2JB95AA
	HP 256GB TLC PCIe 3x4 NVMe M.2 SSD	1FU87AA
	HP 512GB TLC PCIe 3x4 NVMe M.2 SSD	1FU88AA
<b>Security</b>	HP Docking Station Cable Lock	AU656AA#XXX
	HP 14.0" Notebook Privacy Filter	J6E65AA
	HP Keyed Cable Lock 10mm	T1A62AA

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

<b>Memory</b>	HP 4GB DDR4 Memory	Z4Y84AA
	HP 8GB DDR4 Memory	Z4Y85AA
	HP 16GB DDR4 Memory	Z4Y86AA
<b>UCC</b>	HP Wireless Collaboration Keyboard	Z9N39AA
	HP USB Collaboration Keyboard	Z9N38AA
	HP UC Speaker Phone	K7V16AA
	HP UC Wireless Mono Headset	W3K08AA
	HP UC Wireless Duo Headset	W3K09AA
<b>Displays</b>	HP ProDisplay P223 21.5-inch Monitor	X7R61AA
	HP ProDisplay P240va 23.8-inch Monitor	N3H14AA
	HP EliteDisplay E243 23.8-inch Monitor	1FH47AA

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## Summary of Changes

Date of change:	Version History:	Update	Description of change:
June 22, 2018	V1 to V2	Add	Dimensions updated

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