

### Overview

#### HP ProBook 430 G5 Notebook PC



#### Front

- |                       |  |
|-----------------------|--|
| 1. Microphones (2)    | 8. Headphone/microphone combo jack             |
| 2. Webcam             | 9. USB 3.1 Gen 1 (power port)                  |
| 3. Webcam light       | 10. Power button                               |
| 4. Fingerprint reader | 11. Security lock slot (Lock sold separately.) |
| 5. Clickpad           |  |
| 6. Hard drive LED     |  |
| 7. SD Card reader     |  |

### Overview



#### Rear

- |                              |                                    |
|------------------------------|------------------------------------|
| 1. Power connector           | 4. HDMI port (Cable not included.) |
| 2. Ethernet port (RJ-R45)    | 5. USB 3.1 Gen 1                   |
| 3. External VGA monitor port | 6. USB Type-C™ port                |

### Overview

#### At a Glance

1. Preinstalled with Windows 10 versions or FreeDOS 2.0
  2. Choice of Intel® Core™ processors
  3. Full size HP Premium Keyboard, spill-resistant keyboard with a thin layer of mylar film to prevent minor spills
  4. Function keys provide control of features including: standby mode, display brightness, external display, microphone mute, volume down, volume up, and backlight toggle for backlit keyboard (Select models only.)
  5. Large Clickpad with gestures support
  6. Enhanced security features with preinstalled software and hardware options
  7. Optional HD webcam with dual-microphone array for video conferencing [1]
  8. HDMI port for connecting to high-resolution displays
  9. Choice of displays
    - 33.7 cm (13.3") diagonal FHD UWVA anti-glare LED-backlit non-touch; 220 cd/m<sup>2</sup>; 45% sRGB (1920 x 1080)
    - 33.7 cm (13.3") diagonal HD SVA anti-glare LED-backlit non-touch; 220 cd/m<sup>2</sup>; 45% sRGB (1366 x 768)
    - 33.7 cm (13.3") diagonal HD touch; 220 cd/m<sup>2</sup>; 45% sRGB (1366 x 768)
  10. Flexible wireless connectivity options
  11. Battery life up to 17 hours and 30 minutes (i3, HD with SSD)
  12. HP 3-cell, 48 WHr Li-ion battery
  13. Passed MIL-STD testing [2]
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1. Sold separately or as an optional feature.
  2. MIL-STD-810G testing is not intended to demonstrate fitness of U.S. Department of Defense (DoD) contract requirements or for military use. Test results are not a guarantee of future performance under these test conditions. Accidental damage requires an optional HP Accidental Damage Protection Care Pack.

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



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## Features

### PRODUCT NAMES

HP ProBook 430 G5 Notebook PC

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### OPERATING SYSTEMS

#### Preinstalled

Windows 10 Pro 64 – HP recommends Windows 10 Pro [1]  
Windows 10 Pro 64 (National Academic License) [1,2]  
Windows 10 Home 64 [1]  
Windows 10 Home Single Language 64 [1]  
Windows 10 Home 64 (National Academic License) [1,2]  
FreeDOS 2.0

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. **Note:** 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.

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### PROCESSORS

Intel® Core™ i7-8550U Intel® UHD graphics 620 (1.8 GHz, up to 3.7 GHz with Intel® Turbo Boost Technology 2.0, 8 MB cache, 4 cores) [3,4,5]

Intel® Core™ i5-8250U Intel® UHD Graphics 620 (1.6 GHz, up to 3.4 GHz with Intel® Turbo Boost Technology 2.0, 6 MB cache, 4 cores) [3,4,5]

Intel® Core™ i3-7100U with Intel® HD Graphics 620 (2.4 GHz, 3 MB cache, 2 cores) [3,4,5]

Intel® Core™ i3-6006U with Intel® HD Graphics 520 (2 GHz, 3 MB cache, 2 cores) [3,4]

Intel® Celeron® 3865U with Intel® HD Graphics (1.8 GHz, 2 MB cache, 2 cores) [3,4,5]

#### Processors Family

8th Generation Intel® Core™ i7 processor (i7-8550U model) [5]

8th Generation Intel® Core™ i5 processor (i5-8250U model) [5]

7th Generation Intel® Core™ i3 processor (i3-7100U model) [5]

6th Generation Intel® Core™ i3 processor (i3-6006U model)

Intel® Celeron® processor (3865U is Windows 10 only) [5]

3. Multicore is designed to improve performance of certain software products. Not all customers or software applications will necessarily benefit from use of this technology. Performance and clock frequency will vary depending on application workload and your hardware and software configurations. Intel's numbering 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. **NOTE:** In accordance with Microsoft's support policy, HP does not support the Windows 8 or Windows 7 operating system on products configured with Intel and AMD 7th generation and forward processors or provide any Windows 8 or Windows 7 drivers on <http://www.support.hp.com>.
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## Features

### CHIPSET

Integrated with processor

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### GRAPHICS

#### Integrated

Intel® UHD graphics 620 [6]

Intel® HD graphics 620 [6]

Intel® HD graphics 520 [6]

Intel® HD graphics [6]

**NOTE:** View processor section for details.

6. HD content required to view HD images.

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### DISPLAYS

#### Internal

##### eDP FHD Ultraslim

33.7 cm (13.3") diagonal FHD UWVA anti-glare LED-backlit non-touch, 220 cd/m<sup>2</sup>, 45% sRGB (1920 x 1080) [6,7]

##### eDP HD Slim

33.7 cm (13.3") diagonal HD SVA anti-glare LED-backlit non-touch, 220 cd/m<sup>2</sup>, 45% sRGB (1366 x 768) [6,7]

33.7 cm (13.3") diagonal HD SVA LED-backlit touch, 220 cd/m<sup>2</sup>, 45% sRGB (1366 x 768) [6,7]

#### Display Size

13.3"

33.8 cm (13.3")

6. HD content required to view HD images.
  7. Resolutions are dependent upon monitor capability, and resolution and color depth settings.
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### STORAGE AND DRIVES

#### Primary Storage

500 GB SATA (7200 rpm) [8]

500 GB (8 GB cache) SATA SSHD (5400 rpm) [8]

1 TB SATA (5400 rpm) [8]

#### Primary M.2 Storage

128 GB M.2 2280 SATA TLC SSD [8]

256 GB M.2 2280 PCIe NVMe Value SSD [8]

512 GB M.2 2280 PCIe NVMe TLC SSD [8]

**NOTE:** PCIe SSD not available for Celeron

8. 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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## Features

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### MEMORY

16 GB DDR4-2400 SDRAM (1 x 16 GB) [9]  
16 GB DDR4-2400 SDRAM (2 x 8 GB) [9]  
12 GB DDR4-2400 SDRAM (4 and 8 GB) [9]  
8 GB DDR4-2400 SDRAM (1 x 8 GB) [9]  
8 GB DDR4-2400 SDRAM (2 x 4 GB) [9]  
4 GB DDR4-2400 SDRAM (1 x 4 GB) [9]

**Maximum**

32 GB DDR4-2400 SDRAM [9]

**Memory Slots**

2 SODIMM

Both slots are customer accessible / upgradeable

DDR4 PC4 SODIMMS, system runs at 2133 (Intel 8th Gen CPU runs at 2400)

Supports Dual Channel Memory

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

**Wireless LAN (WLAN)**

Realtek 802.11ac (1x1) WiFi and Bluetooth® 4.2 Combo [10]

Realtek 802.11ac (2x2) WiFi and Bluetooth® 4.2 Combo [10]

Intel® Dual Band Wireless-AC 3168 802.11 a/b/g/n/ac (1x1) Wi-Fi® and Bluetooth® 4.2 Combo (non-vPro™) [10]

Intel® Dual Band Wireless-AC 8265 802.11a/b/g/n/ac (2x2) Wi-Fi® and Bluetooth® 4.2 Combo (non-vPro™) [10]

**Broadband Wireless (WWAN)**

HP lt4132 LTE/HSPA+ 4G Mobile Broadband [11]

HP lt4210 LTE/HSPA+ 4G Mobile Broadband [11]

**Ethernet**

Realtek RTL8111HSH Gigabit Ethernet

10. 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.
  11. 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.
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### AUDIO/MULTIMEDIA

**Audio**

2 Integrated stereo speakers

Integrated dual array microphone



## Features

### Webcam

HD webcam [6,12]

HD IR webcam [6,12]

6. HD content required to view HD images.

12. Internet access required.

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## KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS

### Keyboard

HP Premium Keyboard

Backlit keyboard available as an option

Full-sized island-style, spill resistant

### Pointing Device

Clickpad with multi-touch gesture support image sensor, taps enabled as default

### Buttons and Function Keys

Separate launch buttons provide easy access to wireless on/off and speaker mute. Function keys provide control of features including: standby mode, display brightness, external display, microphone mute, volume down, volume up, and backlight toggle for backlit keyboard (select models only).

### Function Keys

ESC: system information

F1 - Display Switching

F2 - Blank

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 - NumLock

F11 - Wifi Toggle

F12 - Sleep

### Hidden Functions

Fn+R = Break

Fn+S = Sys Rq

Fn+C = Scroll Lock

### Pointing Devices

Clickpad with multi-touch gesture support image sensor, taps enabled as default

### Gestures

#### Enabled by default Win 10

2 Finger Scrolling

2 Finger Zoom (Pinch)

OSD (enable/disable)

3 finger tap = Cortana

3 finger flick = App switch

4 finger tap = Action Center



### Features

**Disabled by default Win 10**

- 3 Finger Flick
- 2 Finger Rotate
- Momentum Motion
- 1 Finger Vertical Scroll

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### SOFTWARE AND SECURITY

**BIOS**

- HP BIOSphere Gen4 [13]
- HP DriveLock & Automatic DriveLock
- BIOS Update via Network
- Master Boot Record Security
- Power On Authentication
- Secure Erase [14]
- Absolute Persistence Module [15]
- Pre-boot Authentication

**Software**

- HP Native Miracast Support [16]
- HP LAN-Wireless Protection
- HP Wireless Wakeup
- HP Connection Optimizer
- HP Velocity
- HP 3D DriveGuard 6
- HP ePrint + JetAdvantage [17]
- HP Hotkey Support
- HP Recovery Manager
- HP Jumpstart
- HP Support Assistant [18]
- HP Noise Cancellation Software
- Buy Office
- Bing Search

**Manageability Features**

- HP Driver Packs [19]
- HP System Software Manager
- HP BIOS Config Utility (BCU)
- HP Client Catalog
- HP Management Integration Kit for Microsoft System Center Configuration Manager [20]
- LANDESK Management [21]





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## Features

### Client Security Software

HP Client Security Suite Gen3 [22] including:

HP Security Manager (including Credential Manager and Password Manager)

HP DriveLock

HP Fingerprint Sensor

HP Password Manager [23]

Absolute Persistence Module

Power On Authentication

Microsoft Defender [24]

13. HP BIOSphere Gen4 requires Intel® 7th or 8th Generation processors.
  14. Secure Erase for the methods outlined in the National Institute of Standards and Technology Special Publication 800-88. Supported on Elite platforms with BIOS version F.03 or higher.
  15. 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.
  16. Miracast is a wireless technology your PC can use to project your screen to TVs, projectors, and streaming media players that also support Miracast. You can use Miracast to share what you're doing on your PC and present a slide show. For more information: <http://windows.microsoft.com/en-us/windows-8/project-wireless-screen-miracast>
  17. HP ePrint Drive 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.
  18. HP Support Assistant requires Windows and Internet access.
  19. HP Driver Packs not preinstalled, however available for download at <http://www.hp.com/go/clientmanagement>.
  20. HP Management Integration Kit can be downloaded from <http://www8.hp.com/us/en/ads/clientmanagement/overview.html>.
  21. LANDESK Management subscription required.
  22. HP Client Security Suite Gen3 requires Windows and Intel® or AMD 7th or 8th Generation processors.
  23. 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.
  24. Microsoft Defender Opt in and internet connection required for updates.
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### Features

#### POWER

##### Power Supply

- 45 W HP Smart right angle 4.5mm AC adapter [25]
- 45 W HP Smart right angle 4.5mm AC adapter 2-prong (Japan only) [25]
- 65 W EM right angle 4.5mm Smart AC adapter [25]

##### Battery

- 3-cell, 48 Wh Long Life Li-ion [26]

##### Power Cord

- 2-wire plug - 1 m (2-prong Japan only) [25]
- 3-wire plug - 1 m [25]
- 3-wire plug - 1.8m [25]

##### Battery life

- Up to 17 hours and 30 minutes (i3, HD with SSD) [27]
- Up to 15 hours and 30 minutes (i5 quad core, HD with SSD) [27]

25. Availability may vary by country.

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

27. 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 [www.bapco.com](http://www.bapco.com) for additional details.

#### WEIGHTS & DIMENSIONS

##### Weight

- Starting at 3.28 lb [28]
- Starting at 2.5 kg [28]

##### Dimensions (w x d x h)

##### Non-Touch

- 12.83 x 9.21 x 0.78 in
- 32.6 x 23.4 x 1.98 cm

##### Touch

- 12.83 x 9.21 x 0.84 in
- 32.6 x 23.4 x 2.14 cm

28. Weight will vary by configuration.

#### PORTS/SLOTS

##### Ports

- 1 USB 3.1 Type-C™
- 2 USB 3.1 Gen 1 (1 powered port)
- 1 HDMI 1.4b [29]
- 1 VGA
- 1 RJ-45
- 1 AC power
- 1 headphone/microphone combo jack



### Features

#### Expansion Slots

1 multi-format digital media reader  
Supports SD, SDHC, SDXC.

29. HDMI cable sold separately.

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### SERVICE AND SUPPORT

#### Warranty

3 year and 1 year limited warranties and 90-day software limited warranty options depending on country. Batteries have a default one year limited warranty except for Long Life batteries which will have same 1-year or 3-year limited warranty as the platform. 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> [30]

30. 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.

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### CERTIFICATION AND COMPLIANCE

ENERGY STAR® certified  
EPEAT® Gold [31]  
Low halogen [32]

31. 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 [www.hp.com/go/options](http://www.hp.com/go/options).

32. External power supplies, power cords, cables and peripherals are not Low Halogen. Service parts obtained after purchase may not be Low Halogen.

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### Technical Specifications

#### SYSTEM UNIT

##### Stand-Alone Power Requirements (AC Power)

Nominal Operating Voltage	19V
Average Operating Power	Win 10
Integrated graphics	4.49W
Discrete Graphics	N/A

Max Operating Power	UMA < 45W
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##### Temperature

Operating	32° to 95° F (0° to 35° C)
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Non-operating	-4° to 140° F (-20° to 60° C)
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##### Relative Humidity

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

Operating	40 G, 2 ms, half-sine
Non-operating	200 G, 2 ms, half-sine

##### Random Vibration

Operating	0.75 grms
Non-operating	1.50 grms

##### Altitude (unpressurized)

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

##### Planned Industry Standard Certifications

UL	Yes
CSA	Yes
FCC Compliance	Yes
ENERGY STAR 6.0®	Selected models [33]
EPEAT	Registered Gold in United States[31]
ICES	Yes
Australia /	Yes
NZ A-Tick Compliance	Yes
CCC	Yes
Japan VCCI Compliance	Yes
KC	Yes
BSMI	Yes



## Technical Specifications

### CE Marking Compliance

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

31. 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 [www.hp.com/go/options](http://www.hp.com/go/options).

33. Configurations of the HP ProBook 430 G4 is ENERGY STAR® qualified are identified as HP ProBook 430 G4 ENERGY STAR on HP websites and on <http://www.energystar.gov>.

## DISPLAYS

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

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

<b>Outline Dimensions (W x H)</b>	306.8x195.7
<b>Active Area</b>	293.47 x 165.08 mm
<b>Weight</b>	260 g max
<b>Diagonal Size</b>	13.3 (inch)
<b>Thickness</b>	2.85mm max.
<b>Interface</b>	eDP 1.2
<b>LCD Mode</b>	IPS
<b>PPI</b>	
<b>Surface Treatment</b>	Anti-Glare (AG)
<b>Touch Enabled</b>	None
<b>Contrast Ratio</b>	600:1 (typical)
<b>Refresh Rate</b>	60 Hz
<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 + Hi FRC
<b>Viewing Angle</b>	UWVA 85/85/85/85



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## Technical Specifications

**13.3" diagonal HD SVA anti-glare LED-backlit non-touch; 220 cd/m<sup>2</sup>; 45% sRGB (1366 x 768)**

<b>Outline Dimensions (W x H)</b>	314.6 x 189.2 (mm) max
<b>Active Area</b>	293.42 x 164.97 (mm)
<b>Weight</b>	260 g max
<b>Diagonal Size</b>	13.3 (inch)
<b>Thickness</b>	3.0 (mm) max
<b>Interface</b>	eDP 1.2
<b>LCD Mode</b>	TN
<b>PPI</b>	
<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

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**13.3" diagonal HD SVA LED-backlit touch; 220 cd/m<sup>2</sup>; 45% sRGB (1366 x 768)**

<b>Outline Dimensions (W x H x D)</b>	314.6 x 189.2 (mm) max
<b>Active Area</b>	293.42 x 164.97 (mm)
<b>Weight</b>	260 g max
<b>Diagonal Size</b>	13.3 (inch)
<b>Thickness</b>	3.0 (mm) max
<b>Interface</b>	eDP 1.2
<b>Surface Treatment</b>	Anti-Glare (AG)
<b>Touch Enabled</b>	Yes
<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



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 Technical Specifications
 

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**STORAGE AND DRIVES**
**HARD DRIVES**
**500 GB 5400 rpm  
SATA Hard Drive**

<b>Drive Weight</b>	0.01 lb (6 g) ~ 0.02 lb (10 g)
<b>Rotation Speed</b>	5400 rpm
<b>Cache Buffer</b>	Up to 16MB
<b>NAND Type/Size</b>	0.28 in (7 mm)
<b>Height</b>	2.75 in (69.85 mm)
<b>Width</b>	ATA-8, SATA 3.0
<b>Interface</b>	600 MB/s
<b>Transfer Rate</b>	0.01 lb (6 g) ~ 0.02 lb (10 g)
<b>Seek Time</b>	
<b>Single Track</b>	1.5 ~ 2 ms
<b>Average</b>	11 ~ 13 ms
<b>Maximum</b>	18 ~ 22 ms
<b>Logical Blocks</b>	976,773,168
<b>Operating Temperature</b>	976,773,168
<b>Security Features</b>	32° to 158°F (0° to 70°C) [ambient temp]
<b>Other Features</b>	ATA Security

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**500 GB 5400 rpm SMART  
SATA Hybrid HDD/SSHD**

<b>Drive Weight</b>	0.20 lbs (92 g) ~ 0.21 lbs (95 g)
<b>Rotation Speed</b>	5400 rpm
<b>Cache Buffer</b>	64 MB
<b>NAND Type/Size</b>	TLC/8GB
<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>Interface Transfer Rate</b>	600 MB/s
<b>Seek Time</b>	
<b>Single Track</b>	2 ~ 1.5 ms;
<b>Average</b>	11 ~ 13 ms
<b>Maximum</b>	18 ~ 22 ms
<b>Logical Blocks</b>	976,773,168
<b>Operating Temperature</b>	976,773,168
<b>Security Features</b>	32° to 158°F (0° to 70°C) [ambient temp]
<b>Other Features</b>	ATA Security

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### Technical Specifications

<b>500 GB 5400 rpm SMART SATA Hybrid HDD/SSHD</b>	<b>Drive Weight</b>	0.20 lbs (92 g) ~ 0.21 lbs (95 g)
	<b>Rotation Speed</b>	5400 rpm
	<b>Cache Buffer</b>	64 MB
	<b>NAND Type/Size</b>	TLC/8GB
	<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>Interface Transfer Rate</b>	600 MB/s
	<b>Seek Time</b>	
	<b>Single Track</b>	2 ~ 1.5 ms;
	<b>Average</b>	11 ~ 13 ms
	<b>Maximum</b>	18 ~ 22 ms
	<b>Logical Blocks</b>	976,773,168
	<b>Operating Temperature</b>	976,773,168
	<b>Security Features</b>	32° to 158°F (0° to 70°C) [ambient temp]
<b>Other Features</b>	ATA Security	

<b>1TB 5400 rpm 7mm SATA Hard Drive</b>	<b>Drive Weight</b>	0.21 lbs (94 g)
	<b>Rotation Speed</b>	5400 rpm
	<b>Cache Buffer</b>	Up to 32 MB
	<b>NAND Type/Size</b>	N/A
	<b>Height</b>	0.28 in (7.2 mm)
	<b>Width</b>	2.75 in (69.85 mm)
	<b>Interface</b>	ATA-8, SATA 3.0
	<b>Interface Transfer Rate</b>	600 MB/s
	<b>Seek Time</b>	
	<b>Single Track</b>	Single Track 2 ms
	<b>Average</b>	Average 12 ~ 13 ms
	<b>Maximum</b>	Maximum 18 ~ 22 ms
	<b>Logical Blocks</b>	1,953,525,168
	<b>Operating Temperature</b>	32° to 140° F (0° to 60° C) [top cover temp]
	<b>Security Features</b>	ATA Security
<b>Other Features</b>	S.M.A.R.T., NCQ, Ultra DMA	





### Technical Specifications

#### SOLID STATE DRIVES

<b>128GB 2280 M2 SATA-3 TLC Solid State Drive</b>	<b>Form Factor</b>	M.2 2280
	<b>Capacity</b>	128 GB
	<b>NAND Type</b>	TLC
	<b>Height</b>	0.09 in (2.3 mm)
	<b>Width</b>	0.87 in (22 mm)
	<b>Weight</b>	0.02 lb (10 g)
	<b>Interface</b>	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

<b>256GB 2280 M2 SATA-3 Value Solid State Drive</b>	<b>Form Factor</b>	M.2 2280
	<b>Capacity</b>	256 GB
	<b>NAND Type</b>	TLC
	<b>Height</b>	0.09 in (2.3 mm)
	<b>Width</b>	0.87 in (22 mm)
	<b>Weight</b>	0.02 lb (10 g)
	<b>Interface</b>	PCIe NVMe Gen3X4
	<b>Maximum Sequential Read</b>	Up To 1700 MB/s
	<b>Maximum Sequential Write</b>	Up To 600 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

<b>512GB 2280 M2 PCIe NVMe TLC Solid State Drive</b>	<b>Form Factor</b>	M.2 2280
	<b>Capacity</b>	512 GB
	<b>NAND Type</b>	TLC
	<b>Height</b>	0.09 in (2.3 mm)
	<b>Width</b>	0.87 in (22 mm)
	<b>Weight</b>	0.02 lb (10 g)
	<b>Interface</b>	PCIe NVMe Gen3X4
	<b>Maximum Sequential Read</b>	Up To 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



## Technical Specifications

### NETWORKING/COMMUNICATIONS

#### WWAN

<b>HP It4132 LTE/HSPA+ 4G Mobile Broadband Module[1]</b>	<b>Technology/Operating bands</b>	LTE: 2100 (Band 1), 1900 (Band 2), 1800 (Band 3) MHz, 850 (Band 5), 2600 (Band 7), 900 (Band 8) MHz, 800 (Band 20), 700 (Band 28) MHz. HSPA+: 2100 (Band 1), 1900 (Band 2), 850 (Band 5), 900 (Band 8) MHz E-GPRS: 1900 (Band 2), 1800 (Band 3), 850 (Band 5), 900 (Band 8) MHz
	<b>Wireless protocol standards</b>	3GPP Release 10 LTE Specification CAT.4, 20MHz BW WCDMA R99, 3GPP Release 5, 6, 7 and 8 UMTS Specification E-GPRS: Class B, Multi-slot class 12, coding schemes CS1 - CS4 and MSC1 - MSC9
	<b>GPS</b>	Standalone, A-GPS (MS-B and LTO)
	<b>GPS bands</b>	1575.42 MHz ± 1.023 MHz, GLONASS 1596-1607MHz
	<b>Maximum data rates</b>	LTE: 150 Mbps (Download), 50 Mbps (Upload) DC-HSPA+: 42 Mbps (Download), 5.76 Mbps (Upload) HSPA+: 21Mbps (Download), 5.76 Mbps (Upload) EDGE: 236.8 kbps (Download), 236.8 kbps (Upload) GPRS: 85.6 kbps(Download), 85.6 kbps (Upload)
	<b>Maximum output power</b>	LTE: 23 dBm HSPA+: 23.5 dBm E-GPRS 1900/1800: 26 dBm E-GPRS 900/850: 27 dBm GPRS 1900/1800: 29.5 dBm GPRS 900/850: 32.5 dBm
	<b>Maximum power consumption</b>	LTE: 1,200 mA (peak); 900 mA (average) HSPA+: 1,100 mA (peak); 800 mA (average) E-GPRS: 2,600 mA (peak); 500 mA (average)
	<b>Form Factor</b>	M.2, 3042-S3 Key B
	<b>Weight</b>	6 g
	<b>Dimensions</b> (Length x Width x Thickness)	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.

<b>HP It4210 LTEHSPA+ 4G Mobile Broadband Module[1]</b>	<b>Technology/Operating bands</b>	FDD LTE: LTE: 2100 (Band 1), 1900 (Band 2), 1800 (Band 3) , 1700 (Band 4), 850 (Band 5), 2600 (Band 7), 900 (Band 8) , 1400 (Band 11), 700 (Band 12), 700 (Band 13) 700 (Band 17) , 850 (Band 18) , 850 (Band 19), 800 (Band 20), 1450 (Band 21) , 850 (Band 26) 700 (Band 28) MHz, 700 (Band 29) , 2300 (Band 30) , 2100 (Band 66) MHz TDD LTE: 2600 (Band 38) , 1900 (Band 39) , 2300 (Band 40) , 2500 (Band 41) MHz HSPA+: 2100 (Band 1), 1900 (Band 2), 1700 (Band 4), 850 (Band 5), 900 (Band 8) MHz
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### Technical Specifications

<b>Wireless protocol standards</b>	3GPP Release 11 LTE Specification CAT.9, MAX 60MHz aggregation BW WCDMA R99, 3GPP Release 5, 6, 7 and 8 UMTS Specification
<b>GPS</b>	Standalone, A-GPS (MS-B and LTO)
<b>GPS bands</b>	GPS 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 g
<b>Dimensions</b> (Length x Width x Thickness)	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.

### WLAN

<b>Intel 802.11 a/b/g/n/AC (2x2) WiFi and Bluetooth® Combo</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 <ul style="list-style-type: none"> <li>• 2.402 – 2.482 GHz</li> </ul> 802.11a/n <ul style="list-style-type: none"> <li>• 4.9 – 4.95 GHz (Japan)</li> <li>• 5.15 – 5.25 GHz</li> <li>• 5.25 – 5.35 GHz</li> <li>• 5.47 – 5.725 GHz</li> <li>• 5.825 – 5.850 GHz</li> </ul>
	<b>Data Rates</b>	<ul style="list-style-type: none"> <li>• 802.11b: 1, 2, 5.5, 11 Mbps</li> <li>• 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</li> <li>• 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</li> <li>• 802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz)</li> <li>• 802.11ac : MCS0 ~ MCS7, (1SS) (20MHz, 40MHz, and 80MHz)</li> </ul>
	<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> </ul>



### Technical Specifications

	<ul style="list-style-type: none"> <li>• 802.1x authentication</li> <li>• WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.</li> <li>• WPA2 certification</li> <li>• 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 : +16dBm minimum</li> <li>• 802.11g : +14dBm minimum</li> <li>• 802.11a : +14dBm minimum</li> <li>• 802.11n HT20(2.4GHz) : +14dBm minimum</li> <li>• 802.11n HT40(2.4GHz) : +12dBm minimum</li> <li>• 802.11n HT20(5GHz) : +14dBm minimum</li> <li>• 802.11n HT40(5GHz) : +12dBm minimum</li> <li>• 802.11ac 80MHz(5GHz) : +11dBm minimum</li> </ul>
<b>Power Consumption</b>	Transmit: 2.0 W (max) Receive: 1.6 W (max) Idle mode (PSP): 180 mW (WLAN Associated) Idle mode: 50 mW (WLAN unassociated) Connect Standby: 10 mW (WLAN+BT) Radio disabled: 5 mW
<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 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

1. [Check latest software/driver release for updates on supported security features.](#)

### Technical Specifications

2. Maximum output power may vary by country according to local regulations.
3. 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).

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

<b>Bluetooth Specification</b>	4.0/4.1/4.2 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>Data Rates and Throughput</b>	Legacy : 3 Mbps data rate; throughput up to 2.17 Mbps BLE : 1 Mbps data rate; throughput up to 0.2 Mbps Legacy : Synchronous Connection Oriented links up to 3, 64 kbps, voice channels Legacy : Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)
<b>Transmit Power</b>	The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 4 dBm for BR and EDR.
<b>Power Consumption</b>	Peak (Tx) 330 mW Peak (Rx) 230 mW Selective Suspend 17 mW
<b>Electrical Interface</b>	USB 2.0 compliant
<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</b>	ETS 300 328, ETS 300 826
<b>Certifications</b>	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)



### Technical Specifications

<b>Intel 802.11 a/b/g/n/AC (1x1) WiFi and Bluetooth® Combo[1]</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 <ul style="list-style-type: none"> <li>• 2.402 – 2.482 GHz</li> </ul> 802.11a/n <ul style="list-style-type: none"> <li>• 4.9 – 4.95 GHz (Japan)</li> <li>• 5.15 – 5.25 GHz</li> <li>• 5.25 – 5.35 GHz</li> <li>• 5.47 – 5.725 GHz</li> <li>• 5.825 – 5.850 GHz</li> </ul>
	<b>Data Rates</b>	<ul style="list-style-type: none"> <li>• 802.11b: 1, 2, 5.5, 11 Mbps</li> <li>• 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</li> <li>• 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</li> <li>• 802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz)</li> <li>• 802.11ac : MCS0 ~ MCS7, (1SS) (20MHz, 40MHz, and 80MHz)</li> </ul>
	<b>Modulation</b>	Direct Sequence Spread Spectrum BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM
	<b>Security[3]</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[2]</b>	<ul style="list-style-type: none"> <li>• 802.11b : +14dBm minimum</li> <li>• 802.11g : +12dBm minimum</li> <li>• 802.11a : +12dBm minimum</li> <li>• 802.11n HT20(2.4GHz) : +12dBm minimum</li> <li>• 802.11n HT40(2.4GHz) : +12dBm minimum</li> <li>• 802.11n HT20(5GHz) : +10dBm minimum</li> <li>• 802.11n HT40(5GHz) : +10dBm minimum</li> <li>• 802.11ac VHT80(5GHz) : +10dBm minimum</li> </ul>
	<b>Power Consumption</b>	Transmit: 2.0 W (max) Receive: 1.6 W (max) Idle mode (PSP): 180 mW (WLAN Associated) Idle mode: 50 mW (WLAN unassociated) Connect Standby: 10 mW (WLAN+BT) Radio disabled: 8 mW



## Technical Specifications

<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 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
	<ol style="list-style-type: none"> <li>1. Check latest software/driver release for updates on supported security features.</li> <li>2. Maximum output power may vary by country according to local regulations.</li> <li>3. 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> </ol>

**HP Integrated Module with Bluetooth 4.0/4.1/4.2 Wireless Technology**

<b>Bluetooth Specification</b>	4.0/4.1/4.2 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>Data Rates and Throughput</b>	Legacy : 3 Mbps data rate; throughput up to 2.17 Mbps BLE : 1 Mbps data rate; throughput up to 0.2 Mbps Legacy : Synchronous Connection Oriented links up to 3, 64 kbps, voice channels Legacy : Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)
<b>Transmit Power</b>	The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 4 dBm for BR and EDR.
<b>Power Consumption</b>	Peak (Tx) 330 mW Peak (Rx) 230 mW Selective Suspend 17 mW
<b>Electrical Interface</b>	USB 2.0 compliant
<b>Bluetooth Software</b>	Microsoft Windows Bluetooth Software

### Technical Specifications

<b>Supported 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</b>	ETS 300 328, ETS 300 826
<b>Certifications</b>	Low Voltage Directive IEC950
<b>Bluetooth Profiles Supported</b>	<ul style="list-style-type: none"> <li>UL, CSA, and CE Mark</li> <li>BT4.1-ESR 5/6/7 Compliance</li> <li>LE Link Layer Ping</li> <li>LE Dual Mode</li> <li>LE Link Layer</li> <li>LE Low Duty Cycle Directed Advertising</li> <li>LE L2CAP Connection Oriented Channels</li> <li>Train Nudging &amp; Interlaced Scan</li> <li>BT4.2 ESR08 Compliance</li> <li>LE Secure Connection- Basic/Full</li> <li>LE Privacy 1.2 –Link Layer Privacy</li> <li>LE Privacy 1.2 –Extended Scanner Filter Policies</li> <li>LE Data Packet Length Extension</li> <li>FAX Profile (FAX)</li> <li>Basic Imaging Profile (BIP)2</li> <li>Headset Profile (HSP)</li> <li>Hands Free Profile (HFP)</li> <li>Advanced Audio Distribution Profile (A2DP)</li> </ul>

<b>Realtek 802.11a/b/g/n/AC (2x2) WiFi and Bluetooth® 4.2 Combo [1]</b>	<b>Wireless LAN Standards</b>	<ul style="list-style-type: none"> <li>IEEE 802.11a</li> <li>IEEE 802.11b</li> <li>IEEE 802.11g</li> <li>IEEE 802.11n</li> <li>IEEE 802.11ac</li> </ul>
	<b>Interoperability</b>	Wi-Fi certified
	<b>Frequency Band</b>	<ul style="list-style-type: none"> <li>802.11b/g/n                             <ul style="list-style-type: none"> <li>• 2.402– 2.482 GHz</li> </ul> </li> <li>802.11a/n                             <ul style="list-style-type: none"> <li>• 5.15 – 4.95 GHz (Japan)</li> <li>• 5.15 – 5.25 GHz</li> <li>• 5.25 – 5.35 GHz</li> <li>• 5.47 – 5.725 GHz</li> <li>• 5.825 – 5.850 GHz</li> </ul> </li> </ul>
	<b>Data Rates</b>	<ul style="list-style-type: none"> <li>802.11b: 1, 2, 5.5, 11 Mbps</li> <li>802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</li> <li>802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</li> <li>802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz)</li> <li>802.11ac : MCS0 ~ MCS9, (1SS, and 2SS) (20MHz, 40MHz, and 80MHz)</li> </ul>





### Technical Specifications

<b>Modulation</b>	Direct Sequence Spread Spectrum BPSK, QPSK, CCK, 16-QAM, 64-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 : +16dBm minimum</li> <li>• 802.11g : +14dBm minimum</li> <li>• 802.11a : +14dBm minimum</li> <li>• 802.11n HT20(2.4GHz) : +13dBm minimum</li> <li>• 802.11n HT40(2.4GHz) : +13dBm minimum</li> <li>• 802.11n HT20(5GHz) : +12dBm minimum</li> <li>• 802.11n HT40(5GHz) : +12dBm minimum</li> </ul>
<b>Power Consumption</b>	Transmit mode 2.0 W Receive mode 1.6 W Idle mode (PSP) 180 mW (WLAN Associated) Idle mode 50 mW (WLAN unassociated) Connected Standby 10mW Radio disabled 8 mW
<b>Power Management</b>	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
<b>Receiver Sensitivity[3]</b>	802.11b, 1Mbps : -94dBm maximum 802.11b, 11Mbps : -86dBm maximum 802.11g, 6Mbps : -88dBm maximum 802.11g, 54Mbps : -74dBm maximum 802.11a, 6Mbps : -86dBm maximum 802.11a, 54Mbps : -72dBm maximum 802.11n, MCS07 : -69dBm maximum 802.11n, MCS15 : -66dBm maximum
<b>Antenna type</b>	High efficiency antenna with spatial diversity, mounted in the display enclosure  Two embedded 2.4 GHz antennas are provided to the card to support WLAN and Bluetooth communications (Support Dual antenna or Single antenna, depend on platform requirement)
<b>Form Factor</b>	PCI-Express M.2 MiniCard
<b>Dimensions</b>	Type 2230 : 2.3 x 22.0 x 30.0 mm



### Technical Specifications

<b>Weight</b>	Type 2230 : 2.8g	
<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 White – Radio ON	
	<ol style="list-style-type: none"> <li>1. Check latest software/driver release for updates on supported security features.</li> <li>2. Maximum output power may vary by country according to local regulations.</li> <li>3. 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> </ol>	

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

<b>Bluetooth Specification</b>	4.0/4.1/4.2 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>Data Rates and Throughput</b>	Legacy : 3 Mbps data rate; throughput up to 2.17 Mbps BLE : 1 Mbps data rate; throughput up to 0.2 Mbps Legacy : Synchronous Connection Oriented links up to 3, 64 kbps, voice channels Legacy : Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)
<b>Transmit Power</b>	The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 4 dBm for BR and EDR.
<b>Power Consumption</b>	Peak (Tx) 330 mW Peak (Rx) 230 mW Selective Suspend 17 mW
<b>Electrical Interface</b>	USB 2.0 compliant
<b>Bluetooth Software Supported Link Topology</b>	Microsoft Windows Bluetooth Software
<b>Power Management Certifications</b>	Microsoft Windows ACPI, and USB Bus Support FCC (47 CFR) Part 15C, Section 15.247 & 15.249
<b>Power Management Certifications</b>	ETS 300 328, ETS 300 826
<b>Certifications</b>	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



### Technical Specifications

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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)

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### Technical Specifications

<b>Realtek 802.11a/b/g/n/ac (1x1) WiFi and Bluetooth® 4.2 Combo [1]</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 <ul style="list-style-type: none"> <li>• 2.402– 2.482 GHz</li> </ul> 802.11a/n <ul style="list-style-type: none"> <li>• 5.15 – 4.95 GHz (Japan)</li> <li>• 5.15 – 5.25 GHz</li> <li>• 5.25 – 5.35 GHz</li> <li>• 5.47 – 5.725 GHz</li> <li>• 5.825 – 5.850 GHz</li> </ul>
	<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, and 80MHz)
	<b>Modulation</b>	Direct Sequence Spread Spectrum BPSK, QPSK, CCK, 16-QAM, 64-QAM,
	<b>Security[1]</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[2]</b>	<ul style="list-style-type: none"> <li>• 802.11b : +14dBm minimum</li> <li>• 802.11g : +12dBm minimum</li> <li>• 802.11a : +12dBm minimum</li> <li>• 802.11n HT20(2.4GHz) : +12dBm minimum</li> <li>• 802.11n HT40(2.4GHz) : +12dBm minimum</li> <li>• 802.11n HT20(5GHz) : +10dBm minimum</li> <li>• 802.11n HT40(5GHz) : +10dBm minimum</li> <li>• 802.11ac VHT80(5GHz) : +10dBm minimum</li> </ul>
	<b>Power Consumption</b>	Transmit mode 2.0 W Receive mode 1.6 W Idle mode (PSP) 180 mW (WLAN Associated)



### Technical Specifications

Idle mode	50 mW (WLAN unassociated)
Connected Standby	10mW
Radio disabled	8 mW

<b>Power Management</b>	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
<b>Receiver Sensitivity[3]</b>	802.11b, 1Mbps : -93.5dBm maximum 802.11b, 11Mbps : -84dBm maximum 802.11a/g, 6Mbps : -86dBm maximum 802.11a/g, 54Mbps : -72dBm maximum 802.11n, MCS07 : -67dBm maximum 802.11n, MCS15 : -64dBm maximum 802.11ac, MCS0 : -84dBm maximum 802.11ac, MCS9 : -59dBm maximum
<b>Antenna type</b>	High efficiency antenna with spatial diversity, mounted in the display enclosure  Two embedded 2.4 GHz antennas are provided to the card to support WLAN and Bluetooth communications (Support Dual antenna or Single antenna, depend on platform requirement)
<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>	<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 White – Radio ON
	<ol style="list-style-type: none"> <li>1. <a href="#">Check latest software/driver release for updates on supported security features.</a></li> <li>2. <a href="#">Maximum output power may vary by country according to local regulations.</a></li> <li>3. <a href="#">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).</a></li> </ol>

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

<b>Bluetooth Specification</b>	4.0/4.1/4.2 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>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



## Technical Specifications

	channels
	Legacy : Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)
<b>Transmit Power</b>	The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 4 dBm for BR and EDR.
<b>Power Consumption</b>	Peak (Tx) 330 mW Peak (Rx) 230 mW Selective Suspend 17 mW
<b>Electrical Interface</b>	USB 2.0 compliant
<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</b>	ETS 300 328, ETS 300 826
<b>Certifications</b>	Low Voltage Directive IEC950
<b>Bluetooth Profiles Supported</b>	UL, CSA, and CE Mark 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)

## POWER

### HP 45W Smart AC Adapter

<b>Dimensions (H x W x D)</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>Input AC current</b> 1.4 A at 90 VAC
<b>Output</b>	<b>Output power</b> 45W
	<b>DC output</b> 19.5V



### Technical Specifications

	<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>EMI and Safety Certifications</b>		<p>*CE Mark - full compliance with LVD and EMC directives</p> <p>* 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.</p> <p>* MTBF - over 200,000 hours at 25°C ambient condition.</p>

<b>HP 65W AC Adapter</b>	<b>Dimensions</b>	4.25 x 1.85 x 1.47 in (10.8 x 4.7 x 3.74 cm)
	<b>Weight</b>	1.81 lb (250g) max
	<b>Input</b>	100 to 240 VAC
	<b>Input Efficiency</b>	88% min at 115 VAC and 89% min at 230 VAC
	<b>Input frequency range</b>	47 to 63 Hz
	<b>Input AC current</b>	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>	5 msec 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>	32° to 104° F (0° to 40° C)
	<b>Non-operating (storage) temperature</b>	-4° to 149° F (-20° to 65° C)
	<b>Altitude</b>	0 to 10,000 ft (0 to 3,048 m)
	<b>Humidity</b>	20% to 80%
	<b>Storage Humidity</b>	10% to 90%
<b>EMI and Safety Certifications</b>		<p>*CE Mark - full compliance with LVD and EMC directives</p> <p>* 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.</p> <p>* MTBF - over 200,000 hours at 25°C ambient condition.</p>



### Technical Specifications

<b>HP 3-cell, Long Life 48 WHr Li-ion</b>	<b>Dimensions (H x W x L)</b>	7.0. x180.48x88.95 mm (0.273 x 7.09 x 3.49 inch)		
	<b>Weight</b>	0.22 kg (0.48lb)		
	<b>Cells/Type</b>	3cell Lithium-Ion		
	<b>Energy</b>	<b>Voltage</b>	11.4V/ 10.95V	
		<b>Amp-hour capacity</b>	4.212Ah /4.385Ah	
		<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>Non-operating</b>	-4° to 122° F (-20° to 60° C)	
	<b>Battery Re-Charge Time</b>	<b>System in OFF or Standby Mode</b>	<3 hours	
	<b>Fuel Gauge LED</b>	No		
	<b>Warranty</b>	3-years		
	<b>Optional Travel Battery Available</b>	No		

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#### Country of Origin

China

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

Type	Description	Part Number	
<b>Cases</b>	HP Essential Top Load Case	H2W17AA	
	HP Essential Backpack	H1D24AA	
	HP Essential Messenger Case	H1D25AA	
<b>Docking</b>	HP 3005pr USB3 Port Replicator	Y4H06AA	
	HP Thunderbolt Dock 120W G2	TBD	
	HP USB-C Travel Dock	T0K29AA	
	HP USB Travel Dock	T0K30AA	
	HP Elite USB-C Docking Station	X7W54AA	
	HP Elite USB-C Dock	Z9R42AA	
	HP Elite USB-C Dock G3	2DW60AA	
	<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 3-Button USB Laser Mouse		H4B81AA	
HP USB Travel Mouse		G1K28AA	
HP HDMI to DVI Adapter		F5A28AA	
HP USB-C to DP		N9K78AA	
HP USB-C to USB-A Hub		Z6A00AA	
HP Stereo 3.5mm Headset		T1A66AA	
HP Stereo USB Headset		T1A67AA	
<b>Memory</b>		HP 4GB 2400MHz DDR4 Memory	Z4Y84AA
		HP 8GB 2400MHz DDR4 Memory	Z4Y85AA
	HP 16GB 2400MHz DDR4 Memory	Z4Y86AA	
<b>Power</b>	HP 45W Smart AC Adapter 4.5mm	H6Y88AA	
	HP 65W Smart AC Adapter	H6Y89AA	
	HP 65W Slim AC Adapter	H6Y82AA	
	HP 45W USB-C Power Adapter	1HE07AA	
	HP 65W USB-C Power Adapter	1HE08AA	
	HP Power Bank	N9F71AA	
	HP USB-C Notebook Power Bank	1TZ86AA	
	HP Notebook Power Bank	N9F71AA	
<b>Storage</b>	HP External USB Optical Drive	F2B56AA	
	HP 500GB 7200rpm HDD	F3B97AA	
	HP External Portable USB3.0 HDD	K6A93AA	
	HP 256GB Value 2280 M.2 SATA3 SSD	1DE47AA	
	HP 512GB TLC PCI-e 3x4 NVMe M.2 SSD	1FU88AA	
<b>Security</b>	HP Essential Combination Lock	T0Y16AA	
	HP Combination Lock	T0Y15AA	
	HP Keyed Cable lock	T0Y14AA	
	HP Keyed Cable Lock 10mm	T1A62AA	
<b>UCC</b>	HP Conferencing Keyboard	K8P74AA	



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

	HP USB Collaboration Keyboard	Z9N38AA
	HP Wireless Collaboration Keyboard	Z9N39AA
	HP UC Wireless Mono Headset	W3K08AA
	HP UC Wireless Duo Headset	W3K09AA
	HP UC Speaker Phone	K7V16AA
	HP UC Wired Headset	K7V17AA
<b>Displays</b>	HP EliteDisplay S140u USB Portable Monitor	G8R65AA
	HP ProDisplay P240VA 23.8-inch Monitor	N3H14AA
	HP ProDisplay P232 23-inch Monitor	K7X31AA
	HP ProDisplay P223 21.5-inch Monitor	X7R61AA
	HP EliteDisplay E230t 23-inch Touch Monitor	W2Z50AA
	HP EliteDisplay E240c 23.8-inch Collaboration Monitor	M1P00A8



### Summary of Changes

<b>Date of change:</b>	<b>Version History:</b>		<b>Description of change:</b>
August 22, 2017	From V1 to V2	Update	Change Battery life information TBD
September 7, 2017	From V2 to V3	Update	Fix battery life information to current

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