

### Overview

#### HP 245 G7 Notebook PC



1. Webcam LED
2. Webcam
3. Internal microphone
4. Touchpad
5. Touchpad button
6. Power indicator LED

#### Left

7. Hard drive indicator LED
8. SD Card slot
9. USB 2.0 port
10. Security lock slot (Lock sold separately)
11. Power button

### Overview



#### Right

- |                                   |                       |
|-----------------------------------|-----------------------|
| 1. AC Smart Pin adapter plug      | 4. USB 3.1 Gen 1 port |
| 2. RJ-45/Ethernet port            | 5. USB 3.1 Gen 1 port |
| 3. HDMI port (Cable not included) | 6. Audio combo jack   |

### Overview

### AT A GLANCE

- Preinstall with Windows 10 versions, FreeDOS or Ubuntu
- Choice of AMD Ryzen™ and 7th Generation AMD APU processors
- 14" (35.56 cm) diagonal HD Anti-Glare Display
- Choice of Integrated AMD Radeon Vega or Radeon Graphics
- Dark Ash Silver color with texture pattern
- Up to 1 TB Hard Drive or 256 GB M.2 SATA3 Solid State Drive
- Weight starting at 1.52 Kg (3.4lbs)
- Security features including FW TPM 2.0 and security lock slot (Lock not included)
- Keyboard - Full size textured island-style keyboard
- Touchpad with gestures support
- HP webcam with single digital microphone and HD (supporting WDR- Wide Dynamic Range) or VGA camera
- Two USB 3.1 (Gen 1) ports and One USB 2.0 port
- Wireless LAN (WLAN) up to 802.11ac to keep you connected

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

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### Technical Specifications

## PRODUCT NAME

HP 245 G7 Notebook PC

## OPERATING SYSTEM

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

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.

## PROCESSOR

- AMD Ryzen™ 5 2500U APU with Radeon™ Vega Graphics  
(2 GHz base frequency, up to 3.6 GHz burst frequency, 6 MB cache, 4 cores)<sup>3,4,5</sup>
- AMD Ryzen™ 3 2200U APU with Radeon™ Vega Graphics  
(2.5 GHz base frequency, up to 3.4 GHz burst frequency, 5 MB cache, 2 cores)<sup>3,4,5</sup>
- AMD A6-9225 APU with Radeon™ R4 Graphics  
(2.6 GHz base frequency, up to 3 GHz burst frequency, 1 MB cache, 2 cores)<sup>3,4,5</sup>
- AMD A4-9125 APU with Radeon™ R3 Graphics  
(2.3 GHz base frequency, up to 2.6 GHz burst frequency, 1 MB cache, 2 cores)<sup>3,4,5</sup>

### Processor Family

- AMD Ryzen™ 5 Mobile Processors<sup>5</sup>
- AMD Ryzen™ 3 Mobile Processors<sup>5</sup>
- 7th Generation AMD A6 APU processor (A6-9225)<sup>5</sup>
- 7th Generation AMD A4 APU processor (A4-9125)<sup>5</sup>

3. Multi core is designed to improve performance of certain software products. Not all customers or software applications will necessarily benefit from use of this technology. Performance and clock frequency will vary depending on application workload and your hardware and software configurations. AMD's numbering is not a measurement of clock speed.

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

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

### Technical Specifications

#### CHIPSET

Chipset is integrated with processor

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#### GRAPHICS

##### Integrated

AMD Radeon Vega 8 Mobile Graphics  
AMD Radeon Vega 3 Mobile Graphics  
AMD Radeon™ R4 Graphics  
AMD Radeon™ R3 Graphics

##### Supports

Support HD decode, DX12, HDMI 1.4b<sup>6</sup>

6. HDMI cable sold separately.

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#### DISPLAY

##### Non-Touch

35.56 cm (14") diagonal HD SVA eDP anti-glare WLED-backlit slim-flat, 220 cd/m<sup>2</sup>, 67% sRGB (1366 x 768)<sup>7,8</sup>

##### HDMI

Port supports resolutions up to 1920 x 1200 external resolution @60 Hz

7. HD content required to view HD images.

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

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#### STORAGE AND DRIVES

##### Primary Storage

1 TB 5400 rpm SATA<sup>9</sup>  
500 GB 7200 rpm SATA<sup>9</sup>  
500 GB 5400 rpm SATA<sup>9</sup>

##### Primary M.2 Storage

128 GB SATA-3 TLC Solid State Drive<sup>9</sup>  
256 GB SATA-3 TLC Solid State Drive<sup>9</sup>

9. 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

### MEMORY

**Maximum Memory**

16 GB DDR4-2400 SDRAM<sup>10</sup>

8 GB DDR4-1866 SDRAM<sup>10</sup>

**Memory**

16 GB DDR4-2400 SDRAM (2 X 8 GB)<sup>10</sup>

8 GB DDR4-2400 SDRAM (1 x 8 GB)

8 GB DDR4-2400 SDRAM (2 x 4 GB)<sup>10</sup>

4 GB DDR4-2400 SDRAM (1 x 4 GB)

8 GB DDR4-1866 SDRAM (1 x 8 GB)

4 GB DDR4-1866 SDRAM (1 x 4 GB)

**Memory Slots**

2 SODIMM (AMD Ryzen™ Mobile Processors)

DDR4 PC4 SODIMMS, system runs at 2400 (AMD Ryzen™ Mobile Processors)

1 SODIMM (7th Generation AMD APU processor)

Supports Dual Channel Memory

DDR4 PC4 SODIMMS, system runs at 1866 (7th Generation AMD APU processor)

All slots are customer non-accessible / non-upgradeable

**NOTE:** All slots are customer non-accessible / non-upgradeable.

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

### NETWORKING/COMMUNICATIONS

**WLAN**

Realtek 802.11ac (2x2) WLAN and Bluetooth® 4.2 Combo (MU-MIMO supported)<sup>11</sup>

Realtek 802.11ac (1x1) WLAN and Bluetooth® 4.2 Combo<sup>11</sup>

Realtek 802.11b/g/n (1x1) WLAN and Bluetooth® 4.2 Combo<sup>11</sup>

**Miracast**

Compatible with Miracast-certified devices<sup>12</sup>

**Ethernet**

Integrated 10/100/1000 GbE NIC

11. Wireless access point and Internet service required and sold separately. Availability of public wireless access points limited.

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

### AUDIO/MULTIMEDIA

**Audio**

2 Integrated stereo speakers

### Technical Specifications

**Camera**

HP TrueVision HD Camera <sup>7,13</sup>

**Webcam**

VGA webcam<sup>13,14</sup>

7. HD content required to view HD images.

13. Sold separately or as an optional feature.

14. Internet access required.

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### KEYBOARDS/TOUCHPAD

**Keyboard**

Full Size Island-style Keyboard

**Pointing Device**

Touchpad with multi-touch gesture support

**Function Keys**

F1 - Open "How to get help in Windows 10" webpage

F2 - Brightness Down

F3 - Brightness Up

F4 - Display Switching

F5 - Blank

F6 - Mute

F7 - Volume Down

F8 - Volume Up

F9 - Previous

F10 - Play/Pause

F11 - Next

F12 - Airplane mode

### Technical Specifications

## SOFTWARE AND SECURITY

### Preinstalled Software

HP JumpStart  
HP Documentation  
HP Setup Integrated OOB  
HP SSRM  
HP Audio Switch  
HP SUPPORT ASSISTANT  
McAfee LiveSafe™  
HP Support Assistant<sup>15</sup>

### Security Management

TPM 2.0<sup>16</sup>  
Security lock slot (Lock sold separately)

15. HP Support Assistant requires Windows and Internet access.

16. Firmware TPM is version 2.0. Hardware TPM is v1.2, which is a subset of the TPM 2.0 specification version v0.89 as implemented by Intel Platform Trust Technology (PTT).re TPM is version 2.0. Hardware TPM is v1.2, which is a subset of the TPM 2.0 specification version v0.89 as implemented by Intel Platform Trust Technology (PTT).

## POWER

### Power Supply

65 W EM Smart AC adapter<sup>17,19</sup>  
45 W Smart AC adapter<sup>17</sup>

### Primary Battery

HP Long Life 3-cell, 41 Wh Li-ion Battery<sup>18</sup>  
Support battery fast charge - Approximately 90% in 90 minutes<sup>19</sup>

### Battery Life

Up to 10 hours and 45 minutes<sup>20</sup>

### Power Cord

1M (3.28 feet) length power cord<sup>17</sup>

17. Availability may vary by country.

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

19. Recharges the battery up to 90% within 90 minutes when the system is off or in standby mode. Power adapter with a minimum capacity of 65 watts is required. After charging has reached 90% capacity, charging will return to normal. Charging time may vary +/-10% due to System tolerance.

20. 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.



### Technical Specifications

## WEIGHTS & DIMENSIONS

### Product Weight

Starting at 3.3 lb<sup>21</sup>

Starting at 1.52 kg<sup>21</sup>

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

13.19 x 9.21 x 0.78 in

33.5 x 23.4 x 1.99 cm

21. Weight will vary by configuration.

## PORTS/SLOTS

### Ports/Connectors

2 USB 3.1 Gen 1

1 USB 2.0

1 HDMI v1.4b<sup>6</sup>

1 RJ-45

1 AC power

1 Headphone/microphone combo jack

### Expansion Slots

1 multi-format digital media reader

Supports SD, SDHC, SDXC

6. HDMI cable sold separately.

## SERVICE AND SUPPORT

HP Services offers 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. Refer to <http://www.hp.com/support/batterywarranty/> for additional battery information. On-site service and extended coverage is also available. HP Care Pack Services are optional extended service contracts that go beyond the standard limited warranties. To choose the right level of service for your HP product, use the HP Care Pack Services Lookup Tool at: <http://www.hp.com/go/cpc>.<sup>22</sup>

22. HP Care Packs are sold separately. Service levels and response times for HP Care Packs may vary depending on your geographic location. Service starts on date of hardware purchase. Restrictions and limitations apply. For details, visit <http://www.hp.com/go/cpc>. HP services are governed by the applicable HP terms and conditions of service provided or indicated to Customer at the time of purchase. Customer may have additional statutory rights according to applicable local laws, and such rights are not in any way affected by the HP terms and conditions of service or the HP Limited Warranty provided with your HP Product.

### Technical Specifications

#### SYSTEM UNIT

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

Nominal Operating Voltage	19.5 V
Average Operating Power	Win 10
Integrated graphics	8.98W
Max Operating Power	Discrete < 65W UMA < 45W

##### Temperature

Operating	32° to 95° F (0° to 35° C) (not writing optical) 41° to 95° F (5° to 35° C) (writing optical)
Non-operating	-4° to 140° F (-20° to 60° C)

##### Relative Humidity

Operating	10% to 90%, non-condensing
Non-operating	5% to 95%

##### Shock

Operating	40 G, 2 ms duration, half-sine
Non-operating	240 G, 2 ms duration, half-sine

##### Random Vibration

Operating	1.043 grms
Non-operating	3.5 grms

##### Planned Industry Standard Certifications

UL	Yes
CSA	No
FCC Compliance	Yes
ENERGY STAR®	Yes <sup>23</sup>
EPEAT	EPEAT Silver <sup>24</sup>
ICES	Yes
Australia	Yes
NZ A-Tick Compliance	Yes
CCC	Yes
Japan VCCI Compliance	Yes
KC	Yes
BSMI	Yes
CE Marking Compliance	Yes
BNCI or BELUS	Yes

### Technical Specifications

CIT	Yes
GOST	Yes
Saudi Arabian Compliance (ICCP)	Yes
SABS	Yes

23. Configurations of the HP ProBook 430 G6 that are ENERGY STAR® certified<sup>2</sup> are identified as HP ProBook 430 G6 ENERGY STAR on HP websites and on <http://www.energystar.gov>.

24. 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>.

### DISPLAYS

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

<b>14" HD WLED Anti-Glare diagonal (1366x768) slim-flat (3.0mm), SVA, eDP</b>	<b>Outline Dimensions</b> (W x H x D)	320.9 x 250.6 x 3.0
	<b>Active Area</b>	309.5 x 174.05
	<b>Weight</b>	270g max
	<b>Diagonal Size</b>	14.0 (inch)
	<b>Thickness</b>	3.0 (mm) max
	<b>Interface</b>	eDP 1.2
	<b>Surface Treatment</b>	AG
	<b>Touch Enabled</b>	No
	<b>Contrast Ratio</b>	600:1 (typ. AG)
	<b>Refresh Rate</b>	60Hz
	<b>Brightness</b>	220nits typical
	<b>Pixel Resolution</b>	1366 x 768 (HD)
	<b>Format</b>	RGB
	<b>Backlight</b>	LED
	<b>Color Depth</b>	6 bits
	<b>Viewing Angle</b>	45/45/20/40

### Technical Specifications

#### STORAGE AND DRIVES

<b>500 GB 5400 rpm SATA Dard Drive</b>	<b>Drive Weight</b>	92g(0.20lb)
	<b>Rotation speed</b>	5400 rpm
	<b>Cache Buffer</b>	Up to 128MB
	<b>Height</b>	7.0 +/- 0.2 mm (0.28 +/- .008 in)
	<b>Width</b>	69.85 +/- 0.25 mm (2.750 +/- 0.010 in)
	<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 ~ 16 ms Maximum: 18 ~ 22 ms
	<b>Logical Blocks</b>	976,773,168
	<b>Operating Temperature</b>	0° to 60°C
	<b>Security Features</b>	ATA Security
	<b>Features</b>	S.M.A.R.T., NCQ, Ultra DMA

<b>500 GB 7200 rpm SATA Hard Drive</b>	<b>Drive Weight</b>	92g(0.20lb)
	<b>Rotation speed</b>	7200 rpm
	<b>Cache Buffer</b>	Up to 128MB
	<b>Height</b>	7.0 +/- 0.2 mm (0.28 +/- .008 in)
	<b>Width</b>	69.85 +/- 0.25 mm (2.750 +/- 0.010 in)
	<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>	0° to 60°C
	<b>Security Features</b>	ATA Security
	<b>Features</b>	S.M.A.R.T., NCQ, Ultra DMA

### Technical Specifications

<b>1 TB 5400 rpm SATA Hard Drive</b>	<b>Drive Weight</b>	90g(0.198lb)
	<b>Rotation speed</b>	5400 rpm
	<b>Cache Buffer</b>	Up to 128MB
	<b>Height</b>	<7.2mm
	<b>Width</b>	69.85 +/- 0.25 mm (2.750 +/- 0.010 in)
	<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 ~ 16 ms Maximum: 18 ~ 22 ms
	<b>Logical Blocks</b>	976,773,168
	<b>Operating Temperature</b>	0° to 60°C
	<b>Security Features</b>	ATA Security
	<b>Features</b>	S.M.A.R.T., NCQ, Ultra DMA
<b>128 GB 2280 M2 SATA-3 TLC Solid State Drive</b>	<b>Drive Weight</b>	0.02 lb (10 g)
	<b>NAND Type/Size</b>	TLC/128GB
	<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>Transfer Rate</b>	550MB/s
	<b>Logical Blocks</b>	250,069,680
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]
	<b>Security Features</b>	ATA Security
	<b>Features</b>	DIPM; TRIM; DEVSLP
<b>256 GB 2280 M2 SATA-3 TLC Solid State Drive</b>	<b>Drive Weight</b>	0.02 lb (10 g)
	<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>Transfer Rate</b>	550MB/s
	<b>Logical Blocks</b>	500,118,192
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]
	<b>Security Features</b>	ATA Security
	<b>Features</b>	DIPM; TRIM; DEVSLP

### Technical Specifications

## NETWORKING/COMMUNICATIONS

### WLAN

<b>Realtek RTL8822BE 802.11 ac 2x2 WLAN and Bluetooth® 4.2 Combo Adapter (MU-MIMO supported)</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>3</sup></b>	<ul style="list-style-type: none"> <li>• IEEE and Wi-Fi® 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>	• 802.11b: +14dBm minimum • 802.11g: +12dBm minimum • 802.11a: +12dBm minimum • 802.11n HT20(2.4GHz): +12dBm minimum • 802.11n HT40(2.4GHz): +12dBm minimum • 802.11n HT20(5GHz): +10dBm minimum • 802.11n HT40(5GHz): +10dBm minimum

### Technical Specifications

<b>Power Consumption</b>	<ul style="list-style-type: none"> <li>• 802.11ac VHT80(5GHz): +10dBm minimum</li> </ul> Transmit mode: 2.0 W Receive mode: 1.6 W Idle mode (PSP)180 mW (WLAN Associated) Idle mode: 50 mW (WLAN unassociated) Connected Standby/Modern Standby: 10mW Radio disabled: 8 mW
<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.
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</b>	Legacy: 0~79 (1 MHz/CH)

### Technical Specifications

	<b>Channels</b>	BLE: 0~39 (2 MHz/CH)
	<b>Signaling Data Rate</b>	Legacy: 3 Mbps Signaling data rate <sup>1</sup> BLE: 1 Mbps Signaling data rate <sup>1</sup> <a href="#">1. Actual throughput may vary.</a>
		Legacy: Synchronous Connection Oriented links up to 3, 64 kbps, voice channels
		Legacy: Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)
	<b>Transmit Power</b>	The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 4 dBm for BR and EDR.
<b>Realtek RTL8821CE 802.11 ac 1x1 WLAN and Bluetooth® 4.2 Combo Adapter (MU-MIMO supported)</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, and 80MHz)
	<b>Modulation</b>	Direct Sequence Spread Spectrum BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM
	<b>Security<sup>3</sup></b>	<ul style="list-style-type: none"> <li>• IEEE and Wi-Fi® 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> </ul>



### Technical Specifications

	<ul style="list-style-type: none"> <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: +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>	<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 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.  One embedded dual band 2.4/5 GHz antenna is provided to the card to support WLAN 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

### Technical Specifications

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

**Bluetooth® Specification** 4.0/4.1/4.2 Compliant

**Frequency Band** 2402 to 2480 MHz

**Number of Available Channels** Legacy: 0~79 (1 MHz/CH)  
BLE: 0~39 (2 MHz/CH)

**Signaling Data Rate** Legacy: 3 Mbps Signaling data rate<sup>1</sup>  
BLE: 1 Mbps Signaling data rate<sup>1</sup>

1. Actual throughput may vary.

Legacy: Synchronous Connection Oriented links up to 3, 64 kbps, voice channels

Legacy: Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)"

**Transmit Power** The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 4 dBm for BR and EDR.

**Realtek RTL8723DE  
802.11 bgn 1x1 WLAN and  
Bluetooth® 4.2 Combo  
Adapter**

#### Wireless LAN Standards

IEEE 802.11a  
IEEE 802.11b  
IEEE 802.11g  
IEEE 802.11n  
IEEE 802.11ac

#### Interoperability

Wi-Fi® certified

#### Frequency Band

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

#### Data Rates

•802.11b: 1, 2, 5.5, 11 Mbps  
•802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps  
•802.11n: MCS 0 ~ MCS 7, (20MHz, and 40MHz)

### Technical Specifications

<b>Modulation</b>	Direct Sequence Spread Spectrum BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM
<b>Security<sup>3</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: +14dBm minimum</li> <li>• 802.11g: +12dBm minimum</li> <li>• 802.11n HT20(2.4GHz): +12dBm minimum</li> <li>• 802.11n HT40(2.4GHz): +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/Modern 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<sup>3</sup></b>	802.11b, 1Mbps: -93.5dBm maximum 802.11b, 11Mbps: -84dBm maximum 802.11g, 6Mbps: -86dBm maximum 802.11g, 54Mbps: -72dBm maximum 802.11n, MCS07: -67dBm maximum
<b>Antenna type</b>	High efficiency antenna.
	One embedded dual band 2.4/5 GHz antenna is provided to the card to support WLAN 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)

### Technical Specifications

Non-operating 0 to 50,000 ft (15,240 m)

#### LED Activity

LED Amber – Radio OFF; LED White – Radio ON

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

**Bluetooth® Specification** 4.0/4.1/4.2 Compliant

**Frequency Band** 2402 to 2480 MHz

**Number of Available Channels** Legacy: 0~79 (1 MHz/CH)  
BLE: 0~39 (2 MHz/CH)

**Signaling Data Rate** Legacy: 3 Mbps Signaling data rate up to 2.17 Mbps<sup>1</sup>  
BLE: 1 Mbps Signaling data rate up to 0.2 Mbps<sup>1</sup>

1. Actual throughput may vary.

Legacy: Synchronous Connection Oriented links up to 3, 64 kbps, voice channels

Legacy: Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)"

#### Transmit Power

The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 4 dBm for BR and EDR.

#### Realtek Ethernet (10/100/1000)

#### Ethernet Features

10 Mbit/s operation (10BASE-T; IEEE 802.3i; IEEE 802.3 clauses 13-14)  
100 Mbit/s operation (100BASE-TX; IEEE 802.3u; IEEE 802.3 clauses 21-30)  
1000 Mbit/s operation (1000BASE-T; IEEE 802.3ab; IEEE 8023 clauses 40)  
Auto-Negotiation (Automatic Speed Selection)  
Full Duplex Operation at all Speeds, Half Duplex operation at 10 and 100 Mbit/s  
IEEE 802.1p QoS (Quality of Service) Support  
IEEE 802.1q VLAN support  
IEEE 802.3x Flow Control (IEEE 802.3 clauses 31-32; configurable)  
IEEE 802.3az EEE (Energy Efficient Ethernet)  
Jumbo Frame 9K  
Auto MDI/MDIX Crossover cable detection

#### Power Management

ACPI compliant - multiple power modes  
Situation-sensitive features reduce power consumption  
Advanced link down power saving for reducing link down power consumption

#### Performance Features

TCP/IP/UDP Checksum Offload (configurable)  
Protocol Offload (ARP & NS)

### Technical Specifications

	Large send offload and Giant send offload Receiving Side Scaling
<b>Manageability</b>	Wake-on-LAN from standby and hibernation (Magic Packet and Microsoft Wake-Up Frame); Wake-on-LAN from off (Magic Packet only) PXE 2.1 Remote Boot Statistics Gathering (SNMP MIB II, Ethernet-like MIB, Ethernet MIB (802.3x, clause 30) Comprehensive diagnostic and configuration software suite Virtual Cable Doctor for Ethernet cable status
<b>Interface</b>	PCI Express 1.1 to support ASPM L1
<b>NIC Device Driver Name</b>	Realtek PCIe GBE Ethernet Family Controller

### POWER

<b>HP 45 W AC adapter</b>	<b>Dimensions (H x W x D)</b>	95 x 40 x 26.5mm	
	<b>Weight</b>	200 g	
	<b>Input</b>	100 to 240 VAC	
		<b>Input Efficiency</b>	87.8 % at 115 VAC and 88.5 % at 230VAC
		<b>Input frequency range</b>	50~ 60 Hz
		<b>Input AC current</b>	Max. 1.4 A at 90 VAC
	<b>Output</b>	<b>Output power</b>	45W
		<b>DC output</b>	19.5V
		<b>Hold-up time</b>	5ms at 115 Vac input
		<b>Output current limit</b>	The power supply shall limit the maximum steady state output current to an average current of 8 Amperes.
	<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>	The power supply can be operated at 5,000 m above sea level
		<b>Humidity</b>	The power supply shall withstand without degradation with 95% relative humidity, non-condensing, both operating and non-operating.
<b>EMI and 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 65 W Smart AC adapter (EM)</b>	<b>Dimensions (H x W x D)</b>	102 x 55 x 30mm	
	<b>Weight</b>	270 g	

### Technical Specifications

<b>Input</b>	100 to 240 VAC	
	<b>Input Efficiency</b>	88.0 % at 115 VAC and 89.0 % at 230VAC
<b>Output</b>	<b>Input frequency range</b>	50~ 60 Hz
	<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>	The power supply shall limit the maximum steady state output current to an average current of 11 Amperes.
<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>	The power supply can be operated at 5,000 m above sea level
	<b>Humidity</b>	The power supply shall withstand without degradation with 95% relative humidity, non-condensing, both operating and non-operating.
<b>EMI and 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 3-cell Li-Ion Long Life -Fast Charge (41 WHr)</b>	<b>Dimensions</b>	6.0 x 186.85 x 90.2 mm (0.236 x 7.35 x 3.55 inch)
	<b>Weight</b>	0.18 kg (0.39 lb)
	<b>Cells/Type</b>	3cell Lithium-Ion Polymer cell / 515974
	<b>Voltage</b>	11.4V
	<b>Amp-hour capacity</b>	3.6Ah
	<b>Watt-hour capacity</b>	41Wh
	<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>Optional Travel Battery Available</b>	No

<b>HP 3-cell Li-Ion Long Life -Fast Charge (41 WHr)</b>	<b>Dimensions</b>	6.0 x 186.85 x 90.2 mm (0.236 x 7.35 x 3.55 inch)
	<b>Weight</b>	0.19 kg (0.41 lb)
	<b>Cells/Type</b>	3cell Lithium-Ion Prismatic cell / 496080
	<b>Voltage</b>	11.55V
	<b>Amp-hour capacity</b>	3.615Ah/3.63Ah
	<b>Watt-hour capacity</b>	41Wh
	<b>Operating (Charging)</b>	32° to 113° F (0° to 45° C)

Technical Specifications

<b>Operating (Discharging)</b>	14° to 122° F (-10° to 60° C)
<b>Optional Travel Battery Available</b>	No

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

Category	Description	Part Number
<b>Cases</b>	HP Essential Top Load Case	H2W17AA#xxx
	HP Essential Backpack (up to 15.6")	H1D24AA
	HP Essential Messenger Case (up to 17.3")	H1D25AA
<b>Docking</b>	HP 3005PR USB3 Port Replicator	Y4H06AA
	HP USB Travel Dock	T0K30AA
	HP Monitor Stand	M9X76AA
<b>Input / Output</b>	HP Slim USB Keyboard and Mouse	T6T83AA
	HP Slim Wireless Keyboard and Mouse	T6L04AA
	HP 3-Button USB Laser Mouse	H4B81AA
	HP USB Travel Mouse	G1K28AA
	HP Comfort Grip Wireless Mouse	H2L63AA
	HP Ultra Mobile Wireless Mouse	H6F25AA#xxx
	HP HDMI to DVI Adapter	F5A28AA
	HP Stereo USB Headset	T1A67AA
	HP Stereo 3.5mm Headset	T1A66AA
<b>Power</b>	HP 45W Smart AC Adapter 4.5mm	H6Y88AA#XXX
	HP 65W Smart AC Adapter	H6Y89AA#xxx
	HP 65W Slim AC Adapter	H6Y82AA#xxx
<b>Memory</b>	HP 4GB 2666Mhz DDR4	4VN05AA
	HP 8GB 2666Mhz DDR4	4VN06AA
<b>Storage</b>	HP External USB Optical Drive	F2B56AA
	HP External USB Optical Drive	F2B56AA
<b>Displays</b>	HP ProDisplay P240va 23.8-inch Monitor	N3H14AA
	HP ProDisplay P232 23-inch Monitor	K7X31AA
	HP EliteDisplay E223 21.5-inch Monitor	1FH45AA
	HP EliteDisplay E243 23.8-inch Monitor	1FH47AA



### Summary of Changes

Date of change:	Version History:		Description of change:
March 1, 2019	From v1 to v2	Removed	USB-C Travel Dock
March 4, 2019	From v2 to v3	Removed	Battery Life
March 25, 2019	From v3 to v4	Added	Battery Life

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