

### Overview

### HP 250 G7 Notebook PC



1. Webcam LED
2. Webcam
3. Internal microphone
4. Touchpad
5. Touchpad button
6. Audio combo jack

#### Left

7. USB 3.1 Gen 1 port
8. USB 3.1 Gen 1 port
9. HDMI port (Cable not included)
10. RJ-45/Ethernet port
11. AC Smart Pin adapter plug
12. Power button

### Overview



1. Security lock slot (Lock sold separately)
2. Optical drive (optional)
3. USB 2.0 port

#### Right

4. SD Card slot
5. Hard drive indicator LED
6. Power indicator LED

### Overview

## AT A GLANCE

- Preinstalled with Windows 10 versions or FreeDOS
- Choice of 10th or 8th Generation Intel® Core™ processors
- 15.6" (39.6 cm) diagonal FHD/HD Anti-Glare Display
- Choice of Integrated Intel® UHD Graphics 620, Intel® HD Graphics 620, Intel® UHD Graphics 605, Intel® UHD Graphics 600 or Switchable Discrete Graphics NVIDIA Geforce MX130, NVIDIA Geforce MX110
- Dark Ash Silver or Asteroid Silver color with texture pattern (Color options available in select countries)
- Up to 1 TB Hard Drive or 512 GB M.2 PCIe Value Solid State Drive
- Weight starting at 1.78 Kgs (3.91 lbs)
- Security features including FW TPM 2.0 and security lock slot (Lock not included)
- Keyboard - Full size textured island-style keyboard with numeric pad
- 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 802.11 ac to keep you connected
- Battery Life Up to 12 hours and 30 minutes

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

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## Features

**PRODUCT NAME**

HP 250 G7 Notebook PC

**OPERATING SYSTEM**

<b>Preinstalled</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

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**

Intel® Core™ i3-10110U Processor with Intel® UHD Graphics 620 (2.1 GHz base frequency, up to 4.1 GHz with Intel® Turbo Boost Technology, 4 MB L3 cache, 2 cores)<sup>3,4,5,6</sup>

Intel® Core™ i5-10210U Processor with Intel® UHD Graphics 620 (1.6 GHz base frequency, up to 4.2 GHz with Intel® Turbo Boost Technology, 6 MB L3 cache, 4 cores)<sup>3,4,5,6</sup>

Intel® Core™ i7-10510U Processor with Intel® UHD Graphics 620 (1.8 GHz base frequency, up to 4.9 GHz with Intel® Turbo Boost Technology, 8 MB L3 cache, 4 cores)<sup>3,4,5,6</sup>

Intel® Core™ i3- 8130U processor with Intel® HD Graphics 620 (2.2 GHz base frequency, up to 3.4 GHz with Intel® Turbo Boost Technology, 4 MB L3 cache, 4 cores)<sup>3,4,5,6</sup>

Intel® Core™ i3+ 8130U processor (Core™ i3 and 16 GB Intel® Optane™ memory) with Intel® HD Graphics 620 (2.2 GHz base frequency, up to 3.4 GHz with Intel® Turbo Boost Technology, 4 MB L3 cache, 4 cores)<sup>3,4,5,6,7</sup>

Intel® Pentium® Gold Processor 4417U with Intel® HD Graphics 610 (2.3 GHz base frequency, 2 MB cache, 2 cores)<sup>3,4,6</sup>

Intel® Pentium® Silver Processor N5030 with Intel® UHD Graphics 605 (1.1 GHz base frequency, up to 3.1 GHz burst frequency, 4 MB cache, 4 cores)<sup>3,4,6</sup>

Intel® Celeron® Processor N4020 with Intel® UHD Graphics 600 (1.1 GHz base frequency, up to 2.8 GHz burst frequency, 4 MB cache, 2 cores)<sup>3,4,6</sup>

Intel® Core™ i7-8565U processor with Intel® UHD Graphics 620 (1.8 GHz base frequency, up to 4.6 GHz with Intel® Turbo Boost Technology, 8 MB L3 cache, 4 cores)<sup>3,4,5,6,31</sup>

Intel® Core™ i5-8265U with Intel® UHD Graphics 620 Graphics (1.6 GHz base frequency, up to 3.9 GHz with Intel® Turbo Boost Technology, 6 MB L3 cache, 4 cores)<sup>3,4,5,6,31</sup>

Intel® Core™ i3-7020U with Intel® HD Graphics 620 (2.3 GHz, 3 MB cache, 2 cores)<sup>3,4,6,31</sup>

Intel® Pentium® Silver Processor N5000 with Intel® UHD Graphics 605 (1.1 GHz base frequency, up to 2.7 GHz burst frequency, 4 MB cache, 4 cores)<sup>3,4,6,31</sup>

Intel® Celeron® Processor N4000 with Intel® UHD Graphics 600 (1.1 GHz base frequency, up to 2.6 GHz burst frequency, 4 MB cache, 2 cores)<sup>3,4,6,31</sup>

Intel® Core™ i7+ 8565U processor (Core™ i7 and 16 GB Intel® Optane™ memory) with Intel® UHD Graphics 620 (4.1 GHz base frequency, up to 4.6 GHz with Intel® Turbo Boost Technology, 8 MB L3 cache, 4 cores)<sup>3,4,5,6,7,31</sup>

Intel® Core™ i5+ 8265U processor (Core™ i5 and 16 GB Intel® Optane™ memory) with Intel® UHD Graphics 620 (3.7 GHz base frequency, up to 3.9 GHz with Intel® Turbo Boost Technology, 6 MB L3 cache, 4 cores)<sup>3,4,5,6,7,31</sup>

Intel® Celeron® N3060 with Intel® HD Graphics 400 (1.6 GHz base frequency, up to 2.48 GHz burst frequency, 2 MB cache, 2 cores)<sup>3,4,6,31</sup>

### Features

Intel® Core™ i3-7100U with Intel® HD Graphics 620 (2.4 GHz, 3 MB cache, 2 cores)<sup>3,4,6,31</sup>

#### Processor Family

10th Generation Intel® Core™ i7 processor (i7-1065G7)<sup>6</sup>

10th Generation Intel® Core™ i5 processor (i5-1035G1)<sup>6</sup>

10th Generation Intel® Core™ i3 processor (i3-1005G1)<sup>6</sup>

8th Generation Intel® Core™ i3 processor (i3-8130U)<sup>6</sup>

Intel® Pentium® processor (N5030, 4417U)<sup>6</sup>

Intel® Celeron® processor (N4020)<sup>6</sup>

8th Generation Intel® Core™ i7 processor (i7-8565U)<sup>6,31</sup>

8th Generation Intel® Core™ i5 processor (i5-8265U)<sup>6,31</sup>

7th Generation Intel® Core™ i3 processor (i3-7020U)<sup>6,31</sup>

Intel® Pentium® processor (N5000 are Windows 10 only)<sup>6,31</sup>

Intel® Celeron® processor (N4000, N3060 are Windows 10 only)<sup>6,31</sup>

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

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

5. Intel® Turbo Boost performance varies depending on hardware, software and overall system configuration. See <http://www.intel.com/technology/turboboost> for more information.

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

7. Intel® Optane™ memory system acceleration does not replace or increase the DRAM in your system and requires configuration with an optional Intel® Core™ i(5 or 7)+ processor.

31. Not available after Sep 1, 2020.

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## CHIPSET

Chipset is integrated with processor

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## GRAPHICS

#### Integrated

Intel® Iris® Plus graphics<sup>8,9,33</sup>

Intel® UHD Graphics 620<sup>8,9</sup>

Intel® UHD Graphics 605<sup>8,9</sup>

Intel® UHD Graphics 600<sup>8,9</sup>

Intel® HD Graphics 620<sup>8,9</sup>

Intel® HD Graphics 610<sup>8,9,31</sup>

Intel® HD Graphics 400<sup>8,9,31</sup>

### Features

#### Discrete

NVIDIA® GeForce® MX130 (2 GB DDR5 dedicated)<sup>9</sup>

NVIDIA® GeForce® MX110 (2 GB DDR5 dedicated)<sup>9</sup>

#### Supports

Support HD decode, DX12, HDMI 1.4b

8. HD content required to view HD images.

9. Integrated graphics depends on processor. NVIDIA® Optimus™ technology requires an Intel processor, plus an NVIDIA® GeForce® discrete graphics configuration and is available on Windows 10 Pro OS. With NVIDIA® Optimus™ technology, full enablement of all discrete graphics video and display features may not be supported on all systems (e.g. OpenGL applications will run on the integrated GPU or the APU as the case may be).

31. Not available after Sep 1, 2020.

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

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## DISPLAY

#### Internal

##### Non-Touch

39.6 cm (15.6") diagonal HD SVA eDP anti-glare WLED-backlit slim, 220 cd/m<sup>2</sup>, 67% sRGB (1366 x 768)<sup>8, 10, 11</sup>

39.6 cm (15.6") diagonal FHD SVA eDP anti-glare WLED-backlit slim, 220 cd/m<sup>2</sup>, 67% sRGB (1920 x 1080)<sup>8, 10, 11</sup>

#### HDMI

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

8. HD content required to view HD images.

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

11. Sold separately or as an optional feature.

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## STORAGE AND DRIVES

#### Primary Storage

1 TB 5400 rpm SATA<sup>12</sup>

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

500 GB 5400 rpm SATA<sup>12</sup>

#### Primary M.2 Storage

128 GB SATA-3 TLC Solid State Drive<sup>12</sup>

256 GB SATA-3 TLC Solid State Drive<sup>12</sup>

256 GB PCIe Gen3x4 NVMe Value Solid State Drive<sup>12</sup>

512 GB PCIe Gen3x4 NVMe Value Solid State Drive<sup>12</sup>

16 GB Intel® Optane™ Memory Cache<sup>7</sup>

12. For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 30 GB (for Windows 7. Intel® Optane™ memory system acceleration does not replace or increase the DRAM in your system and requires configuration with an optional Intel® Core™ (i3, i5 or i7)+ processor.

### Features

## MEMORY

### Standard

#### Maximum Memory

16 GB DDR4-2666 SDRAM<sup>14</sup>

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

8 GB DDR4-2133 SDRAM<sup>14,31</sup>

### Memory

16 GB DDR4-2666 SDRAM (2 X 8 GB)<sup>14</sup>

8 GB DDR4-2666 SDRAM (2 x 4 GB)<sup>14</sup>

8 GB DDR4-2666 SDRAM (1 x 8 GB)

4 GB DDR4-2666 SDRAM (1 x 4 GB)

16 GB DDR4-2400 SDRAM (2 X 8 GB)<sup>14</sup>

12 GB DDR4-2400 SDRAM (1 X 8 GB + 1 X 4 GB)<sup>14,32</sup>

8 GB DDR4-2400 SDRAM (2 x 4 GB)<sup>14</sup>

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

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

8 GB DDR4-2133 SDRAM (1 x 8 GB)

8 GB DDR4-2133 SDRAM (2 x 4 GB)<sup>14,31</sup>

4 GB DDR4-2133 SDRAM (1 x 4 GB)

4 GB DDR3L-1600 SDRAM (1 x 4 GB)<sup>31</sup>

8 GB DDR3L-1600 SDRAM (1 x 8 GB)<sup>31</sup>

### Memory Slots

2 SODIMM (Intel® 10<sup>th</sup>, 8<sup>th</sup> & 7<sup>th</sup> Generation Intel® Core™ processor)

DDR4 PC4 SODIMMS, system runs at 2666 or 2400

DDR4 PC4 SODIMMS, system runs at 2133 (Intel 7th Gen- Kaby Lake)<sup>31</sup>

Supports Dual Channel Memory<sup>13</sup>

Both slots are customer non-accessible / non-upgradeable

### Memory Slots

1 SODIMM (Intel® N5030, N4020 processor)

Single Channel Memory

Memory slot are customer non-accessible / non-upgradeable

### Memory Slots

1 SODIMM (Intel® N5000, N4000 processor)<sup>31</sup>

Single Channel Memory

Memory slot are customer non-accessible / non-upgradeable

### Memory Slots

1 SODIMM (Intel® N3060 processor)<sup>31</sup>

Single Channel Memory

Memory slot are customer non-accessible / non-upgradeable

13. Dual channel memory support only for 10th, 8th and 7th Generation Intel® Core™ processors.

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

31. Not available after Sep 1, 2020.

32. Only available to Intel® Core™ i3- 8130U processor and Intel® Pentium® Gold Processor 4417U

### Features

## NETWORKING/COMMUNICATIONS

### Wireless LAN (WLAN)

Realtek 802.11ac (2x2) Wi-Fi® and Bluetooth® 5.0 Combo (MU-MIMO supported)<sup>15</sup>

Realtek 802.11ac (2x2) Wi-Fi® and Bluetooth® 4.2 Combo (MU-MIMO supported)<sup>15</sup>

Realtek 802.11ac (1x1) and Bluetooth® 4.2 Combo<sup>15</sup>

Realtek 802.11b/g/n (1x1) and Bluetooth® 4.2 Combo<sup>15,31</sup>

### Miracast

Compatible with Miracast-certified devices<sup>16</sup>

### Ethernet

Integrated 10/100/1000 GbE NIC

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

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

31. Not available after Sep 1, 2020.

## AUDIO/MULTIMEDIA

### Audio

2 Integrated stereo speakers

### Camera

HP TrueVision HD Camera<sup>8,11</sup>

### Webcam

VGA webcam<sup>11,17</sup>

### Optical Drive

Optional DVD-Writer<sup>18,19</sup>

8. HD content required to view HD images.

11. Sold separately or as an optional feature.

17. Internet access required.

18. Unit shipped with either "DVD+/-RW SuperMulti DL" or "DVD Writer Drive." Units undergoing repairs may be returned with a "DVD+/-RW SuperMulti DL."

19. HD-DVD disks cannot be played on this drive. No support for DVD-RAM. Actual speeds may vary. Don't copy copyright protected materials. Double Layer discs can store more data than single layer discs; discs burned with this drive may not be compatible with many existing single-layer DVD drives and players.

## KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS

### Keyboard

Keyboard - Full size textured island-style keyboard with numeric pad

### Pointing Device

Touchpad with multi-touch gesture support

### Function Keys

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



### Features

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

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## SOFTWARE AND SECURITY

### Preinstalled Software

HP JumpStarts  
HP Documentation  
HP Setup Integrated OOBE  
SSRM is provided via SSRU/SSRD format, also can be download from Cloud. But it's not default preinstalled in image.  
HP Audio Switch  
HP Support Assistant<sup>20</sup>  
McAfee LiveSafe™

### Security Management

TPM 2.0<sup>21</sup>  
Security lock slot (Lock sold separately)

[20. HP Support Assistant requires Windows and Internet access.](#)

[21. 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 \(PTT\). 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 \(PTT\).](#)

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## POWER

### Power Supply

HP Smart 65 W External AC power adapter<sup>22, 24</sup>  
HP Smart 65 W EM External AC power adapter<sup>22, 24</sup>  
HP Smart 45 W External AC power adapter<sup>22</sup>

### Primary Battery

HP Long Life 3-cell, 41 Wh Li-ion<sup>23,24</sup>  
Support battery fast charging - Approximately 90% in 90 minutes, Fast charge 50% in 45 mins

### Power Cord

1M (3.28 feet) length power cord<sup>22</sup>

### Battery Life

Up to 12 hours and 30 minutes<sup>25</sup>

### Features

#### Battery Weight

0.18 kg  
0.39 lb

22. Availability may vary by country.

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

24. 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.

25. 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.

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## WEIGHTS & DIMENSIONS

#### Product Weight

Starting at 3.91 lb<sup>26</sup>  
Starting at 1.78 kg<sup>26</sup>

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

14.8 x 9.68 x 0.89 in  
37.6 x 24.6 x 2.25 cm

26. Weight varies by configuration and components.

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## PORTS/SLOTS

#### Ports/Slots

2 USB 3.1 Gen 1  
1 USB 2.0  
1 HDMI v1.4b<sup>27</sup>  
1 RJ-45  
1 AC power  
1 Headphone/microphone combo jack

#### Expansion Slots

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

27. HDMI cable sold separately.

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## 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

### Features

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>28</sup>

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

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### Technical Specifications

#### SYSTEM UNIT

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

Nominal Operating Voltage	19.5 V
Average Operating Power	Win 10
Integrated graphics	6.39W
	Discrete < 65W
Max Operating Power	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>29</sup>
EPEAT® 2019	Yes, Silver in U.S. <sup>30</sup>
ICES	Yes
Australia /	Yes
NZ A-Tick Compliance	Yes
CCC	Yes
Japan VCCI Compliance	Yes
KC	Yes
BSMI	Yes
CE Marking Compliance	Yes
BNCI or BELUS	Yes
CIT	Yes
GOST	Yes
Saudi Arabian Compliance (ICCP)	Yes
SABS	Yes
UKRSERTCOMPUTER	Yes

### Technical Specifications

29. Configurations of the HP 250 G7 that are ENERGY STAR® certified are identified as HP 250 G7 ENERGY STAR on HP websites and on <http://www.energystar.gov>.

30. Based on US EPEAT® registration according to IEEE 1680.1-2018 EPEAT®. Status varies by country. Visit <http://www.epeat.net> for more information.

## DISPLAYS

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

<b>15.6" diagonal HD WLED AntiGlare (1366x768) slim-flat (3.2mm) SVA, eDP</b>	<b>Outline Dimensions</b>	360.0 x 224.3mm max	
	(W x H x D)		
	<b>Active Area</b>	344.2 x 193.5	
	<b>Weight</b>	420 max.	
	<b>Diagonal Size</b>	15.6 (inch)	
	<b>Thickness</b>	3.2mm max	
	<b>Interface</b>	eDP 1.2 (1 lane)	
	<b>Surface Treatment</b>	Anti-glare (AG)	
	<b>Touch Enabled</b>	NO	
	<b>Contrast Ratio</b>	300:1 (typ)	
	<b>Refresh Rate</b>	60Hz	
	<b>Brightness</b>	220 nit typ	
	<b>Pixel Resolution</b>	<b>Format</b>	1366 x 768 (HD)
		<b>Configuration</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 40/40/15/30		
<b>15.6" diagonal FHD WLED AntiGlare (1920x1080) slim-flat (3.2mm) SVA, eDP</b>	<b>Outline Dimensions</b>	360.0 x 224.3mm max	
	(W x H x D)		
	<b>Active Area</b>	344.16 x 193.59	
	<b>Weight</b>	370g max.	
	<b>Diagonal Size</b>	15.6 (inch)	
	<b>Thickness</b>	3.2mm max	
	<b>Interface</b>	eDP 1.2	
	<b>Surface Treatment</b>	Anti-glare (AG)	
	<b>Touch Enabled</b>	NO	
	<b>Contrast Ratio</b>	300:1 (typ)	
	<b>Refresh Rate</b>	60Hz	
	<b>Brightness</b>	220 nit typ	
	<b>Pixel Resolution</b>	<b>Format</b>	1920 x 1080 (FHD)

### Technical Specifications

	<b>Configuration</b>	RGB
<b>Backlight</b>	LED	
<b>Color Gamut Coverage</b>	45%	
<b>Color Depth</b>	6 bits + FRC	
<b>Viewing Angle</b>	SVA 45/45/25/35	

### STORAGE AND DRIVES

#### 500 GB 5400 rpm SATA Hard Drive

<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: 1.5 ms Average: 13 ms Maximum: 32 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

#### 500 GB 7200 rpm SATA Hard Drive

<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: 1.5 ms Average: 13 ms Maximum: 32 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>	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: 1.5 ms Average: 13 ms Maximum: 32ms
	<b>Logical Blocks</b>	1,953,525,168
	<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>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

<b>256 GB 2280 M2 PCIe NVMe 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>	0.01 lb (6 g) ~ 0.02 lb (10 g)
	<b>Interface</b>	PCIe NVMe Gen3x2
	<b>Maximum Sequential Read</b>	Up To 1500 MB/s
	<b>Maximum Sequential Write</b>	Up To 900 MB/s
	<b>Logical Blocks</b>	500,118,192
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]
<b>Features</b>	TRIM; L1.2	

<b>512 GB 2280 M2 PCIe NVMe Value 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>Interface</b>	PCIe NVMe Gen3x2
	<b>Maximum Sequential Read</b>	Up To 1600 MB/s
	<b>Maximum Sequential Write</b>	Up To 1000 MB/s
	<b>Logical Blocks</b>	1,000,236,384
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]
	<b>Features</b>	TRIM; L1.2

<b>16 GB Intel® Optane™ Solution PCIe Gen3x2 M.2 SSD</b>	<b>Form Factor</b>	M.2 2280
	<b>Capacity</b>	16 GB
	<b>NAND Type</b>	3D Xpoint
	<b>Height</b>	0.09 in (2.3 mm)
	<b>Width</b>	0.87 in (22 mm)
	<b>Interface</b>	PCIe NVMe Gen3x2



### Technical Specifications

<b>Maximum Sequential Read</b>	1350MB/s
<b>Maximum Sequential Write</b>	290MB/s
<b>Logical Blocks</b>	31,257,387
<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]

## NETWORKING/COMMUNICATIONS

### WLAN

**Realtek RTL8822BE 802.11 ac 2x2 Wi-Fi® + Bluetooth® 4.2 Combo Adapter (MU-MIMO supported)<sup>1</sup>**

<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>	<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>
<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 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

### Technical Specifications

<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>	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
<b>Power Management</b>	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
<b>Receiver Sensitivity<sup>4</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

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

### Technical Specifications

<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>Signaling Data Rate</b>	Legacy: 3 Mbps signaling data rate <sup>1</sup> up to 2.17 Mbps BLE: 1 Mbps data signaling data rate <sup>1</sup> 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.

1. Wireless access point and internet service required and sold separately. Availability of public wireless access points limited.
2. The FCC has declared as of September 1, 2014 products that utilize passive scanning on channel 12/13 and are capable of transmitting must fully comply with requirements of 15.247 or otherwise disable those channels.
3. Check latest software/driver release for updates on supported security features.
4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).

<b>Realtek RTL8821CE 802.11ac 1x1 Wi-Fi® + Bluetooth® 4.2 Combo (MU-MIMO supported)<sup>1</sup></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>	<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>
	<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 compliant 64 / 128 bit WEP encryption for a/b/g mode only</li> </ul>

### Technical Specifications

	<ul style="list-style-type: none"> <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>• 802.11a: +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 mode: 1.6 W (max) Idle mode (PSP): 180 mW (WLAN Associated) Idle mode: 50 mW (WLAN unassociated) Connect Standby: 10 mW 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>4</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)

### Technical Specifications

<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	
<b>HP Integrated Module with Bluetooth 4.0/4.1/4.2 Wireless Technology</b>		
<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>Signaling Data Rate</b>	Legacy: 3 Mbps data signaling data rate <sup>1</sup> up to 2.17 Mbps	
	BLE: 1 Mbps data signaling data rate <sup>1</sup> 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.	

1. Wireless access point and internet service required and sold separately. Availability of public wireless access points limited.
2. The FCC has declared as of September 1, 2014 products that utilize passive scanning on channel 12/13 and are capable of transmitting must fully comply with requirements of 15.247 or otherwise disable those channels.
3. Check latest software/driver release for updates on supported security features.
4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).

<b>Realtek RTL8822CE 802.11ac 2x2 Wi-Fi® and Bluetooth® 5.0<sup>1</sup></b>	<b>Wireless LAN Standards</b>	IEEE 802.11a
		IEEE 802.11b
		IEEE 802.11g
		IEEE 802.11n
		IEEE 802.11ac
		IEEE 802.11d
		IEEE 802.11e
		IEEE 802.11h
		IEEE 802.11i
		IEEE 802.11k
		IEEE 802.11r
		IEEE 802.11v
		<b>Interoperability</b>
<b>Frequency Band</b>	•802.11b/g/n	
	2.402 – 2.482 GHz	
	•802.11a/n/ac	
	4.9 – 4.95 GHz (Japan)	

### Technical Specifications

	5.15 – 5.25 GHz
	5.25 – 5.35 GHz
	5.47 – 5.725 GHz
	5.825 – 5.850 GHz
<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, 80MHz &amp; 160MHz)</li> </ul>
<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 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>•WAPI</li> </ul>
<b>Network Architecture Models</b>	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
<b>Roaming</b>	IEEE 802.11 compliant roaming between access points
<b>Output Power<sup>2</sup></b>	<ul style="list-style-type: none"> <li>• 802.11b: +18.5dBm minimum</li> <li>• 802.11g: +17.5dBm minimum</li> <li>• 802.11a: +18.5dBm minimum</li> <li>• 802.11n HT20(2.4GHz): +15.5dBm minimum</li> <li>• 802.11n HT40(2.4GHz): +14.5dBm minimum</li> <li>• 802.11n HT20(5GHz): +15.5dBm minimum</li> <li>• 802.11n HT40(5GHz): +14.5dBm minimum</li> <li>• 802.11ac VHT80(5GHz): +11.5dBm minimum</li> <li>• 802.11ac VHT160(5GHz): +11.5dBm minimum</li> </ul>
<b>Power Consumption</b>	<ul style="list-style-type: none"> <li>•Transmit mode 2.0 W</li> <li>•Receive mode 1.6 W</li> <li>•Idle mode (PSP) 180 mW (WLAN Associated)</li> <li>•Idle mode 50 mW (WLAN unassociated)</li> <li>•Connected Standby/Modern Standby: 10mW</li> <li>•Radio disabled 8 mW</li> </ul>
<b>Power Management</b>	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
<b>Receiver Sensitivity<sup>4</sup></b>	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

### Technical Specifications

<b>Antenna type</b>	802.11ac, MCS9: -59dBm maximum High efficiency antenna with spatial diversity, mounted in the display enclosure
<b>Form Factor</b>	Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications PCI-Express M.2 MiniCard with CNVi Interface
<b>Dimensions</b>	Type 2230: 2.3 x 22.0 x 30.0 mm Type 1216: 1.67 x 12.0 x 16.0 mm
<b>Weight</b>	Type 2230: 2.8 g Type 126: 1.3 g
<b>Operating Voltage</b>	3.3v +/- 9%
<b>Temperature</b>	Operating: 14° to 158° F (-10° to 70° C) Non-operating: -40° to 176° F (-40° to 80° C)
<b>Humidity</b>	Operating: 10% to 90% (non-condensing) Non-operating: 5% to 95% (non-condensing)
<b>Altitude</b>	Operating: 0 to 10,000 ft (3,048 m) Non-operating: 0 to 50,000 ft (15,240 m)
<b>LED Activity</b>	LED Amber – Radio OFF LED OFF – Radio ON
<b>HP Integrated Module with Bluetooth 4.0/4.1/4.2/5.0 Wireless Technology</b>	
<b>Bluetooth Specification</b>	4.0/4.1/4.2/5.0 Compliant
<b>Frequency Band</b>	2402 to 2480 MHz
<b>Number of Available Channels</b>	Legacy: 0~79 (1 MHz/CH) BLE: 0~39 (2 MHz/CH)
<b>Signaling Data Rate</b>	Legacy: 3 Mbps Signaling Data Rate 2.17 Mbps BLE: 1 Mbps Signaling Data Rate 0.2 Mbps <a href="#">1. Actual throughput may vary.</a>
<b>Transmit Power</b>	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) 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>	

### Technical Specifications

<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</b>	BT4.1-ESR 5/6/7 Compliance
<b>Supported</b>	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)

1. Wireless access point and internet service required and sold separately. Availability of public wireless access points limited.
2. The FCC has declared as of September 1, 2014 products that utilize passive scanning on channel 12/13 and are capable of transmitting must fully comply with requirements of 15.247 or otherwise disable those channels.
3. Check latest software/driver release for updates on supported security features.
4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).



### Technical Specifications

<b>Realtek RTL8822CE 802.11ac 2x2 Wi-Fi + BT5</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> <li>IEEE 802.11d</li> <li>IEEE 802.11e</li> <li>IEEE 802.11h</li> <li>IEEE 802.11i</li> <li>IEEE 802.11k</li> <li>IEEE 802.11r</li> <li>IEEE 802.11v</li> </ul>
	<b>Interoperability</b>	Wi-Fi® certified
	<b>Frequency Band</b>	<ul style="list-style-type: none"> <li>•802.11b/g/n 2.402 – 2.482 GHz</li> <li>•802.11a/n/ac 4.9 – 4.95 GHz (Japan) 5.15 – 5.25 GHz 5.25 – 5.35 GHz 5.47 – 5.725 GHz 5.825 – 5.850 GHz</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 &amp; 80MHz)</li> </ul>
	<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 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>•WAPI</li> </ul>
	<b>Network Architecture</b>	Ad-hoc (Peer to Peer)
	<b>Models</b>	Infrastructure (Access Point Required)
	<b>Roaming</b>	IEEE 802.11 compliant roaming between access points
	<b>Output Power<sup>2</sup></b>	<ul style="list-style-type: none"> <li>• 802.11b: +18.5dBm minimum</li> <li>• 802.11g: +17.5dBm minimum</li> <li>• 802.11a: +18.5dBm minimum</li> <li>• 802.11n HT20(2.4GHz): +15.5dBm minimum</li> <li>• 802.11n HT40(2.4GHz): +14.5dBm minimum</li> <li>• 802.11n HT20(5GHz): +15.5dBm minimum</li> <li>• 802.11n HT40(5GHz): +14.5dBm minimum</li> </ul>

### Technical Specifications

<b>Power Consumption</b>	<ul style="list-style-type: none"> <li>• 802.11 ac VHT80(5GHz): +11.5dBm minimum</li> <li>• 802.11 ac VHT160(5GHz): +11.5dBm minimum</li> <li>• Transmit mode 2.0 W</li> <li>• Receive mode 1.6 W</li> <li>• Idle mode (PSP) 180 mW (WLAN Associated)</li> <li>• Idle mode 50 mW (WLAN unassociated)</li> <li>• Connected Standby/Modern Standby: 10mW</li> <li>• Radio disabled 8 mW</li> </ul>
<b>Power Management</b>	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
<b>Receiver Sensitivity<sup>4</sup></b>	802.11b, 1Mbps: -93.5dBm maximum 802.11b, 11Mbps: -84dBm maximum 802.11 a/g, 6Mbps: -86dBm maximum 802.11 a/g, 54Mbps: -72dBm maximum 802.11n, MCS07: -67dBm maximum 802.11n, MCS15: -64dBm maximum 802.11 ac, MCS0: -84dBm maximum 802.11 ac, MCS9: -59dBm maximum
<b>Antenna type</b>	High efficiency antenna with spatial diversity, mounted in the display enclosure
<b>Form Factor</b>	Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications
<b>Dimensions</b>	PCI-Express M.2 MiniCard with CNVi Interface
<b>Weight</b>	Type 2230: 2.3 x 22.0 x 30.0 mm Type 1216: 1.67 x 12.0 x 16.0 mm
<b>Operating Voltage</b>	Type 2230: 2.8 g Type 126: 1.3 g
<b>Temperature</b>	3.3v +/- 9%
<b>Humidity</b>	Operating: 14° to 158° F (-10° to 70° C) Non-operating: -40° to 176° F (-40° to 80° C)
<b>Altitude</b>	Operating: 10% to 90% (non-condensing) Non-operating: 5% to 95% (non-condensing)
<b>LED Activity</b>	Operating: 0 to 10,000 ft (3,048 m) Non-operating: 0 to 50,000 ft (15,240 m)
<b>HP Integrated Module with Bluetooth 4.0/4.1/4.2/5.0 Wireless Technology</b>	
<b>Bluetooth Specification</b>	LED Amber – Radio OFF LED OFF – Radio ON
<b>Frequency Band</b>	4.0/4.1/4.2/5.0 Compliant
<b>Number of Available Channels</b>	2402 to 2480 MHz
	Legacy: 0~79 (1 MHz/CH) BLE: 0~39 (2 MHz/CH)

### Technical Specifications

<b>Signaling Data Rate</b>	<p>Legacy: 3 Mbps Signaling Data Rate 2.17 Mbps BLE: 1 Mbps Signaling Data Rate 0.2 Mbps <a href="#">1. Actual throughput may vary.</a></p> <p>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)</p>
<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>	<p>Peak (Tx) 330 mW Peak (Rx) 230 mW Selective Suspend 17 mW</p>
<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 Certifications</b>	<p>ETS 300 328, ETS 300 826 Low Voltage Directive IEC950 UL, CSA, and CE Mark</p>
<b>Bluetooth Profiles Supported</b>	<p>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 &amp; 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)</p>

[1. Wireless access point and internet service required and sold separately. Availability of public wireless access points limited.](#)

[2. The FCC has declared as of September 1, 2014 products that utilize passive scanning on channel 12/13 and are capable of transmitting must fully comply with requirements of 15.247 or otherwise disable those channels.](#)

### Technical Specifications

3. Check latest software/driver release for updates on supported security features.
4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).

#### 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)  
 Large send offload and Giant send offload  
 Receiving Side Scaling

##### Manageability

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

##### Interface

PCI Express 1.1 to support ASPM L1

##### NIC Device Driver Name

Realtek PCIe GBE Ethernet Family Controller

## POWER

#### HP 65 W Smart AC adapter

<b>Dimensions (H x W x D)</b>	108 x 47 x 37.4 mm
<b>Weight</b>	250 g
<b>Input</b>	<b>Input</b> 100 to 240 VAC
	<b>Input Efficiency</b> 88.0 % at 115 VAC and 89.0 % at 230VAC
	<b>Input frequency range</b> 50~ 60 Hz
	<b>Input AC current</b> Max. 1.7 A at 90 VAC

### Technical Specifications

<b>Output</b>	<b>Output power</b>	65 W
	<b>DC output</b>	19.5 V
	<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>	4.5 mm 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>	<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>	

### 45 W AC adapter

<b>Dimensions (H x W x D)</b>	95 x 40 x 26.5 mm	
<b>Weight</b>	200 g	
<b>Input</b>	<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>	45 W
	<b>DC output</b>	19.5 V
	<b>Hold-up time</b>	5 ms 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>	4.5 mm 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>	<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</p>	

### Technical Specifications

Class B, CISPR22 Class B, CCC, NOM-1 NYCE.  
 \* MTBF - over 200,000 hours at 25°C ambient condition.

#### HP 65W Smart AC adapter (EM)

<b>Dimensions (H x W x D)</b>	102 x 55 x 30 mm
<b>Weight</b>	270 g
<b>Input</b>	<b>Input</b> 100 to 240 VAC
	<b>Input Efficiency</b> 88.0 % at 115 VAC and 89.0 % at 230VAC
	<b>Input frequency range</b> 50~ 60 Hz
	<b>Input AC current</b> Max. 1.7 A at 90 VAC
<b>Output</b>	<b>Output power</b> 65 W
	<b>DC output</b> 19.5 V
	<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>	4.5 mm 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.

#### HP 3-cell Li-Ion Long Life - Fast Charge (41 WHr)

<b>Dimensions (H x W x L)</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/11.34V
<b>Amp-hour capacity</b>	3.6Ah/3.62Ah
<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>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)

### Technical Specifications

<b>HP 3-cell Li-Ion Long Life - Fast Charge (41 WHr)</b>	<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)
	<b>Operating (Discharging)</b>	14° to 122° F (-10° to 60° C)
<b>Optional Travel Battery Available</b>	No	

## Technical Specifications

**Country of Origin**

China



Category	Description	Part Number
<b>Docking</b>	HP Monitor Stand	M9X76AA
<b>Input / Output</b>	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>Storage</b>	HP External USB Optical Drive	F2B56AA
<b>Memory</b>	HP 4GB 2666Mhz DDR4	4VN05AA
	HP 8GB 2666Mhz DDR4	4VN06AA
<b>Displays</b>	HP EliteDisplay S14 14-inch USB-C Portable Monitor	3HX46AA

