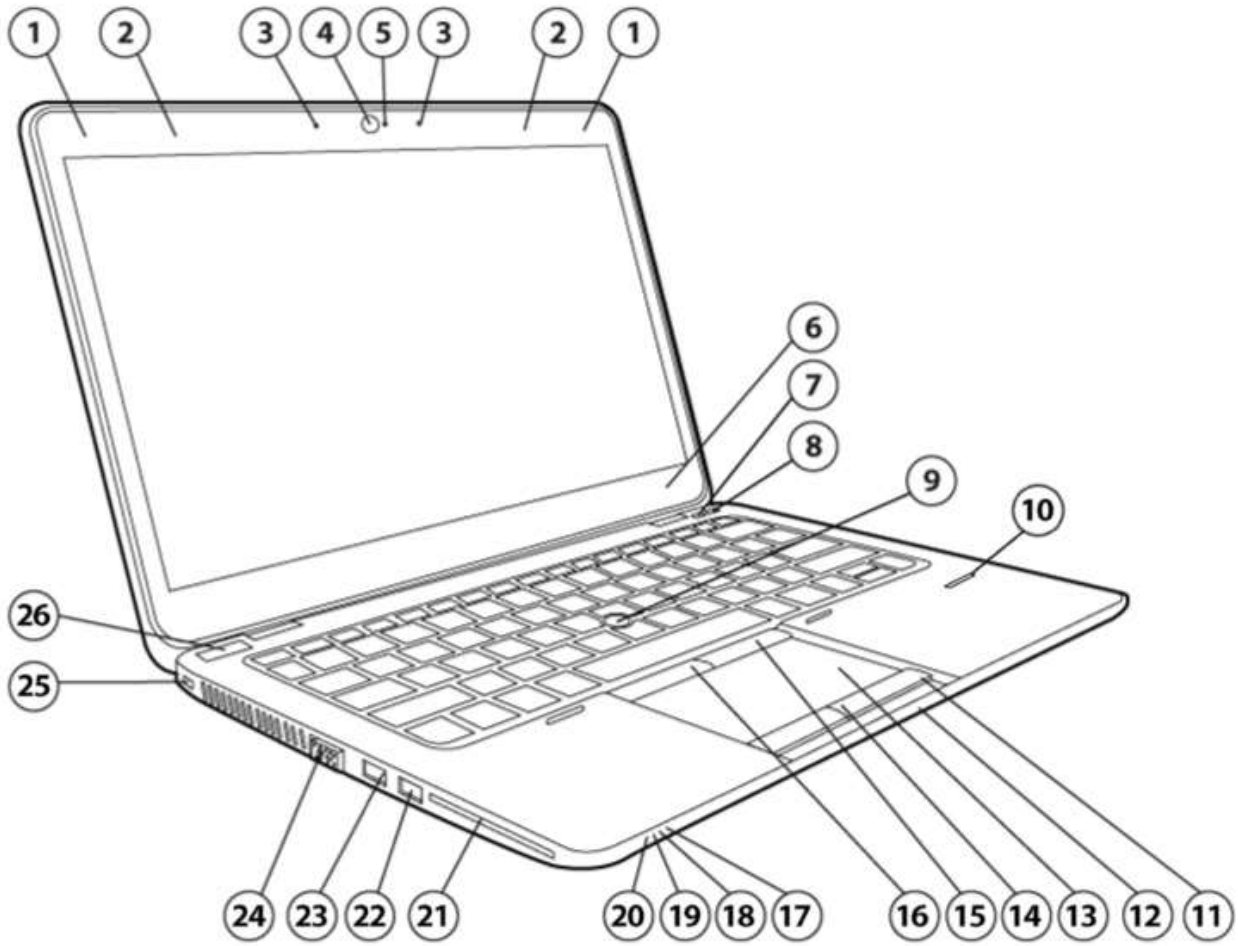
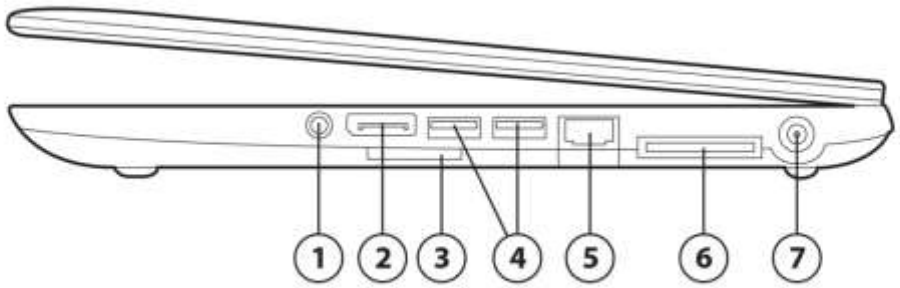
Overview

HP EliteBook 840 G2 Notebook PC



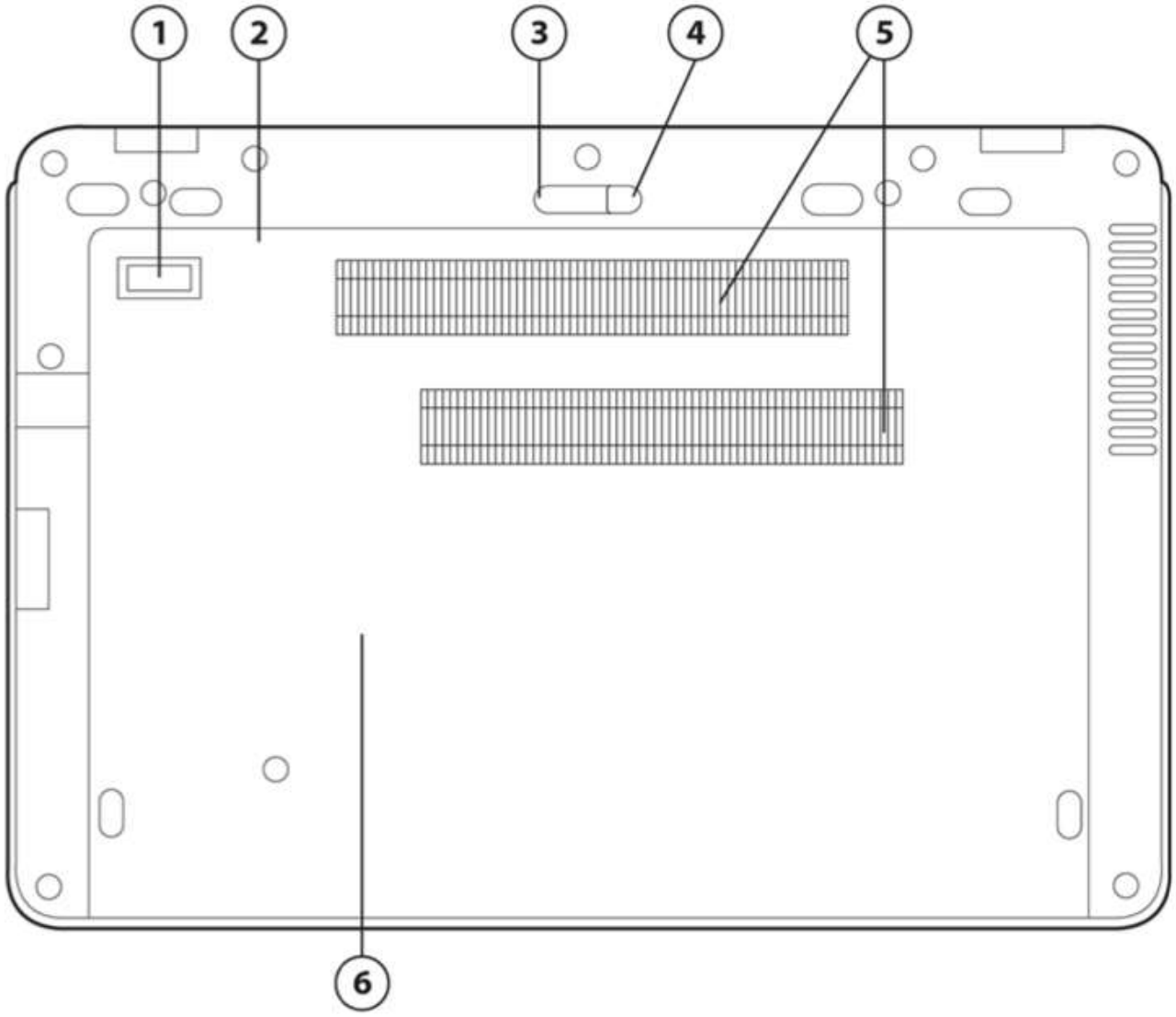
Front/Left

1. WLAN antennas (2)
2. WWAN antennas (2)
3. Internal microphones (2)
4. Webcam (select models only)
5. Webcam light (select models only)
6. Internal display switch
7. Wireless button
8. Volume mute button
9. Pointstick
10. Fingerprint reader (optional)
11. Right TouchPad button
12 NFC sensor (optional)
13. TouchPad zone
14. Left TouchPad button
15. Right pointing stick button
16. Left pointing stick button
17. Hard drive light
18. AC adapter/Battery light
19. Power light
20. Wireless light
21. Smart card reader
22. USB 3.0 port
23. USB 3.0 charging port
24. External VGA monitor port
25. Security cable slot
26. Power button



Right

1. Audio-out (headphone) jack/Audio-in(microphone) jack
2. DisplayPort
3. Memory card reader
4. USB 3.0 ports (2)
5. Drop-jaw Ethernet port (RJ-45)
6. Docking port
7. Power connector



1. Accessory battery connector
2. EasyAccess panel
3. EasyAccess panel release latch
4. Security screw
5. Vents (2)
6. SIM slot *

* Supports full-size 2FF (mini-SIM card)

AT A GLANCE

- Windows 8.1 , Windows 7 , Ubuntu Linux or FreeDOS 2.0
- Magnesium and aluminum chassis, HP DuraFinish, HP DisplaySafe frame, HP duraKeys, precision aluminum drop hinge, aluminum palm rest
- 4-step Soft-touch paint process
- Patent-pending Drop-jaw Ethernet port
- EasyAccess door to quickly access most components for easy serviceability
- Full-sized spill-resistant keyboard; optional back-lit keyboard keeps you productive in low-light settings
- Choice of 5th Generation Intel® Core™ i7, i5 and i3 processors
- Memory options up to 16 GB
- Weight starting at 3.40 lbs/1.55 kg
- Storage options up to 1 TB Hard Drives, 512 GB Solid State Drives, or 256GB PCIe Solid State Drive
- M.2 32GB Flash Cache for Intel Smart Response Technology installed in the factory
- M.2 120GB Solid State Drive & 256GB PCIe Solid State Drive can be configured as primary storage or combined with a SATA drive for dual storage performance
- Integrated Intel® HD Graphics 5500 or AMD Radeon™ R7 M260X discrete graphics with 1 GB dedicated GDDR5 video memory
- Choice of Touch or Non Touch 14" diagonal displays
- Easily hot dock with the 2013 UltraSlim Docking Station
- DisplayPort for high resolution support
- Touchpad with scroll zone, on/off button with LED indicator
- Enhanced security features including HP Sure Start self-healing BIOS, HP Client Security and optional HP Fingerprint Reader
- Optional HD webcam with dual-microphone array for video conferencing
- HD Audio with DTS Studio Sound™ optimized for high fidelity audio
- Wireless and speaker mute buttons
- Supports a broad range of wireless LAN and wireless WAN options, including 4G LTE, for connectivity on the go.
- UEFI BIOS Compliant with 2.3.1 UEFI Specification

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

PRODUCT NAME

HP ELITEBOOK 840 G2 NOTEBOOK PC

OPERATING SYSTEM

Preinstalled	Windows 8.1 Pro 64* Windows 8.1 64* Windows 7 Professional 64 (available through downgrade rights from Windows 8.1 Pro 64)** Windows 7 Professional 32 (available through downgrade rights from Windows 8.1 Pro 64)** Windows 7 Professional 32* Windows 7 Professional 64* Ubuntu Linux FreeDOS 2.0
Web-only Support	Windows 8.1 Enterprise 64* Windows 8 Chinese market 64* Windows 8 Emerging Markets 64* Windows 8 Multi-Language 64* Windows 8 Professional 64* Windows 7 Enterprise 32* Windows 7 Enterprise 64*

* Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows functionality. See http://www.microsoft.com for details.
** This system is preinstalled with Windows 7 Pro software and also comes with a license and media for Windows 8 Pro software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.

PROCESSOR

5th Generation Intel® Core™ i3-5010U 2.1 GHz 3-MB L3 Cache, 15W
5th Generation Intel® Core™ i5-5200U 2.2 GHz (max turbo frequency 2.7-GHz), 3 MB L3 cache, 15W
5th Generation Intel® Core™ i5-5300U 2.3 GHz (max turbo frequency 2.9-GHz), 3 MB L3 Cache, 15W
5th Generation Intel® Core™ i7-5500U 2.4 GHz (max turbo frequency 3.0-GHz), 4 MB L3 Cache, 15W
5th Generation Intel® Core™ i7-5600U 2.6 GHz (max turbo frequency 3.2-GHz), 4 MB L3 Cache, 15W

* 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. 64-bit computing on Intel® architecture requires a computer system with a processor, chipset, BIOS, operating system, device drivers, and applications enabled for Intel® 64 architecture. Processors will not operate (including 32-bit operation) without an Intel® 64 architecture-enabled BIOS. Performance will vary depending on your hardware and software configurations. Intel's numbering is not a measurement of higher performance.
** Not available with Intel iAMT (*Not available with vPro)
NOTE: Processor speed denotes maximum performance mode; processors will run at lower speeds in battery optimization mode.

INTEL TURBO BOOST TECHNOLOGY*

Intel Turbo Boost is a feature that speeds up the CPU for a short time. It is similar to overclocking the processor, except within a framework provided by Intel. This feature provides additional performance and allows the computer to perform certain tasks more quickly. It also draws additional power and generates additional heat. Therefore, if Turbo Boost is used while powered from battery, it causes additional stress on the battery.

Using Turbo Boost while powered from battery might impact battery cycle life. Cycle life describes how long the battery will last before it needs to be replaced. A cycle refers to one complete charge/discharge cycle of the battery. Because Turbo Boost causes extra stress on the battery, it often shortens the lifetime of the battery.

HP decided not to enable Turbo Boost when powered from battery. This decision was based on the desire to give customers the greatest battery cycle life possible. Turbo Boost is enabled when powered from AC adapter.

Based on customer requests, HP will provide an option to enable Turbo Boost while powered from battery. For the 2013 platform, it will be an F10 option. Turbo Boost will be available for devices powered from battery by the end of the year. The additional performance might cause a slight reduction in battery cycle life, but will not void the battery warranty.

*Implementing Turbo Boost in F10 option is only allowed for batteries over 40WHr. Intel® Turbo Boost technology requires a PC with a processor with Intel Turbo Boost capability. Intel Turbo Boost performance varies depending on hardware, software and overall system configuration. See www.intel.com/technology/turboboost for more information.

CHIPSET

Chipset integrated with processor

INTEL CORE I5 WITH VPRO/CORE I7 WITH VPRO TECHNOLOGY CAPABLE

Intel Core i5 with vPro and Core i7 with vPro technology is a selectable feature that is available on units configured with select processors, an Intel Centrino® Advanced-N or Ultimate-N WLAN module and a preinstalled Windows operating system. It provides advances in remote manageability, security, energy efficient performance, and wireless connectivity. Intel Active Management Technology 9.0 (iAMT) offers built-in manageability and proactive security for networked notebook PCs, even when they are powered off* or when the operating system is inoperable. It can help identify threats before they reach the network, isolate infected systems, and update PCs regardless of their power state.
*Requires a Windows operating system, network hardware and software, connection with a power source, and a direct (non-VPN) corporate network connection which is either cable or wireless LAN.

NOTE: Some functionality of this technology, such as Intel® Active management technology and Intel Virtualization technology, requires additional 3rd party software in order to run. Availability of future "virtual appliances" applications for Intel vPro technology is dependent on 3rd party software providers. Microsoft Windows required.

GRAPHICS

Integrated:
Intel® HD* Graphics 5500
Discrete
AMD Radeon™ R7 M260X, with 1 GB dedicated DDR5 video memory**
*HD content required to view HD images.
**AMD Dynamic Switchable Graphics technology requires an Intel processor, plus an AMD Radeon™ discrete graphics configuration and is not available on FreeDOS and Linux OS. With AMD Dynamic Switchable Graphics technology, full enablement of all discrete graphics video and display features may not be supported on all systems (e.g. OpenGL applications will run on the integrated GPU or the APU as the case may be).

DISPLAY

Internal
Non Touch
14.0" diagonal LED-backlit HD anti-glare SVA flat (1366x768)
14.0" diagonal LED-backlit HD anti-glare SVA flat (1366x768) with camera
14.0" diagonal LED-backlit HD+ anti-glare SVA flat (1600x900)
14.0" diagonal LED-backlit HD+ anti-glare SVA flat (1600x900) with camera
14.0" diagonal LED-backlit FHD anti-glare UWA slim (1920x1080)
14.0" diagonal LED-backlit FHD anti-glare UWA slim (1920x1080) with camera

Touch
14.0" diagonal LED-backlit FHD UWA slim (1920x1080) with camera

Touch panel has chemically-strengthened Corning® Gorilla® Glass 3 top cover

External
Up to 32-bit per pixel color depth

VGA
Port supports resolutions up to 1920 x 1200 external resolution@75 Hz

DisplayPort
Supports resolutions up to 3840 x 2160 @ 60Hz. Supports Multi-Stream Transport (MST) where three displays can be daisy chained with digital displays through DisplayPort Only. The full resolution of each display will be limited as you reach 3 displays due to the bandwidth limitations with a maximum resolution of:

- 2560x1600@60Hz for 2 displays
- 1920x1200@60Hz for 3 displays

Number of Displays supported
3 With Optional* 2013 UltraSlim Docking Station
*Sold separately.

STORAGE AND DRIVES

Primary Storage Bay -
Hard Drives*
320 GB 7200rpm SATA Hard Drive
500 GB 7200rpm SATA Hard Drive
500 GB 7200rpm Self-Encrypting Drive
500 GB 5400 rpm Self Encrypting Drive (FIPS-140-2)
1TB 7200rpm SATA Hard Drive

Solid State Drive*
120 GB M.2 Solid State Drive
128 GB SATA-3 Solid State Drive

180 GB SATA-3 Solid State Drive
180 GB SATA-3 Self-Encrypting Drive
240 GB SATA-3 Solid State Drive
256 GB SATA-3 Solid State Drive
256 GB SATA-3 Self-Encrypting Drive
256 GB M.2 PCIe Solid State Drive
512 GB SATA-3 Solid State Drive

HP 3D DriveGuard (Windows only)
HP 3D DriveGuard mitigates the risk of hard drive failures, safeguarding your data when you are on the go by sensing sudden movement and protecting the hard drive. The hard drive is mounted directly to the notebook frame, reducing the transmission of shock to the hard drive.

*For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 16 GB (for Windows 7) and 30 GB (for Windows 8) of system disk is reserved for the system recovery software.

FLASH CACHE

32 GB M.2 (NGFF)
Optional 32 GB M.2 flash cache module support for Intel Smart Response Technology.
Available only with standard non-SED hard drive and non-solid state drives.

MEMORY

Standard
DDR3L-1600 (Transfer rates up to 1600 MT/s)
Two SODIMM slots supporting dual-channel memory

4 GB Total System Memory (4 GB x 1)
8 GB Total System Memory (4 GB x 2) (Not available with Windows 7 Professional 32)
8 GB Total System Memory (8 GB x 1)) (Not available with Windows 7 Professional 32)
16 GB Total System Memory (8 GB x 2)) (Not available with Windows 7 Professional 32)

Maximum
Upgradeable to 16 GB with optional 8 GB SODIMMs in slots 1 and 2*
Dual-channel
Maximized dual-channel performance requires SODIMMs of the same size and speed in both memory slots.

* Maximum memory capacities assume Windows 64-bit operating systems or Linux. With Windows 32-bit operating systems, memory above 3 GB may not all be available due to system resource requirements.
NOTE: 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

Wireless
Support for a broad range of secure, integrated wireless LAN and wireless WAN options featuring support for the latest industry standards. Broadband Wireless (WWAN) requires a Windows operating system and is available in select countries as a standard, factory configurable feature only. Integrated Bluetooth is also available (factory configurable only) and can be combined with any of the supported wireless LAN and wireless WAN options.

Broadband Wireless (WWAN)*
HP lt4112 LTE/HSPA+ Qualcomm® Gobi™ 4G Module
HP lt4211 LTE/EV-DO/HSPA+ Qualcomm® Gobi™ 4G Module**
HP hs3110 HSPA+ Mobile Broadband Module
* WWAN is an optional feature sold separately or as an add on feature. WWAN 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 WWAN is an optional feature, not available on all products, in all regions and requires separately purchased service contract. Check with service provider for coverage and availability. Connection speeds will vary due to location, environment, network conditions, and other factors.

Wireless LAN (WLAN)*
Intel® Dual Band Wireless-AC 7265 802.11 ac (2X2) Wi-Fi + Bluetooth®
Intel® Dual Band Wireless-7265AN 802.11 a/b/g/n (2X2) Wi-Fi + Bluetooth®
Intel® Dual Band Wireless-AC 3160 802.11 ac (1x1) Wi-Fi + Bluetooth®

*Wireless access point and Internet service is required and is not included.
Availability of public wireless access points limited.

Communications
Intel® I218LM Gigabit* Network Connection (10/100/1000 NIC)
* The term "10/100/1000" or "Gigabit" Ethernet indicates compatibility with IEEE standard 802.3ab for Gigabit Ethernet, and does not connote actual operating speed of 1 Gb/s. For high-speed transmission, connection to a Gigabit Ethernet server and network infrastructure is required.

Optional Near Field Communication (NFC)

AUDIO/MULTIMEDIA

Audio
HD Audio with DTS Studio Sound™
2 Integrated stereo speakers
Integrated dual-microphone array; located in the display
Function keys for microphone mute, volume up, volume down
Stereo headphone/line out
Stereo microphone/line in

Webcam
Optional* 720p HD** webcam

- HD format (widescreen)

- Supports videoconferencing (non-HD) and still image capture
- High quality fixed focus lens
- Video capture at various resolutions up to 1280x720 resolution (720p) and up to 30fps
- M-JPEG compression supports higher frame rates for video capture and videoconferencing
- Improved low light sensitivity
- Improved dynamic range
- Skype-ready ***

* Sold separately.
** HD content required to view HD images.
***Internet access required.

KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS

Keyboard
The HP spill-resistant keyboard is designed using a thin layer of Mylar film under the keyboard and includes an all-metal keyboard deck for greater rigidity, as well as HP DuraKeys. The 101/102-key compatible keyboard features a full-pitch key layout with desktop keyboard features, such as editing keys, both left and right control and alt keys, and function keys. US and International key layouts are available. Backlit keyboard available as an option.
Pointing Devices
Touchpad with scroll zone, on/off button with LED indicator, two-way scroll, two pick buttons
Buttons and Function Keys
Separate discrete buttons provide easy access to WLAN on/off and speaker mute. Function keys provide control of features including: standby mode, display brightness, external display, microphone mute, volume down, and volume up.

SOFTWARE AND SECURITY

Preinstalled Software with Windows Operating System

BIOS
HP BIOSphere[1]
HP Sure Start
HP DriveLock | HP Automatic Drive Lock
HP BIOS Protection[2]
HP Disk Sanitizer[3]
HP SpareKey[4]
BIOS Update via Network
Master Boot Record Security
Power On Authentication
Pre-Boot Security
Secure Erase[5]
Hybrid Boot
Measured Boot
Secure Boot
Absolute Persistence Module[6]

1. Available only on business PCs with HP BIOS.
2. May require a manual recovery step if all copies of BIOS are compromised or deleted.
3. For the use cases outlined in the DOD 5220.22-M Supplement.Does not support solid state drives..

4. Requires initial user set up.
5. For the methods outlined in the National Institute of Standards and Technology Special Publication 800-88.
6. 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.

MultiMedia
CyberLink PowerDVD
CyberLink YouCam BE

Communication
HP Connection Manager with support for HP Mobile Connect (Windows 7 only)[2]
HP GPS and Location[1]
HP Mobile Connect (Windows 8 only)[2]
HP Wireless Hotspot[3] (Windows 8 only)
Intel WiDi Software[4]
HP Roaming Alert
Intel My WiFi and Wireless Drivers

HP Value Add Software
Getting Started with Windows 8
HP 3D DriveGuard (Windows required)
HP ePrint Driver (HP Exclusive)[5]
HP Hotkey Support
HP PageLift
HP Recovery Manager (Windows 7 only)
HP Support Assistant
HP Recovery Disc Creator (Windows 7 only)
UEFI System Diagnostics W8

3rd Party
Adobe® Flash Player (Commercial)
Foxit PhantomPDF Express for HP
Bing Search
Skype[6]
Buy Office

NOTE: HP Recovery Manager enables fast recovery of the factory preinstalled image if the system becomes corrupted or if important system files are accidentally deleted. Up to 16 GB (for Windows 7) and 36 GB (for Windows 8) of system disk is reserved for the system recovery software.

1. GPS access requires an unobstructed path to multiple satellites. Performance may be affected if/when used inside of buildings, bridges or heavily congested metropolitan areas. Requires separately purchased GPS navigation software available from multiple GPS applications.
2. HP Mobile Connect is only available on selective devices with wwan. For geographical availability refer to www.hp.com/go/mobileconnect

3. The wireless hotspot application requires an active internet connection that is shared with the connecting devices. Wireless hotspot data usage may incur additional charges. Check with your service provider for plan details.
4. Integrated Intel Wi-Di feature is available on select configurations only and requires separately purchased projector, tv or computer monitor with an integrated or external Wi-Di receiver. External Wi-Di receivers connect to the projector, tv or computer monitor via a standard HDMI cable, also sold separately.
5. 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/businessmobileprinting..
6. Skype is not offered in China.

Manageability
HP Driver Packs *
HP SoftPaq Download Manager (SDM)
HP System Software Manager (SSM)*
HP BIOS Config Utility (BCU) *
HP Client Catalog / HP CIK for Microsoft SCCM *
LANDESK Management *
* Not preinstalled
For more information on HP Client Management Solutions refer to: http://www.hp.com/go/clientmanagement.

Standard Security Features
HP Client Security Manager (Windows only)
HP Device Access Manager
HP Drive Encryption[1]
HP File Sanitizer[2]
Microsoft Security Essentials (Windows 7 only)[3]
TPM Embedded Security Chip /2.0
Security lock slot
Fingerprint Reader
Integrated Smart Card Reader
For more information on HP Client Security Software Suite, refer to http://www.hp.com/go/clientsecurity.

1. Requires Windows. Data is protected prior to Drive Encryption login. Turning the PC off or into hibernate logs out of Drive Encryption and prevents data access.
2. For the use cases outlined in the DOD 5220.22-M Supplement. Supports standard Hard Drives. Initial setup required.
3. Opt in and internet connection required for updates.

POWER

Power Supply
HP 45W Smart AC Adapter
45W 2-prong 7.4mm DC jack AC Adapter (Only for Japan)
HP 65W Smart AC Adapter
HP 65W Smart EM AC Adapter (China and India only)

Power cord is configurable; either 3.2 feet or 6 feet (1.0 or 1.8 meter)
Total length including external AC adapter is 9.2 feet or 12 feet (2.86 or 3.66 meter).

Primary Battery
3-cell HP Long Life Polymer 24 WHr
3-cell HP Long Life Polymer/Prismatic 50 WHr

Secondary Battery
6-cell HP Long Life Polymer 60 WHr

Battery Life*

Hardware details	Battery	With UMA Graphics	With Discrete Graphics
HDD	3-cell (50WHr)	Up to 12 hrs 15 mins	Up to 12 hrs 45 mins
SSD	3-cell (24Whr)	Up to 7 hrs 45 mins	Up to 7 hrs 15 mins
SSD	3-cell (50WHr)	Up to 16 hrs	Up to 15 hrs 15 mins
SSD	3-cell (50WHr) + Slice (60Whr)	Up to 35 hrs 30 mins	Up to 35 hrs 15 mins

*Windows 7 MM07 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 for additional details.

System Standby Time**

With UMA Graphics	With Discrete Graphics
Up to 180 hrs	Up to 171 hrs

**Standby life will vary depending on various factors including battery, Memory, CPU, EC and LAN chip. The maximum capacity of the battery will naturally decrease with time and usage.

Power Conservation
Supports enhanced Intel SpeedStep technology (allows Battery Optimized Mode, Maximum Performance Mode, or Automatic mode)
AMD PowerPlay technology (discrete models)
Hibernation
Standby

ACPI COMPLIANCE

WEIGHTS & DIMENSIONS

Weight
Non Touch
Starting at 3.40 lbs/1.55 kg
Weight will vary by configuration.
3-cell (24Whr) battery, HD panel, UMA, no FPR, one SODIMM, WLAN, lightest M.2 SSD primary storage module, no camera, no WWAN

Touch

Starting at 3.76 lbs/1.71 kg
Weight will vary by configuration.
3-cell (24Whr) battery, FHD Touch panel, UMA, no FPR, one SODIMM, WLAN, lightest M.2 SSD primary storage module, no camera, no WWAN

Dimensions (w x d x h)

Non Touch

13.35 x 9.33 x 0.83 in

33.9 x 23.7 x 2.10 cm (at front)

Touch

13.35 x 9.33 x 0.89 in

33.9 x 23.7 x 2.26 cm (at front)

PORTS/SLOTS

Ports
(1) DisplayPort 1.2
(1) USB 3.0 Charging Port
(3) USB 3.0 Port
(1) RJ-45 / Ethernet
(1) Side Docking connector
(1) Secondary battery connector
(1) Headphone/Microphone Combo
(1) AC Port
Expansion Slots
Media Card Reader
Supports SD, SDHC, SDXC

SERVICE AND SUPPORT

HP Services offers 3-year, 1-year and 90 day 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.

NOTE: Certain restrictions and exclusions apply. Consult the HP Customer Support Center for details.
http://h20000.www2.hp.com/bizsupport/TechSupport/ProductRoot.jsp

*HP Care Packs are sold separately. Service levels and response times for HP Care Services may vary depending on your geographic location. Service starts on date of hardware purchase. Restrictions and limitations apply. Consult the HP Customer Support Center for details. http://h20000.www2.hp.com/bizsupport/TechSupport/ProductRoot.jsp

SYSTEM UNIT

Stand-Alone Power Requirements (AC Power)	**Nominal Operating Voltage**	19.5 V	
	Average Operating Power	**Windows 7 (64-bit)**	**Windows8 (64-bit)**
	Integrated graphics	4.75 W	4.26 W
	Max Operating Power	Discrete < 90W UMA < 65W	
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%, 101.6° F (38.7° C) maximum wet bulb temperature	
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®	Select models*	
	EPEAT®	Registered Gold in United States**	
	ICES	Yes	
	Australia / 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	

For accessibility information on HP products, please visit: http://www.hp.com/accessibility.

DISPLAYS

Non-Touch

Outline Dimensions (W x H x D)	12.6 x 8.09 x 0.14 in (32.09 x 20.56 x 0.36 cm)

14" diagonal LED-backlit HD anti-glare SVA flat (1366 x 768)	**Active Area**	12.18 x 6.85 in (30.94 x 17.395 cm)	
	Weight	0.71 lb (320g) (max)	
	Diagonal Size	14.0 in (35.6cm)	
	Surface Treatment	Anti-glare	
	Contrast Ratio	300:1 (min)	
	Refresh Rate	60 Hz	
	Brightness	200 nit (typical)	
	Pixel Resolution	**Format**	1366 x 768 (HD)
		Configuration	RGB Stripe
	Interface	eDP 1.2 (1 lane)	
	LCD Mode	TN	
	PPI	125 ppi	
	Viewing Angle	SVA 40/40/15/30 (Left/Right/Down/Up)	

14" diagonal LED-backlit HD+ anti-glare SVA flat (1600 x 900)	**Outline Dimensions** (W x H x D)	12.6 x 8.09 x 0.14 in (32.09 x 20.56 x 0.36 cm)	
	Active Area	12.19 x 6.86 in (30.96 x 17.415 cm)	
	Weight	0.72 lb (325 g) (max)	
	Diagonal Size	14.0 in (35.6cm)	
	Surface Treatment	Anti-glare	
	Contrast Ratio	300:1 (min)	
	Refresh Rate	60 Hz	
	Brightness	250 nit (typical)	
	Pixel Resolution	**Format**	1600 x 900 (HD+)
		Configuration	RGB Stripe
	Interface	eDP 1.2 (1 lane)	
	LCD Mode	TN	
	PPI	131 ppi	
	Viewing Angle	SVA 40/40/15/30 (Left/Right/Down/Up)	

14" diagonal LED-backlit FHD anti-glare UWVA slim (1920 x 1080)	**Outline Dimensions** (W x H x D)	12.6 x 8.09 x 0.12 in (32.09 x 20.56 x 0.3 cm)
	Active Area	12.18 x 6.85 in (30.93 x 17.4 cm)
	Weight	0.75 lb (340 g) (max)
	Diagonal Size	14.0 in (35.6cm)
	Surface Treatment	Anti-glare
	Contrast Ratio	600:1 (min)
	Refresh Rate	60 Hz

	Brightness	300 nit (typical)	
	Pixel Resolution	**Format**	1920 x 1080 (FHD)
		Configuration	RGB Stripe
	Interface	eDP 1.3+PSR (2 lane)	
	LCD Mode	IPS/FFS/VA	
	PPI	157 ppi	
	Viewing Angle	UWVA 85/85/85/85 (Left/Right/Down/Up)	

Touch

14" diagonal LED-backlit FHD anti-glare UWVA slim (1920 x 1080)+touch	**Outline Dimensions** (W x H x D)	12.6 x 8.09 x 0.12 in (32.09 x 20.56 x 0.3 cm)	
	Active Area	12.18 x 6.85 in (30.93 x 17.4 cm)	
	Weight	0.75 lb (340 g) (max)	
	Diagonal Size	14.0 in (35.6cm)	
	Touch enabled	Yes	
	TSP Type	Capacitive	
	Touch point supported	Min 5-point & Max 10-point for Win8	
	Surface Treatment	Anti-glare	
	Contrast Ratio	600:1 (min)	
	Refresh Rate	60 Hz	
	Brightness	300 nit (typical)	
	Pixel Resolution	**Format**	1920 x 1080 (FHD)
		Configuration	RGB Stripe
	Interface	eDP 1.3+PSR (2 lane)	
	LCD Mode	IPS/FFS/VA	
	PPI	157 ppi	
	Viewing Angle	UWVA 85/85/85/85 (Left/Right/Down/Up)	

STORAGE AND DRIVES

320 GB* 7200 rpm SATA Hard Drive	**Drive Weight**	0.21 lbs (95 g)	
	Capacity	320 GB	
	Height	0.28 in (7 mm)	
	Width	2.75 in (69.85 mm)	
	Interface	ATA-8, SATA 3.0	
	Transfer Rate	**Synchronous** (maximum)	600 MB/s (Drive Capability)
		Single Track	1.5 ms-2ms
		Average	12 ms-13ms

	Seek Time (typical reads, including settling)	**Maximum**	18ms-22 ms
	Cache	Up to 32 MB	
	Rotational Speed	7200 rpm	
	Logical Blocks	625,142,448	
	Operating Temperature	32° to 140° F (0° to 60° C) [case temp]	
	Features	ATA Security; S.M.A.R.T. IV, NCQ, Ultra DMA	
500 GB* 7200 rpm SATA Hard Drive	**Drive Weight**	0.20lbs(92g- 0.21 lbs (95g)	
	Capacity	500 GB	
	Height	0.28 in (7 mm)	
	Width	2.75 in (69.85 mm)	
	Interface	ATA-8, SATA 3.0	
	Transfer Rate	**Synchronous** (maximum)	600 MB/s (Drive Capability)
	Seek Time (typical reads, including settling)	**Single Track**	1.5 ms-2ms
		Average	12 ms-13ms
		Maximum	18ms-22 ms
	Rotational Speed	7200 rpm	
	Logical Blocks	976,773,168	
	Operating Temperature	32° to 140° F (0° to 60° C) [case temp]	
	Features	ATA Security; S.M.A.R.T. IV, NCQ, Ultra DMA	
500 GB* 7200 rpm SMART SATA II Self Encrypting Drive	**Drive Weight**	0.21 lbs (95g)	
	Capacity	500 GB	
	Height	0.28 in (7 mm)	
	Width	2.75 in (69.85 mm)	
	Interface	ATA-8, SATA 3.0	
	Transfer Rate	**Synchronous** (maximum)	300 MB/s (Drive Capability)
	Seek Time (typical reads, including settling)	**Single Track**	2 ms
		Average	13 ms
		Maximum	18 ms
	Cache	32 MB	
	Rotational Speed	7200 rpm	
	Logical Blocks	976,773,168	
	Operating Temperature	32° to 140° F (0° to 60° C) [case temp]	
	Features	ATA Security; TCG OPAL v1.00	

500 GB* 5400 rpm SMART SATA II FIPS Self Encrypting Drive	**Drive Weight**	0.21 lbs (95g)	
	Capacity	500 GB	
	Height	0.28 in (7 mm)	
	Width	2.75 in (69.85 mm)	
	Interface	ATA-8, SATA 3.0	
	Transfer Rate	**Synchronous** (maximum)	600 MB/s (Drive Capability)
	Seek Time (typical reads, including settling)	**Single Track**	1.5 ms
		Average	12 ms
		Maximum	22 ms
	Cache	16 MB	
	Rotational Speed	5400 rpm	
	Logical Blocks	976,773,168	
	Operating Temperature	32° to 140° F (0° to 60° C) [case temp]	
	Features	ATA Security; TCG Opal 2.x, FIPS	

1 TB* 7200 rpm SATA Hard Drive	**Drive Weight**	0.25 lb (115 g)	
	Capacity	1 TB	
	Height	0.37 in (9.5 mm)	
	Width	2.75 in (69.85 mm)	
	Interface	ATA-8, SATA 3.0	
	Transfer Rate	**Synchronous** (maximum)	600 MB/s (Drive Capability)
	Seek Time (typical reads, including settling)	**Single Track**	2 ms
		Average	13 ms
		Maximum	15 ms
	Rotational Speed	7200 rpm	
	Logical Blocks	1,953,525,168	
	Operating Temperature	32° to 140° F (0° to 60° C) [case temp]	
	Features	ATA Security; S.M.A.R.T. IV, NCQ, Ultra DMA	

SATA 3 Gb/s 32 GB*, M.2 2242 Solid State Drive	**Drive Weight**	10 Grams	
	Capacity	32 GB	
	Height	0.09 in (3.7 mm)	
	Width	0.87 in (22 mm)	
	Interface	ATA-8, SATA 3.0	
	Performance	**Maximum Sequential Read**	**Maximum Sequential Write**
		Up to 380 MB/s	Up to 110 MB/s

	Logical Blocks	62,533,296	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	
	Features	ATA Security; DIPM; TRIM; DEVSLP	
SATA 3 Gb/s 120 GB*, M.2 2242 Solid State Drive	**Drive Weight**	10 Grams	
	Capacity	120 GB	
	Height	0.09 in (3.7 mm)	
	Width	0.87 in (22 mm)	
	Interface	ATA-8, SATA 3.0	
	Performance	**Maximum Sequential Read**	**Maximum Sequential Write**
		Up to 540 MB/s	Up to 480 MB/s
	Logical Blocks	234,441,648	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	
	Features	ATA Security; DIPM; TRIM; DEVSLP	
SATA 3 Gb/s 128 GB*, 2.5-inch MLC Solid State Drive	**Drive Weight**	78- Grams	
	Capacity	128 GB	
	Height	0.28 in (7 mm)	
	Width	2.75 in (69.85 mm)	
	Interface	ATA-8, SATA 3.0	
	Performance	**Maximum Sequential Read**	**Maximum Sequential Write**
		Up to 550 MB/s	Up to 350 MB/s
	Logical Blocks	250,069,680	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	
	Features	ATA Security; DIPM; TRIM; DEVSLP	
SATA 3 Gb/s 128 GB*, 2.5-inch TLC Solid State Drive	**Drive Weight**	78 Grams	
	Capacity	128 GB	
	Height	0.28 in (7 mm)	
	Width	2.75 in (69.85 mm)	
	Interface	ATA-8, SATA 3.0	
	Performance	**Maximum Sequential Read**	**Maximum Sequential Write**
		Up to 520 MB/s	Up to 140 MB/s
	Logical Blocks	250,069,680	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	
	Features	ATA Security; DIPM; TRIM; DEVSLP	
	Drive Weight	78 Grams	

	Capacity	180 GB	
	Height	0.28 in (7 mm)	
	Width	2.75 in (69.85 mm)	
	Interface	ATA-8, SATA 3.0	
SATA 3 Gb/s 180 GB*, 2.5-inch SATA Solid State Drive	**Performance**	**Maximum Sequential Read**	**Maximum Sequential Write**
		Up to 540 MB/s	Up to 490 MB/s
	Logical Blocks	351,651,888	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	
	Features	ATA Security; DIPM; TRIM; DEVSLP	
SATA 3 Gb/s 180 GB*, 2.5-inch SATA SED Solid State Drive	**Drive Weight**	Up to 78 Grams	
	Capacity	180 GB	
	Height	0.28 in (7 mm)	
	Width	2.75 in (69.85 mm)	
	Interface	ATA-8, SATA 3.0	
	Performance	**Maximum Sequential Read**	**Maximum Sequential Write**
		Up to 540 MB/s	Up to 490 MB/s
	Logical Blocks	351,651,888	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	
	Features	ATA Security; DIPM; TRIM; DEVSLP; TCG Opal 1x	
SATA 3 Gb/s 240 GB*, 2.5-inch Solid State Drive	**Drive Weight**	78 Grams	
	Capacity	240 GB	
	Height	0.28 in (7 mm)	
	Width	2.75 in (69.85 mm)	
	Interface	ATA-8, SATA 3.0	
	Performance	**Maximum Sequential Read**	**Maximum Sequential Write**
		Up to 540 MB/s	Up to 490 MB/s
	Logical Blocks	468,862,128	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	
	Features	ATA Security; DIPM; TRIM; DEVSLP	
SATA 3 Gb/s 256 GB*, 2.5-inch Solid State Drive	**Drive Weight**	78 Grams	
	Capacity	256 GB	
	Height	0.28 in (7 mm)	
	Width	2.75 in (69.85 mm)	
	Interface	ATA8, SATA 3.0	

	Performance	**Maximum Sequential Read**	**Maximum Sequential Write**
		Up to 520 MB/s	Up to 280 MB/s
	Logical Blocks	500,118,192	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	
	Features	ATA Security; TCG Opal 2.x; DIPM; TRIM; DEVSLP	
SATA 3 Gb/s 256 GB*, 2.5-inch Self Encrypting Solid State Drive	**Drive Weight**	78 Grams	
	Capacity	256 GB	
	Height	0.28 in (7 mm)	
	Width	2.75 in (69.85 mm)	
	Interface	ATA8, SATA 3.0	
	Performance	**Maximum Sequential Read**	**Maximum Sequential Write**
		Up to 550 MB/s	Up to 500 MB/s
	Logical Blocks	500,118,192	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	
	Features	ATA Security; TCG Opal 2.x; DIPM; TRIM; DEVSLP	
SATA 3 Gb/s 256 GB*, 2.5-inch M2 PCIe Solid State Drive	**Drive Weight**	10 Grams	
	Capacity	256 GB	
	Height	0.24 in (60 mm)	
	Width	0.87 in (22 mm)	
	Interface	ATA-8, PCIe 2.0	
	Performance	**Maximum Sequential Read**	**Maximum Sequential Write**
		Up to 730 MB/s	620 MB/s
	Logical Blocks	500,118,192	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	
	Features	ATA Security; DIPM; TRIM; DEVSLP	
SATA 3 Gb/s 512 GB*, 2.5-inch Solid State Drive	**Drive Weight**	78 Grams	
	Capacity	512 GB	
	Height	0.28 in (7 mm)	
	Width	2.75 in (69.85 mm)	
	Interface	ATA-8, SATA 3.0	
	Performance	**Maximum Sequential Read**	**Maximum Sequential Write**
		Up to 550 MB/s	Up to 550 MB/s
	Logical Blocks	1,000,215,216	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	

	Features	ATA Security; DIPM; TRIM; DEVSLP

NETWORKING/COMMUNICATIONS

Broadband Wireless (WWAN)

HP lt4112 LTE/HSPA+ Gobi 4G Module**	**Technology/Operating bands**	LTE FDD all bands with diversity: 2100 MHz (Band I), 1900 MHz (Band II), 1800 MHz (Band III), 850 MHz (Band V), 2600 MHz (Band VII), 900 MHz (Band VIII), 800 MHz (Band XX, DD800) WCDMA/HSDPA/HSUPA/HSPA+ all bands with diversity: 2100 MHz (Band I), 1900 MHz (Band II), 800 MHz (Band V), 900 MHz (Band VIII) GSM/GPRS/EDGE: 1900 MHz (Band II), 1800 MHz (Band III), 850 MHz (Band V), 900 MHz (Band VIII)
	Wireless protocol standards	3GPP Release 8 LTE Specification WCDMA R99, 3GPP Release 5, 6 and 7 UMTS Specification
	Wireless parametric standards	Complies with 3GPP specifications Release 8 for LTE
	Maximum data rates	LTE (Category 3): 100 Mbps (Download), 50Mbps (Upload) DC-HSPA+: 42 Mbps (Download), 5.76 Mbps (Upload) HSPA+: 21.6 Mbps (Download), 5.76 Mbps (Upload) EDGE: 236.8 kbps (Download), 236.8 kbps (Upload) GPRS: 85.6 kbps(Download), 85.6 kbps (Upload)
	GPS	Standalone
	GPS bands	1575.42 MHz (± 1.023 MHz), GLONASS 1596-1607MHz
	Maximum output power	LTE: +23 dBm (+/- 2 dBm) WCDMA: +23.5 dBm (+/- 1 dBm) GPRS Band II, III: +29.5 dBm (+/- 1 dBm) GPRS Band V, VIII: +32.5 dBm (+/- 1 dBm) EGPRS Band II, III: +26.5 dBM (+/-1.5 dBm) EGPRS Band V, VIII: +27.5 dBM (+/-1.5 dBm)
	Maximum power consumption	LTE: 1,200 mA (peak); <900 mA (average) WCDMA: 1,100 mA (peak); <800 mA (average) EGPRS: 2,800 mA (peak); <700 mA (average)
	Power consumption, sleep mode	3 mA
	Power management	USB selective suspend, Integrated notebook wireless button
	Antenna type	Dual high efficiency multi-band antennae with spatial diversity
	Form Factor	M.2, USB 2.0 interface
	Weight	6 g
	Dimensions (Length x Width x Thickness)	42 mm × 30 mm × 2.3 mm
	Voltage, Operating	3.135 V to 4.4 V (3.3 V +1.1V/-0.165V)
	Temperature, operating (from TIA/EIA/IS-98-D)	14° to 131° F (–10° to 55° C)

Temperature, non-operating, 96 hours (from MIL-STD 202 Method 108)	–40° to 185° F (–40° to 85° C)
Humidity, non-operating	95% relative humidity for 48 hours @ 185° F (85° C) (non-condensing)
LED activity	LED Off - Radio Off; Solid LED On - Radio On

* 4G LTE not available on all products, in all regions and only available on products featuring Intel processors. WWAN use 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.

HP lt4211 LTE/EV-DO/HSPA+ Gobi 4G Module

Technology/Operating bands	LTE: 1900 (Band 2), 1700/2100 (Band 4), 850 (Band 5), 700 (Band 13 upper SMH), 700 (Band 17 lower SMH), 1900 MHz (Band 25, extended PCS) MHz HSPA+: 2100 (Band 1), 1900 (Band 2), 1700/2100 (Band 4), 850 (Band 5), 900 (Band 8) MHz E-GPRS: 1900 (Band 2), 1800 (Band 3), 850 (Band 5), 900 (Band 8) MHz EV-DO: 800 (BC0), 1900 (BC1) MHz
Wireless protocol standards	3GPP Release 8 LTE Specification WCDMA R99, 3GPP Release 5, 6 and 7 UMTS Specification E-GPRS: Class B, Multi-slot class 33, coding schemes CS1 - CS4 and MSC1 - MSC9 EVDO Release 0 and Release A
GPS	Standalone, A-GPS
GPS bands	1575.42 MHz ± 1.023 MHz, GLONASS 1596-1607MHz
Maximum data rates	LTE: 100 Mbps (Download), 50 Mbps (Upload) DC-HSPA+: 42 Mbps (Download), 5.76 Mbps (Upload) HSPA+: 21.6 Mbps (Download), 5.76 Mbps (Upload) EDGE: 236.8 kbps (Download), 236.8 kbps (Upload) GPRS: 85.6 kbps(Download), 85.6 kbps (Upload) CDMA 1x: DL 153.6 kbps/UL 153.6 kbps EVDO Rev.A: DL 3.1 Mbps/UL 1.8 Mbps
Maximum output power	LTE: 23 dBm HSPA+: 23.5 dBm E-GPRS 1900/1800: 26.5 dBM E-GPRS 900/850: 27.5 dBM GPRS 1900/1800: 29.5 dBm GPRS 900/850: 32.5 dBm CDMA/EVDO: 24dBm
Maximum power consumption	LTE: 1,200 mA (peak); 900 mA (average) HSPA+: 1,100 mA (peak); 800 mA (average) E-GPRS: 2,800 mA (peak); 700 mA (average) EVDO: 1000mA (peak); 720mA (average)
Form Factor	M.2, 3042-S3 Key B
Weight	6 g

Dimensions (Length x Width x Thickness)	1.65 x 1.18 x 0.09 in (42 x 30 x 2.3 mm)

HP hs3110 HSPA+ Mobile Broadband Module

Technology/Operating bands	HSPA+: 2100 (Band 1), 1900 (Band 2), 850 (Band 5), 700 (Band 17) MHz E-GPRS: 1900 (Band 2), 1800 (Band 3), 850 (Band 5), 900 (Band 8) MHz
Wireless protocol standards	WCDMA R99, 3GPP Release 5, 6 and 7 UMTS Specification E-GPRS: Class B, Multi-slot class 33, coding schemes CS1 - CS4 and MSC1 - MSC9
GPS	Standalone, A-GPS
GPS bands	1575.42 MHz ± 1.023 MHz, GLONASS 1596-1607MHz
Maximum data rates	DC-HSPA+: 42 Mbps (Download), 5.76 Mbps (Upload) HSPA+: 21.6 Mbps (Download), 5.76 Mbps (Upload) EDGE: 236.8 kbps (Download), 236.8 kbps (Upload) GPRS: 85.6 kbps(Download), 85.6 kbps (Upload)
Maximum output power	HSPA+: 23.5 dBm E-GPRS 1900/1800: 26.5 dBM E-GPRS 900/850: 27.5 dBM GPRS 1900/1800: 29.5 dBm GPRS 900/850: 32.5 dBm
Maximum power consumption	HSPA+: 1,100 mA (peak); 800 mA (average) E-GPRS: 2,800 mA (peak); 700 mA (average)
Form Factor	M.2, 3042-S3 Key B
Weight	6g
Dimensions (Length x Width x Thickness)	1.65 x 1.18 x 0.09 in (42 x 30 x 2.3 mm)

Wireless LAN
Intel® 802.11 a/b/g/n ac (2X2) + Bluetooth®

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 Note:

The FCC has declared as of January 1, 2015 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.

802.11a

- 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

Note:
Indonesia only supports 5.725 - 5.825 GHz (CH149 - CH161)

Data Rates
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)

Modulation
Direct Sequence Spread Spectrum
BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM

Security1

- IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only
- AES-CCMP: 128 bit in hardware
- 802.1x authentication
- WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.
- WPA2 certification
- IEEE 802.11i
- Cisco Certified Extensions, all versions through CCX4 and CCX Lite
- WAPI

Network Architecture
Ad-hoc (Peer to Peer)
Models
Infrastructure (Access Point Required)
Roaming
IEEE 802.11 compliant roaming between access points
Output Power[2]
802.11b : +16dBm minimum
802.11g : +14dBm minimum
802.11a : +14dBm minimum
802.11n HT20(2.4GHz) : +13dBm minimum
802.11n HT40(2.4GHz) : +13dBm minimum
802.11n HT20(5GHz) : +12dBm minimum
802.11n HT40(5GHz) : +12dBm minimum
802.11ac 80MHz(5GHz) : +11dBm minimum

Power Consumption
Transmit: 2.0 W (max)
Receive: 1.6 W (max)
Idle mode (PSP): 180 mW (WLAN Associated)
Idle mode: 60 mW (WLAN unassociated)
Radio disabled: 30 mW

Power Management
ACPI and PCI Express compliant power management
802.11 compliant power saving mode

Receiver Sensitivity[3]	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 802.11ac, 1SS, MCS-0 : -86dBm maximum 802.11ac, 1SS, MCS-9 : -61dBm maximum 802.11ac, 2SS, MCS-0 : -83dBm maximum 802.11ac, 2SS, MCS-9 : -58dBm maximum	
Antenna type	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	
Form Factor	PCI-Express M.2 MiniCard	
Dimensions	Type 2230 : 2.3 x 22.0 x 30.0 mm Or Type 1630 : 2.3 x 16.0 x 30.0 mm	
Weight	Type 2230 : 2.8g Or Type 1630 : 2g	
Operating Voltage	3.3v +/- 9%	
Temperature	Operating	14° to 158° F (–10° to 70° C)
	Non-operating	–40° to 176° F (–40° to 80° C)
Humidity	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 95% (non-condensing)
Altitude	Operating	0 to 10,000 ft (3,048 m)
	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+EDR Wireless Technology

Bluetooth Specification	4.0+EDR Compliant
Frequency Band	2402 to 2480 MHz
Number of Available Channels	79 (1 MHz) available channels
Data Rates and Throughput	3 Mbps data rate; throughput up to 2.17 Mbps Synchronous Connection Oriented links up to 3, 64 kbps, voice channels Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric or 1306.9 kbps symmetric
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.

Receiver Sensitivity

Modulation	0.01% BER	0.001% BER
GFSK	-80 dBm	-70 dBm
π/4-DQPSK	-80 dBm	-70 dBm
8DPSK	-80 dBm	-70 dBm

Power Consumption	Peak (Tx) 330 mW Peak (Rx) 230 mW Selective Suspend 17 mW
Range	Up to 33 ft (10 m)
Electrical Interface	USB 2.0 compliant
Bluetooth Software Supported	Microsoft Windows Bluetooth Software
Link Topology	
Electrical Interface	Point to Point, Multipoint Pico Nets up to 7 slaves
Bluetooth Software Supported	Full support of Bluetooth Security Provisions
Security	
Power Management	Microsoft Windows ACPI, and USB Bus Support
Power Management	Self-configurable to optimize power conservation in all operating modes, including Standby, Hold, Park, and Sniff
Certifications	All necessary regulatory approvals for supported countries, including:
Security	FCC (47 CFR) Part 15C, Section 15.247 & 15.249
Certifications	
Bluetooth Profiles Supported	
Power Management	ETS 300 328, ETS 300 826
Certifications	Low Voltage Directive IEC950
	UL, CSA, and CE Mark
	Serial Port Profile (SPP)[1]
	Service Discovery Application Profile (SDAP)
	Dial-Up Networking (DUN)[1,2]
	Generic Object Exchange Profile (GOEP)[1,2]
	Object Push Profile (OPP)[1,2]
	File Transfer Profile (FTP)
Certifications	Synchronization Profile (SYNC)
Bluetooth Profiles Supported	Hard Copy Cable Replacement (HCRP)[1,2]
	Personal Area Networking Profile (PAN)[1,2]
	Human Interface Device Profile (HID)[1,2]
	FAX Profile (FAX)
	Basic Imaging Profile (BIP)[2]
	Headset Profile (HSP)
	Hands Free Profile (HFP)
	Advanced Audio Distribution Profile (A2DP)

Intel® 802.11 a/b/g/n (2X2) +Bluetooth®

Wireless LAN	IEEE 802.11a
Standards	IEEE 802.11b
	IEEE 802.11g
	IEEE 802.11n
Interoperability	Wi-Fi certified
Frequency Band	802.11b/g/n • 2.402 – 2.482 GHz Note: The FCC has declared as of January 1, 2015 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. 802.11a • 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 Note: Indonesia only supports 5.725 - 5.825 GHz (CH149 - CH161)
Antenna Structure	2 transmit; 2 receive (2x2)
Data Rates	802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11b: 1, 2, 5.5, 11 Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz)
Modulation	Direct Sequence Spread Spectrum CCK, BPSK, QPSK, 16-QAM, 64-QAM
Security[1]	• IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware • 802.1x authentication • WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. • WPA2 certification • IEEE 802.11i • Cisco Certified Extensions, all versions through CCX4 and CCX Lite • WAPI
Sub-channels	Multinational support with frequency bands and channels compliant to local regulations.
Network Architecture	Ad-hoc (Peer to Peer)
Models	Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between band Access Points
Output Power[2]	• 802.11b : +16dBm minimum • 802.11g : +14dBm minimum • 802.11a : +14dBm minimum • 802.11n HT20(2.4GHz) : +13dBm minimum • 802.11n HT40(2.4GHz) : +13dBm minimum • 802.11n HT20(5GHz) : +12dBm minimum • 802.11n HT40(5GHz) : +12dBm minimum
Power Consumption	Transmit: 2.0 W (max) Receive: 1.6 W (max) Idle mode (PSP): 180 mW (WLAN Associated) Idle mode: 60 mW (WLAN unassociated) Radio disabled: 30 mW

Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode	
Receiver Sensitivity[4]	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	
Antenna type	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 and Bluetooth communications	
Form Factor	PCI-Express M.2 MiniCard	
Dimensions	Type 2230 : 2.3 x 22.0 x 30.0 mm Or Type 1630 : 2.3 x 16.0 x 30.0 mm	
Weight	Type 2230 : 2.8g Or Type 1630 : 2g	
Operating Voltage	3.3v +/- 9%	
Temperature	Operating	14° to 158° F (-10° to 70° C)
	Non-operating	-40° to 176° F (-40° to 80° C)
Humidity	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 95% (non-condensing)
Altitude	Operating	0 to 10,000 ft (3,048 m)
	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. In Power Save Polling mode and on battery power.
4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CCK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).
5. WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows XP. WLAN may also be compatible with certain third-party software supplicants. WLAN supplier IHV extensions required for Cisco Compatible Extensions support for Microsoft Windows Vista.

HP Integrated Module with Bluetooth 4.0+EDR Wireless Technology

Bluetooth Specification	4.0+EDR Compliant
Frequency Band	2402 to 2480 MHz
Number of Available Channels	79 (1 MHz) available channels
Data Rates and Throughput	3 Mbps data rate; throughput up to 2.17 Mbps Synchronous Connection Oriented links up to 3, 64 kbps, voice channels Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric or 1306.9 kbps symmetric

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.

Receiver Sensitivity

Modulation	0.01% BER	0.001% BER
GFSK	-80 dBm	-70 dBm
π/4-DQPSK	-80 dBm	-70 dBm
8DPSK	-80 dBm	-70 dBm

Power Consumption Peak (Tx) 330 mW
Peak (Rx) 230 mW
Selective Suspend 17 mW

Range Up to 33 ft (10 m)

Electrical Interface USB 2.0 compliant

Bluetooth Software Supported Microsoft Windows Bluetooth Software

Link Topology Point to Point, Multipoint Pico Nets up to 7 slaves

Electrical Interface Full support of Bluetooth Security Provisions

Bluetooth Software Supported Microsoft Windows ACPI, and USB Bus Support

Security Self-configurable to optimize power conservation in all operating modes, including Standby, Hold, Park, and Sniff

Power Management All necessary regulatory approvals for supported countries, including:

Certifications FCC (47 CFR) Part 15C, Section 15.247 & 15.249

Bluetooth Profiles Supported ETS 300 328, ETS 300 826
Low Voltage Directive IEC950
UL, CSA, and CE Mark
Serial Port Profile (SPP)[1]
Service Discovery Application Profile (SDAP)
Dial-Up Networking (DUN)[1,2]
Generic Object Exchange Profile (GOEP)[1,2]
Object Push Profile (OPP)[1,2]
File Transfer Profile (FTP)
Synchronization Profile (SYNC)
Hard Copy Cable Replacement (HCRP)[1,2]
Personal Area Networking Profile (PAN)[1,2]
Human Interface Device Profile (HID)[1,2]
FAX Profile (FAX)
Basic Imaging Profile (BIP)[2]
Headset Profile (HSP)
Hands Free Profile (HFP)
Advanced Audio Distribution Profile (A2DP)

Certifications

Bluetooth Profiles Supported

Intel® 802.11 ac (2x2) WiFi + Bluetooth® 4.0 combo (Indonesia only)

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 Note: The FCC has declared as of January 1, 2015 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. 802.11a • 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 Note: Indonesia only supports 5.725 - 5.825 GHz (CH149 - CH161)
Data Rates	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)
Modulation	Direct Sequence Spread Spectrum BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM
Security1	• IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware • 802.1x authentication • WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. • WPA2 certification • IEEE 802.11i • Cisco Certified Extensions, all versions through CCX4 and CCX Lite • WAPI
Network Architecture	Ad-hoc (Peer to Peer)
Models	Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between access points
Output Power[2]	802.11b : +16dBm minimum 802.11g : +14dBm minimum 802.11a : +14dBm minimum 802.11n HT20(2.4GHz) : +13dBm minimum 802.11n HT40(2.4GHz) : +13dBm minimum 802.11n HT20(5GHz) : +12dBm minimum

	802.11n HT40(5GHz) : +12dBm minimum 802.11ac 80MHz(5GHz) : +11dBm minimum
Power Consumption	Transmit: 2.0 W (max) Receive: 1.6 W (max) Idle mode (PSP): 180 mW (WLAN Associated) Idle mode: 60 mW (WLAN unassociated) Radio disabled: 30 mW
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity[3]	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 802.11ac, 1SS, MCS-0 : -86dBm maximum 802.11ac, 1SS, MCS-9 : -61dBm maximum 802.11ac, 2SS, MCS-0 : -83dBm maximum 802.11ac, 2SS, MCS-9 : -58dBm maximum
Antenna type	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
Form Factor	PCI-Express M.2 MiniCard
Dimensions	Type 2230 : 2.3 x 22.0 x 30.0 mm Or Type 1630 : 2.3 x 16.0 x 30.0 mm
Weight	Type 2230 : 2.8g Or Type 1630 : 2g
Operating Voltage	3.3v +/- 9%
Temperature	Operating 14° to 158° F (–10° to 70° C) Non-operating –40° to 176° F (–40° to 80° C)
Humidity	Operating 10% to 90% (non-condensing) Non-operating 5% to 95% (non-condensing)
Altitude	Operating 0 to 10,000 ft (3,048 m) Non-operating 0 to 50,000 ft (15,240 m)
LED Activity	LED Amber – Radio OFF; LED White – Radio ON

4. Check latest software/driver release for updates on supported security features.
5. Maximum output power may vary by country according to local regulations.
6. 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+EDR Wireless Technology

Bluetooth Specification	4.0+EDR Compliant
Frequency Band	2402 to 2480 MHz
Number of Available Channels	79 (1 MHz) available channels
Data Rates and Throughput	3 Mbps data rate; throughput up to 2.17 Mbps Synchronous Connection Oriented links up to 3, 64 kbps, voice channels

	Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric or 1306.9 kbps symmetric
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.

Receiver Sensitivity

Modulation	0.01% BER	0.001% BER
GFSK	-80 dBm	-70 dBm
π/4-DQPSK	-80 dBm	-70 dBm
8DPSK	-80 dBm	-70 dBm

Power Consumption	Peak (Tx) 330 mW Peak (Rx) 230 mW Selective Suspend 17 mW
Range	Up to 33 ft (10 m)
Electrical Interface	USB 2.0 compliant
Bluetooth Software Supported	Microsoft Windows Bluetooth Software
Link Topology	
Electrical Interface	Point to Point, Multipoint Pico Nets up to 7 slaves
Bluetooth Software Supported	Full support of Bluetooth Security Provisions
Security	
Power Management	Microsoft Windows ACPI, and USB Bus Support
Power Management	Self-configurable to optimize power conservation in all operating modes, including Standby, Hold, Park, and Sniff
Certifications	All necessary regulatory approvals for supported countries, including:
Security	FCC (47 CFR) Part 15C, Section 15.247 & 15.249
Certifications	ETS 300 328, ETS 300 826
Bluetooth Profiles Supported	Low Voltage Directive IEC950
Power Management	UL, CSA, and CE Mark
Certifications	Serial Port Profile (SPP)[1]
	Service Discovery Application Profile (SDAP)
	Dial-Up Networking (DUN)[1,2]
	Generic Object Exchange Profile (GOEP)[1,2]
	Object Push Profile (OPP)[1,2]
	File Transfer Profile (FTP)
Certifications	Synchronization Profile (SYNC)
Bluetooth Profiles Supported	Hard Copy Cable Replacement (HCRP)[1,2]
	Personal Area Networking Profile (PAN)[1,2]
	Human Interface Device Profile (HID)[1,2]
	FAX Profile (FAX)
	Basic Imaging Profile (BIP)[2]
	Headset Profile (HSP)
	Hands Free Profile (HFP)
	Advanced Audio Distribution Profile (A2DP)

Intel® Dual Band Wireless-AC 3160 802.11 ac (1x1) Wi-Fi + Bluetooth®

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 Note: The FCC has declared as of January 1, 2015 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. 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 Note: Indonesia only supports 5.725 - 5.825 GHz (CH149 - CH161)
Data Rates	• 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 ~ MCS7, (1SS) (20MHz, 40MHz, and 80MHz)
Modulation	Direct Sequence Spread Spectrum BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM
Security[1]	• IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware • 802.1x authentication • WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. • WPA2 certification • IEEE 802.11i • Cisco Certified Extensions, all versions through CCX4 and CCX Lite • WAPI
Network Architecture	Ad-hoc (Peer to Peer)
Models	Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between access points
Output Power[2]	• 802.11b : +16dBm minimum • 802.11g : +14dBm minimum • 802.11a : +14dBm minimum • 802.11n HT20(2.4GHz) : +13dBm minimum • 802.11n HT40(2.4GHz) : +13dBm minimum • 802.11n HT20(5GHz) : +12dBm minimum • 802.11n HT40(5GHz) : +12dBm minimum

	• 802.11ac 80MHz(5GHz) : +11dBm minimum	
Power Consumption	Transmit: 2.0 W (max) Receive: 1.6 W (max) Idle mode (PSP): 180 mW (WLAN Associated) Idle mode: 60 mW (WLAN unassociated) Radio disabled: 30 mW	
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode	
Receiver Sensitivity[3]	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 802.11ac, 1SS, MCS-0 : -86dBm maximum 802.11ac, 1SS, MCS-9 : -61dBm maximum 802.11ac, 2SS, MCS-0 : -83dBm maximum 802.11ac, 2SS, MCS-9 : -58dBm maximum	
Antenna type	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	
Form Factor	PCI-Express M.2 MiniCard	
Dimensions	Type 2230 : 2.3 x 22.0 x 30.0 mm Or Type 1630 : 2.3 x 16.0 x 30.0 mm	
Weight	Type 2230 : 2.8g Or Type 1630 : 2g	
Operating Voltage	3.3v +/- 9%	
Temperature	Operating	14° to 158° F (–10° to 70° C)
	Non-operating	–40° to 176° F (–40° to 80° C)
Humidity	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 95% (non-condensing)
Altitude	Operating	0 to 10,000 ft (3,048 m)
	Non-operating	0 to 50,000 ft (15,240 m)
LED Activity	LED Amber – Radio OFF; LED White – Radio ON	

7. Check latest software/driver release for updates on supported security features.
8. Maximum output power may vary by country according to local regulations.
9. 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).

AUDIO/MULTIMEDIA - DTS SOUND+

Hardware	**Implementation**	Realtek ALC3228 HD
	Function Key Volume Controls	Volume up, volume down, and mute
	Full Duplex	Yes

	Microphone In	Stereo
	Headphone/Line Out	Stereo
	Integrated Microphone	Yes, dual digital microphone array
Audio Output Quality	**Frequency Response**	20 Hz – 20 kHz
	Signal to Noise Ratio	>85 dB
	Total Harmonic Distortion	0.01%
	Noise Floor	–110 dB
	Play/Record Sampling Rate(s)	8 kHz – 48kHz
	DAC	16, 20 or 24-bit
	ADC	16 or 20-bit
Integrated Stereo Speakers	**Power Rating**	2 Watts
	Impedance	4 Ohms

SECURITY

HP Fingerprint Reader (optional)	**Mobile Voltage Operation**	3.0V-3.6V
	Operating Temperature	14° – 167°F (-10° – 75°C)
	Current Consumption Image	36 mA peak
	Low Latency Wait for Finger	950 uA
	Capture Rate	6000 lines/sec
	ESD Resistance	IEC 61000-4-2 4B (±15KV)
	Detection Matrix	200*1 (plus another secondary line) 508 dpi 12*3 mm sensor area

Smart Card Reader	**Smart card standard**	PC/SC 2.0 for Windows smart card standard	
	Dimensions (L x W x H)	0.41x 0.08 x 0.32 in (10.5 x 2 x 8.2 mm)	
	Smart Card support	ISO 7816 Class A and AB smart cards	
	Smart Card Interface	Smart Card Interface with T = 0 and T = 1 support Support I2C memory card, SLE4418, SLE4428, SLE4432, SLE4442, SLE4436, SLE5536, SLE6636, AT88SC1608, AT45D041 card and AT45DB041 card via external EEPROM	
	Operating systems	No driver is required for this device. Native support is provided by the operating system.	
	Power	**Normal Mode**	With card present, before being suspended: 40.9 mA Without card present, before being suspended: 33.16 mA After being suspended with smart card present: 380 µA

		After being suspended without smart card present: 380 µA
	Power Saving Mode	With card present, before being suspended: 40.6 mA Without card present: 380 µA After being suspended with smart card present: 380 µA

Features

- Support single slot
- Support T0, T1 protocol
- Support I2C memory card, SLE4418, SLE4428, SLE4432, SLE4442, SLE4436,
- SLE5536, SLE6636, AT88SC1608, AT45D041 card and AT45DB041 card via external EEPROM
- Support ISO7816 Class A, B and C (5V/3V/1.8V) card
- Implemented as an USB full speed device with bulk transfer endpoint, Mass
- Storage endpoint
- Built-in PLL for USB and Smart Card clocks requirement
- Support EEPROM for USB descriptors customization (PID/VID/ iManufacturer/iProduct/Serial Number), Direct Web Page Link, and accessing memory card module.
- EEPROM programmable via USB interface
- Support software update for memory card module
- Support Direct Web Page Link via configuration in external EEPROM
- Support short APDU and extended APDU
- Compatible with Microsoft USB-CCID driver
- Support remote wake up through inserting card/removing card
- Support USB selective suspend
- Support Power Saving Mode (Using one pin to select between Normal/PWR Saving Mode)
- Support card power over current protection mechanism
- Built in resonator.
- Support USB LPM (Link Power Management) features.
- Embedded clock source.

POWER

HP 45W Smart AC Adapter Non-Slim & Non-Slim 2 Prong	**Dimensions**	95.0 x 40.0 x 26.5mm	
	Input	90 to 265 VAC	
		Input Efficiency	**87% min at 115 VAC//** 89% min at 230VAC
		Input frequency range	47 to 63 Hz
		Input AC current	1.4 A at 90 VAC and maximum load
	Output	**Output power**	45W
		DC output	19.5V
		Hold-up time	5 msec at 115 VAC input

		Output current limit	<8A, Over voltage protection- 29V max automatic shutdown
	Connector	3 pin/grounded, mates with interchangeable cords	
	Environmental Design	**Operating temperature**	32° to 95° F (0° to 35° C)
		Non-operating (storage) temperature	-4° to 121° F (-20° to 85° C)
		Altitude	0 to 16,405 ft (0 to 5,000 m)
		Humidity	0% to 95%
		Storage Humidity	0% to 95%
	EMI and Safety Certifications	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; Reliability - failure rate of less than 0.1% annually within the first three years of operation.	
HP 65W Smart AC Adapter	**Dimensions**	4.17 x 1.85 x 1.1 in (10.6 x 4.7 x 2.8 cm)	
	Weight	0.62 lb (280 g)	
	Input	100 to 240 VAC	
		Input Efficiency	**87% min at 115 VAC/230VAC**
		Input frequency range	47 to 63 Hz
		Input AC current	1.7 A at 90 VAC, 0.85 A at 180 VAC
	Output	Output power	65W
		DC output	18.5V
		Hold-up time	5 msec at 115 VAC input
		Output current limit	<11A, Over voltage protection- 29V max automatic shutdown
HP 65W EM Smart AC Adapter	**Dimensions**	4.98 x 1.97 x 1.18 in (12.65 x 5.0 x 3.0 cm)	
	Weight	0.62 lb (300 g) max	
	Input	90 to 265 VAC	
		Input Efficiency	87% min at 115 VAC/230VAC
		Input frequency range	47 to 63 Hz
		Input AC current	1.7 A at 90 VAC
	Output	**Output power**	65W
		DC output	19.5V
		Hold-up time	5 msec at 115 VAC input
		Output current limit	<11A, Over voltage protection- 29V max automatic shutdown
	Connector	3 pin/grounded, mates with 4.5mm barrel type Smart ID DC connector	
	Environmental Design	**Operating temperature**	32° to 95° F (0° to 35° C)

		Non-operating (storage) temperature	-4° to 185° F (-20° to 85° C)
		Altitude	0 to 16,405 ft (0 to 5,000 m)
		Humidity	20% to 95%
		Storage Humidity	10% to 95%
	EMI and Safety Certifications	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.	
3-cell HP Long Life (24WHr) Lithium-Ion Polymer	**Dimensions** (H x W x L)	7.8 x 4.01 x 0.3 in(19.89x10.28x0.84 cm)	
	Weight	180g	
	Cells/Type	3-cell Lithium-Ion Polymer	
	Energy	Voltage	11.1
		Amp-hour capacity	2.2Ah
		Watt-hour capacity	24Wh
	Temperature	Operating (Charging)	32° to 113° F (0° to 45° C)
		Operating (Discharging)	14° to 140° F(-10° to 50° C)
		Non-operating	-4° to 140° F (-20° to 50° C)
	Battery Re-Charge Time	**System in OFF or Standby Mode**	3 hours
	Fuel Gauge LED	No	
	Warranty	1 year or 3 years* *Battery warranty depends on the platform warranty.	
	Optional Travel Battery Available	No	
3-cell HP Long Life (50WHr) Lithium-Ion Polymer	**Dimensions** (H x W x L)	7.8 x 4.01 x 0.3 in(19.89x10.28x0.84 cm)	
	Weight	280 g	
	Cells/Type	3-cell Lithium-Ion Polymer	
	Energy	Voltage	11.1
		Amp-hour capacity	4.504Ah
		Watt-hour capacity	50Wh
	Temperature	Operating (Charging)	32° to 113° F (0° to 45° C)
		Operating (Discharging)	14° to 140° F(-10° to 60° C)
		Non-operating	-4° to 140° F (-20° to 60° C)
	Battery Re-Charge Time	**System in OFF or Standby Mode**	3 hours
	Fuel Gauge LED	No	

	Warranty	1 year or 3 years* *Battery warranty depends on the platform warranty.	
	Optional Travel Battery Available	No	
6-cell HP Long Life (60WHr) Lithium-Ion Polymer	**Dimensions** (H x W x L)	12.59 x 8.6 x0.59 in (32 x 21.85 x 1.51cm)	
	Weight	603 g	
	Cells/Type	3-cell Lithium-Ion Polymer	
	Energy	Voltage	11.1
		Amp-hour capacity	5.4Ah
		Watt-hour capacity	60 Wh
	Temperature	Operating (Charging)	32° to 113° F (0° to 45° C)
		Operating (Discharging)	14° to 140° F(-10° to 60° C)
		Non-operating	-4° to 140° F (-20° to 60° C)
	Battery Re-Charge Time	**System in OFF or Standby Mode**	3 hours
	Fuel Gauge LED	Yes	
	Warranty	1 year or 3 years* *Battery warranty depends on the platform warranty.	
	Optional Travel Battery Available	Yes	

ENVIRONMENTAL

Eco-Label Certifications & declarations	This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks: • IT ECO declaration • US ENERGY STAR® • EPEAT Gold registered in the United States. See http://www.epeat.net for registration status in your country.			
System Configuration Energy Consumption (in accordance with US ENERGY STAR® test method)	The configuration used for the Energy Consumption and Declared Noise Emissions data for the Notebook model is based on a “Typically Configured Notebook”.			
	115VAC, 60Hz		**230VAC, 50Hz**	**100VAC, 60Hz**
Normal Operation (Short idle)	8.59 W		8.92 W	8.65 W

Normal Operation (Long idle)	3.39 W	3.87 W	4.47 W
Sleep	0.74 W	0.79 W	0.74 W
Off	0.36 W	0.4 W	0.35 W

Note:
Energy efficiency data listed is for an ENERGY STAR® compliant product if offered within the model family. HP computers marked with the ENERGY STAR® Logo are compliant with the applicable U.S. Environmental Protection Agency (EPA) ENERGY STAR® specifications for computers. If a model family does not offer ENERGY STAR® compliant configurations, then energy efficiency data listed is for a typically configured PC featuring a hard disk drive, a high efficiency power supply, and a Microsoft Windows® operating system.

Heat Dissipation *	**115VAC, 60Hz**	**230VAC, 50Hz**	**100VAC, 60Hz**
Normal Operation (Short idle)	29 BTU/hr	31 BTU/hr	30 BTU/hr
Normal Operation (Long idle)	12 BTU/hr	13 BTU/hr	15 BTU/hr
Sleep	3 BTU/hr	3 BTU/hr	3 BTU/hr
Off	1 BTU/hr	1 BTU/hr	1 BTU/hr

*NOTE: Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)	Sound Power (L_{WAd}, bels)	Sound Pressure (L_{pAm}, decibels)
Typically Configured – Idle	2.9	21
Fixed Disk – Random writes	3.0	22

Batteries This battery(s) in this product comply with EU Directive 2006/66/EC

Batteries used in the product do not contain:

Mercury greater the1ppm by weight
Cadmium greater than 20ppm by weight

Battery size: CR2032 (coin cell)
Battery type: Lithium
Battery size: 6-cell high capacity Lithium-Ion battery (optional 8 cell available)
Battery type:

Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC.
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold level, see www.epeat.net
- Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.
- This product contains 9.3 % post-consumer recycled plastic (by wt.)
- This product is 97.3 % recycle-able when properly disposed of at end of life.

Packaging Materials

External:	PAPER/Corrugated	405 g
Internal:	PLASTIC/EPE (Expanded Polyethylene)	45 g
	PLASTIC/Polyethylene low density	26 g

The PAPER/Corrugated packaging material is made from 70 % recycled content.
The PLASTIC/EPE (Expanded Polyethylene) materials contains at least 50% recycled content.
The PLASTIC/Polyethylene low density) materials contains at least 50% recycled content.

Material Usage

This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/qse.pdf):

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants – may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- Nickel – finishes must not be used on the external surface designed to be frequently handled or carried by the user.
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Biphenyl Ethers (PBBEs)
- Polybrominated Biphenyl Oxides (PBBOs)

- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) – except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.
- Radioactive Substances
- Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

Packaging Usage

HP follows these guidelines to decrease the environmental impact of product packaging:

- Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.
- Eliminate the use of ozone-depleting substances (ODS) in packaging materials.
- Design packaging materials for ease of disassembly.
- Maximize the use of post-consumer recycled content materials in packaging materials.
- Use readily recyclable packaging materials such as paper and corrugated materials.
- Reduce size and weight of packages to improve transportation fuel efficiency.
- Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.

End-of-life Management and Recycling

Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/go/reuse-recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: http://www.hp.com/go/recyclers. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.

Hewlett-Packard Corporate Environmental Information

For more information about HP's commitment to the environment:

Global Citizenship Report
http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html
Eco-label certifications
http://www8.hp.com/us/en/hp-information/environment/ecolabels.html
ISO 14001 certificates:
http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/PC_GBU_Product_Design_ISO_14K_Certificate.pdf
and
http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf

COUNTRY OF ORIGIN

China

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

Type	Description	Part #
Cases	HP Slim Ultrabook Messenger (up to 15.6" x .88"/22/5mm)	F3W14AA
	HP Slim Ultrabook Top Load (up to 15.6" x .88"/22/5mm)	F3W15AA
Docking	HP 3001pr USB 3 Port Replicator	F3S42AA
	HP 3005pr USB 3.0 Port Replicator	H1L08AA#xxx
	HP 2013 UltraSlim Docking Station	D9Y32AA#xxx
	HP Universal Port Replicator	E6D70AA#xxx
	HP Display and Notebook Stand	AW662AA
Input/Output – Mice	HP Comfort Grip Wireless Mouse	H2L63AA
	HP X4000b Bluetooth Mouse	H3T50AA#xxx
	HP 3-Button USB Laser Mouse	H4B81AA
	HP Ultra Mobile Wireless Mouse	H6F25AA#xxx
	HP Slim Bluetooth Mouse	F3J92AA#xxx
Input/Output – Keyboards	HP Stylish USB Keyboard and Mouse	H4B80AA#xxx
	HP Stylish Wireless Keyboard and Mouse	H4B79AA#xxx
	HP USB Essential Keyboard and Mouse	H6L29AA
	HP 2.4 GHz Keyboard and Mouse	G1K29AA#xxx
Input/Output – Adapters	HP Wireless Display Adapter	J1V25AA#xxx
	DisplayPort to VGA	F7W97AA
	USB Graphic adapter Dual output	C5U89AA
	DisplayPort to DVI Adapter	F7W96AA
	DisplayPort to HDMI Cable	F3W43AA
Power	HP 65W Slim AC Adapter	H6Y82AA#xxx
	HP 90W Slim AC Adapter	H6Y83AA#xxx
	HP 90W Slim Combo AC Adapter w/USB	H6Y84AA#xxx
	HP 45W Smart AC Adapter	H6Y88AA#xxx
	HP 65W Smart AC Adapter	H6Y89AA#xxx
	HP 90W Smart AC Adapter	H6Y90AA#xxx
	HP 90W Smart AC/Auto/Air Combo Adapter	AJ652AA#xxx
	HP 90W Smart Auto/Truck Adapter	ED493AA
Batteries	HP CO06XL Notebook Battery (Slice)	E7U23AA
	HP CA06XL Notebook Battery	E7U21AA
Security	HP Docking Station Cable Lock	AU656AA#XXX
	HP UltraSlim Keyed Cable Lock	H4D73AA
Storage - External Storage	HP USB External DVDRW Drive	F2B56AA
Misc.	HP 14" Notebook PC Privacy Filter	J6E65AA
Displays	HP EliteDisplay S231d 23-in IPS LED BLU Notebook Docking Monitor	F0W81AA
	HP EliteDisplay S240ml 23.8-in IPS LED Backlit MHL Monitor	F4M47AA
	HP EliteDisplay E241i 24-in IPS LED Backlit Monitor	F0W81AA

Summary of Changes

Date of change:	Version History:		Description of change:
January 20, 2015	V1 to V2	Added	The words 'up to' to all battery life specs
January 26, 2015	V2 to V3	Added	Environmental information and stand by time
March 18, 2015	V3 to V4	Changed	Memory unit speed spec on page 8