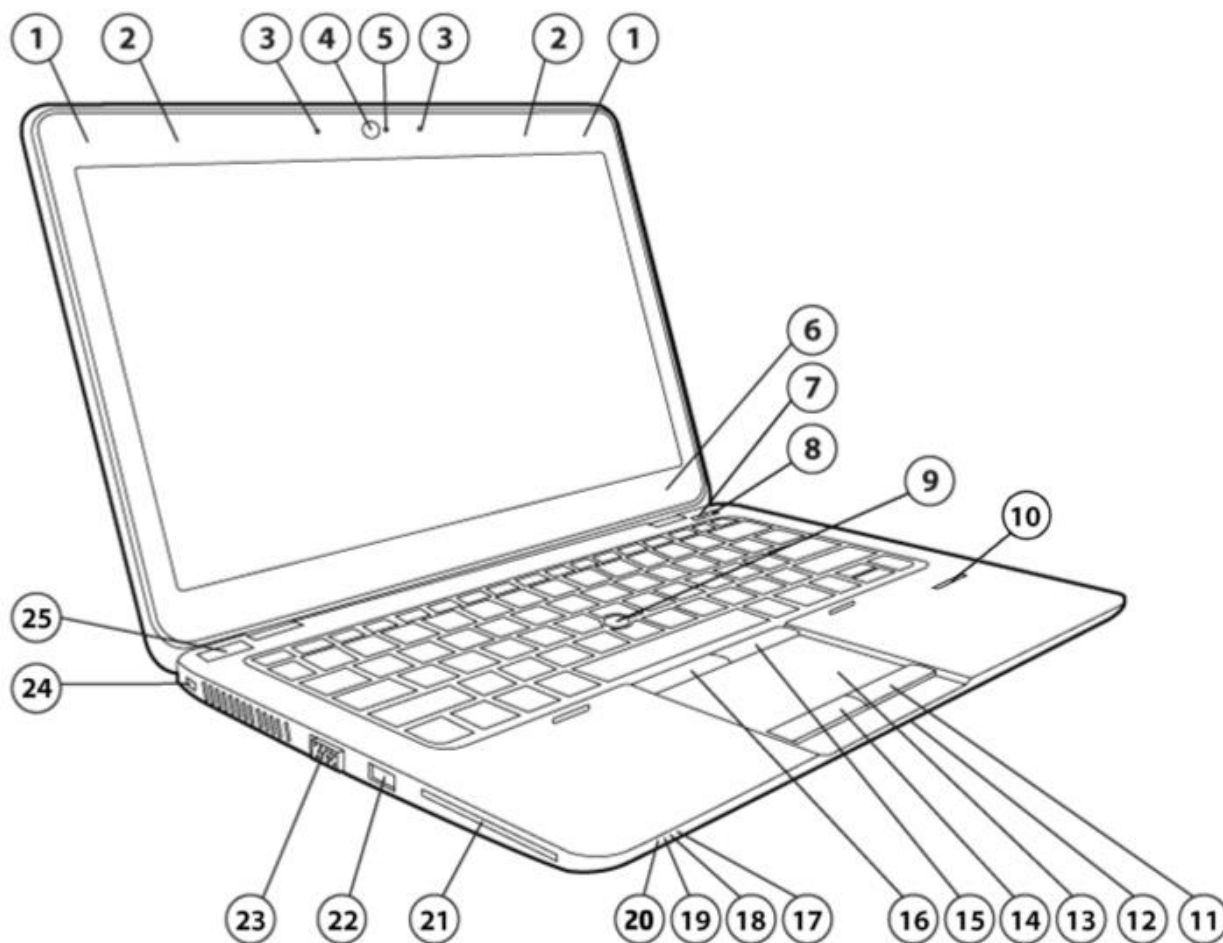


Overview

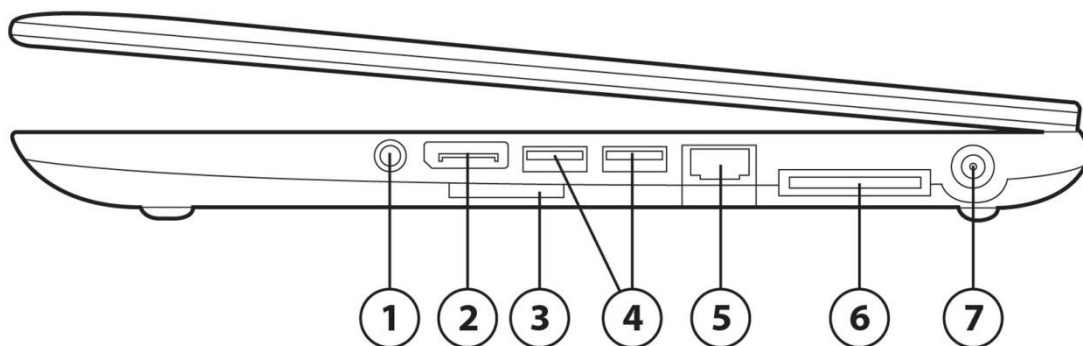
HP EliteBook 850 G2 Notebook PC



Front/Left

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

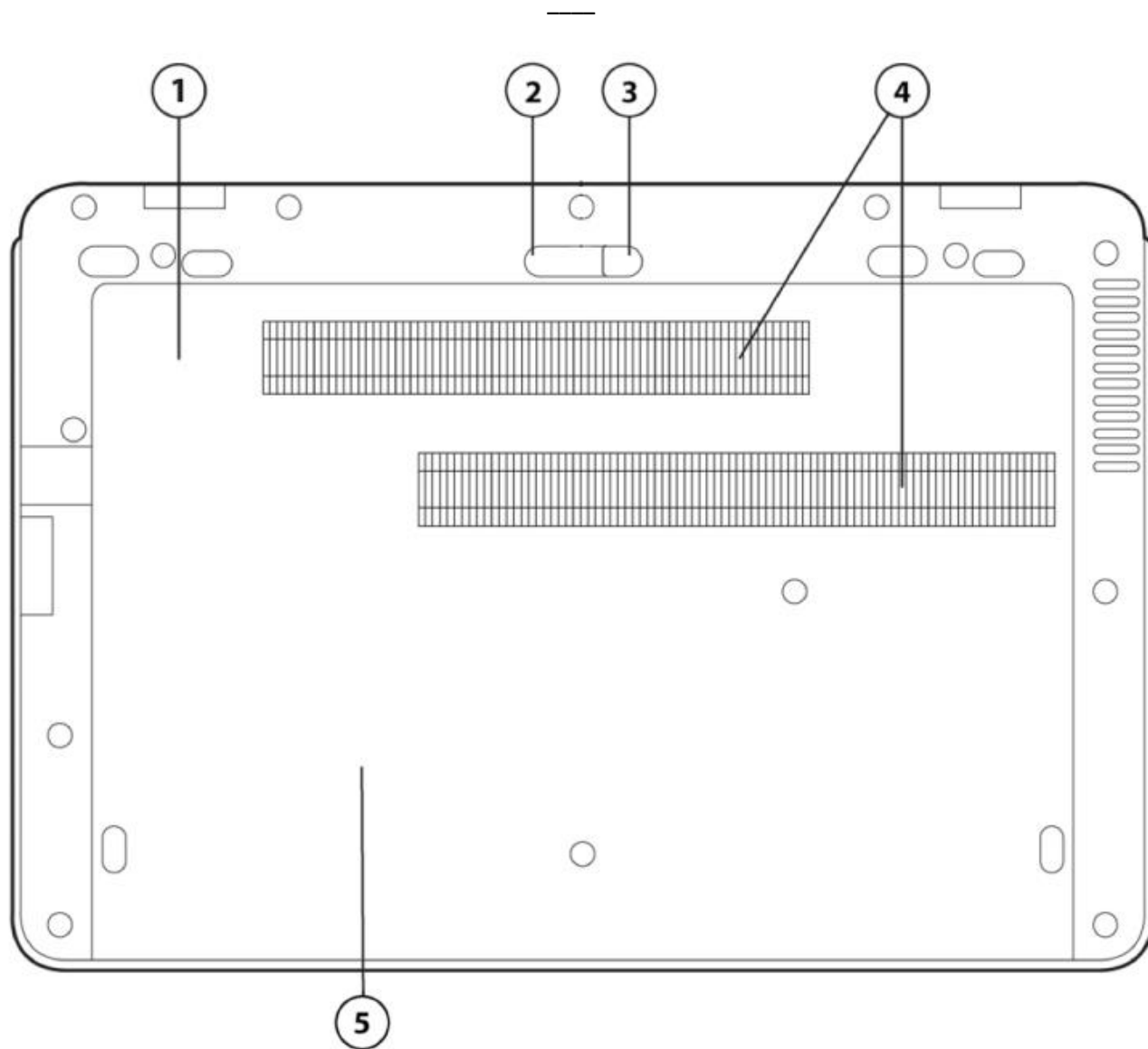




Right

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





1. EasyAccess panel
2. EasyAccess panel release latch
3. Security screw

Bottom

4. Vents (2)
5. SIM slot (inside the panel)*



AT A GLANCE

- Windows 10 versions, Windows 8.1 versions, Windows 7 versions, 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 and i5 processors
- Memory options up to 16 GB
- Weight starting at 4.15 lb/1.88 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 15.6" diagonal displays
- Easily hot dock with the 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 850 G2 NOTEBOOK PC

OPERATING SYSTEM

Preinstalled

- Windows 10 Pro 64*
- Windows 10 Home 64*
- Windows 8.1 Pro 64*
- Windows 8.1 64*
- Windows 7 Professional 64 (available through downgrade rights from Windows 10 Pro)***
- Windows 7 Professional 32 (available through downgrade rights from Windows 10 Pro)***
- Windows 7 Professional 64 (available through downgrade rights from Windows 8.1 Pro)**
- Windows 7 Professional 32 (available through downgrade rights from Windows 8.1 Pro)**
- Windows 7 Professional 64*
- Windows 7 Professional 32*
- Ubuntu Linux
- FreeDOS 2.0

Web-only Support

- Windows 10 Pro 64*
- Windows 10 Home 64*
- Windows 10 Enterprise 64*

- Windows 8.1 Pro 64*
- Windows 8.1 64*
- Windows 8.1 Enterprise 64*

- Windows 7 Professional 64 (available through downgrade rights from Windows 10 Pro)***
- Windows 7 Professional 32 (available through downgrade rights from Windows 10 Pro)***
- Windows 7 Professional 64 (available through downgrade rights from Windows 8.1 Pro)**
- Windows 7 Professional 32 (available through downgrade rights from Windows 8.1 Pro)**
- Windows 7 Professional 64*
- Windows 7 Professional 32*
- Windows 7 Enterprise 64*
- Windows 7 Enterprise 32*

* 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.microsoft.com>

** This system is preinstalled with Windows 7 Professional 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.

***This system is preinstalled with Windows 7 Professional software and also comes with a license and media for Windows 10 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

15.6" diagonal LED-backlit HD anti-glare SVA flat (1366x768)

15.6" diagonal LED-backlit HD anti-glare SVA flat (1366x768) with camera

15.6" diagonal LED-backlit FHD anti-glare SVA Slim (1920x1080)

15.6" diagonal LED-backlit FHD anti-glare SVA Slim (1920x1080) with camera

Touch

15.6" FHD diagonal LED-backlit SVA 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 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 5400rpm Self-Encrypting Drive (FIPS-140-2)
500 GB 5400rpm + 8GB NAND SATA Hybrid Hard Drive
1TB 7200rpm SATA Hard Drive

Solid State Drive*

120 GB M.2 Solid State Drive
128 GB SATA-3 MLC Solid State Drive
128 GB SATA-3 TLC Solid State Drive
180 GB SATA-3 MLC Solid State Drive
180 GB SATA-3 MLC Self-Encrypting Drive
240 GB SATA-3 MLC Solid State Drive
256 GB SATA-3 TLC Solid State Drive
256 GB SATA-3 MLC Self-Encrypting Drive
256 GB M.2 PCIe Solid State Drive
512 GB SATA-3 MLC Solid State Drive
512 GB SATA-3 TLC 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 up to 30 GB (for Windows 8 and 10) 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.

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 It4112 LTE/HSPA+ Qualcomm® Gobi™ 4G Module

HP It4211 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 or as an optional feature.

** 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.

* In independent testing conducted by Trace Laboratories, HP DuraKeys showed no wear after 250,000 cycles. Competitor notebooks showed significant wear after only 5,000 cycles.)

SOFTWARE AND SECURITY

Preinstalled Software with Windows Operating System

BIOS

HP BIOSphere*

HP Sure Start

HP DriveLock | HP Automatic Drive Lock

HP BIOS Protection***

HP Disk Sanitizer ****

HP SpareKey*****

Update via Network

Master Record Security

Power On Authentication

Pre-Boot Security

Secure Erase*****



Hybrid Boot
Measured Boot
Secure Boot
Absolute Persistence Module*****

* Available only on business PCs with HP BIOS.

*** May require a manual recovery step if all copies of BIOS are compromised or deleted.

**** For the use cases outlined in the DOD 5220.22-M Supplement. Does not support solid state drives.

***** Requires initial user set up.

***** For the methods outlined in the National Institute of Standards and Technology Special Publication 800-88.

***** 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 (Windows 7 only)
HP GPS and Location*
HP Mobile Connect (Windows 8 only)**
HP Wireless Hotspot*** (Windows 8 only)
Intel WiDi Software****
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)*****
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*****
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.

*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.

** HP Mobile Connect is only available on selective devices with wwan. For geographical availability refer to www.hp.com/go/mobileconnect

***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.

**** 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.

*****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.

***** 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 with Credential Manager and Password Manager (Windows only)

HP Device Access Manager with Just in Time Authentication

HP Drive Encryption (FIPS 140-2 certified)*

HP File Sanitizer**

Microsoft Security Essentials (Windows 7 only)***

Central Management of Client Security Credential Manager with DigitalPersona Pro Workgroup****

CompuTrace Support

Security Hardware

TPM Embedded Security Chip 1.2

Security lock slot

Fingerprint Reader

Integrated Smart Card Reader

NOTE: The Absolute Persistence agent is shipped turned off, and must be activated by customers when they purchase a subscription. Subscriptions can be purchased for terms ranging multiple years. Service is limited, check with Absolute for availability outside the U.S.

* 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.

** For the use cases outlined in the DOD 5220.22-M Supplement. Supports standard Hard Drives. Initial setup required.

*** Opt in and internet connection required for updates.

**** In order to deploy and receive updated policies, the client needs to be connected to the network server and requires separately purchased DigitalPersona Pro software. System access may not prevent users from logging into the system on the first attempt if policy updates haven't yet been received and applied. Not all features are remotely manageable.

***** Intel Anti-Theft security is supported on Intel Core i processors and requires a separately purchased Absolute CompuTrace service subscription and must be activated and configured. Check with Absolute for availability in your country.



Intel and HP assume no liability for lost or stolen data and/or systems or any other damages resulting therefrom. See <http://www.intel.com/technology/anti-theft/>.

***** Intel Identity Protection feature is only available with Intel Core Processors. Intel® IPT security requires separate Symantec VIP software service subscription and must be activated and configured. Requires a website that uses Symantec VIP Authentication Service and Microsoft® Windows. Intel® and HP assume no liability for lost or stolen data and/or systems or any other damages resulting therefrom.

For more information on HP security solutions refer to: <http://www.hp.com/go/protecttools>.

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 50 WHr

Battery Life*

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

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 4.02 lb/1.83 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 4.02 lb/1.83 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

14.78 x 9.98 x 0.84 in (at front)

37.55 x 25.36 x 2.14 cm (at front)

Touch

14.78 x 9.98 x 1.02 in (at front)

37.55 x 25.36 x 2.58 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)
	Integrated graphics		4.75 W
	Max Operating Power	Discrete < 90W	Windows 8.1 (64-bit)
		UMA < 65W	4.26 W
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

15.6" diagonal LED-backlit HD anti-glare SVA flat (1366 x 768)	Outline Dimensions (W x H x D)	14.17 x 8.83 x 0.15 in (36.0 x 22.43 x 0.38 cm)
	Active Area	13.55 x 7.62 in (34.42 x 19.35 cm)
	Weight	< 1.1 lb (500 g) (max)



Diagonal Size	15.6 in (39.62 cm)	
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	101 ppi	
Viewing Angle	SVA 30/30/20/10 (min) (Left/Right/Down/Up)	

15.6" diagonal LED-backlit FHD anti-glare SVA flat (1920 x 1080)

Outline Dimensions (W x H x D)	14.17 x 8.83 x 0.15 in (36.0 x 22.43 x 0.32 cm)	
Active Area	13.55 x 7.62 in (34.42 x 19.36 cm)	
Weight	< 0.84 lb (380 g) (max)	
Diagonal Size	15.6 in (39.62 cm)	

Contrast Ratio	300:1 (typical)	
Refresh Rate	60 Hz	
Brightness	300 nit (typical)	
Pixel Resolution	Format	1920 x 1080 (FHD)
	Configuration	RGB Stripe
Interface	eDP 1.2 (2 lane)	
LCD Mode	TN	
PPI	142 ppi	
Viewing Angle	SVA 30/30/20/10 (min) (Left/Right/Down/Up)	

15.6" diagonal LED-backlit FHD anti-glare SVA flat (1920 x 1080) + touch

Outline Dimensions (W x H x D)	14.17 x 8.83 x 0.15 in (36.0 x 22.43 x 0.32 cm)	
Active Area	13.55 x 7.62 in (34.42 x 19.36 cm)	
Weight	< 0.84 lb (380 g) (max)	
Diagonal Size	15.6 in (39.62 cm)	
Touch enabled	Yes	
TSP Type	Capacitive	
Touch point supported	Min 5-point & Max 10-point for Win8	

Contrast Ratio	400:1 (typical)	
Refresh Rate	60 Hz	
Brightness	300 nit (typical)	



Pixel Resolution	Format	1920 x 1080 (FHD)
Interface	Configuration	RGB Stripe
LCD Mode	eDP 1.2 (2 lane)	
PPI	TN	
Viewing Angle	142 ppi	
	SVA 45/45/25/35 (Left/Right/Down/Up)	

STORAGE AND DRIVES

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

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 600 MB/s (Drive Capability) (maximum)
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



**500 GB 5400rpm
+ 8GB NAND
SATA Hybrid
Hard Drive**

Drive Weight	95g
Capacity	500GB
Height	7mm
Width	70.1mm
Interface	ATA-8, SATA 3.0
Transfer Rate	600MB/s
Seek Time (typical reads, including settling)	5.6ms (Average Latency)
Rotational Speed	5400rpm
Logical Blocks	976,733,168
Operating Temperature	0-60 degree C
Features	ATA Security, S.M.A.R.T., NCQ, Ultra DMA

**SATA 3 (6 Gb/s)
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 Read	Sequential 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	

**120 GB SATA 3 (6 Gb/s) Drive Weight
M.22242 Solid State Drive Capacity**

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	



128 GB SATA 3 (6 Gb/s) 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			
180 GB SATA 3 (6 Gb/s) 2.5-inch MLC SATA Solid State Drive	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		
	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			
180 GB SATA 3 (6 Gb/s) 2.5 MLC SED OPAL 2 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			
240 GB SATA 3 (6 Gb/s) 2.5 MLC SSD	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	

**256 GB SATA 3 (6 Gb/s)
2.5 MLC SED OPAL 2 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	

**256 GB SATA 3 (6 Gb/s)
2.5 TLC 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; DIPM; TRIM; DEVSLP	
Drive Weight	10 Grams	



256 GB* 2260 M2 PCIe Solid State Drive	Capacity	256 GB		
	Height	0.24 in (60 mm)		
	Width	0.87 in (22 mm)		
	Interface	ATA-8, PCIe 2.0		
	Performance	Maximum Read	Sequential 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		

512 GB SATA 3 (6 Gb/s) 2.5 MLC 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		

512 GB SATA-3 TLC 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 540 MB/s	Up to 500 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 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 It4112 LTE/HSPA+ Gobi 4G Module**	<table border="0"> <tr> <td style="vertical-align: top;">Technology/Operating bands</td> <td>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)</td> </tr> <tr> <td style="vertical-align: top;">Wireless protocol standards</td> <td>3GPP Release 8 LTE Specification WCDMA R99, 3GPP Release 5, 6 and 7 UMTS Specification</td> </tr> </table>	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
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 (\pm 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 x 30 mm x 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 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 (WLAN)

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 <ul style="list-style-type: none"> 2.402 – 2.482 GHz <p>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.</p>
	802.11a <ul style="list-style-type: none"> 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 <p>Note: Indonesia only supports 5.725 - 5.825 GHz (CH149 - CH161)</p>
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	<ul style="list-style-type: none"> • 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 Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between access points
Output Power²	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 Sensitivity³	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	
	<ol style="list-style-type: none"> 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	<table border="1"> <thead> <tr> <th>Modulation</th> <th>0.01% BER</th> <th>0.001% BER</th> </tr> </thead> <tbody> <tr> <td>GFSK</td> <td>-80 dBm</td> <td>-70 dBm</td> </tr> <tr> <td>π/4-DQPSK</td> <td>-80 dBm</td> <td>-70 dBm</td> </tr> <tr> <td>8DPSK</td> <td>-80 dBm</td> <td>-70 dBm</td> </tr> </tbody> </table>			Modulation	0.01% BER	0.001% BER	GFSK	-80 dBm	-70 dBm	π/4-DQPSK	-80 dBm	-70 dBm	8DPSK	-80 dBm	-70 dBm
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: FCC (47 CFR) Part 15C, Section 15.247 & 15.249														
Security															
Certifications															
Bluetooth Profiles Supported															
Power Management	ETS 300 328, ETS 300 826														
Certifications	Low Voltage Directive IEC950														
Certifications	UL, CSA, and CE Mark														



Bluetooth Profiles Supported

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)

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

Wireless LAN Standards

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

Interoperability Frequency Band

Wi-Fi certified
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

Security¹

- IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only
- AES-CCMP: 128 bit in hardware



	<ul style="list-style-type: none"> • 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 Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between band Access Points
Output Power²	<ul style="list-style-type: none"> • 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 Sensitivity⁴	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 Non-operating	10% to 90% (non-condensing) 5% to 95% (non-condensing)
Altitude	Operating Non-operating	0 to 10,000 ft (3,048 m) 0 to 50,000 ft (15,240 m)
LED Activity	LED Amber - Radio OFF; LED White - Radio ON	
	<ol style="list-style-type: none"> 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	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Modulation</th> <th style="text-align: center;">0.01% BER</th> <th style="text-align: center;">0.001% BER</th> </tr> </thead> <tbody> <tr> <td>GFSK</td> <td style="text-align: center;">-80 dBm</td> <td style="text-align: center;">-70 dBm</td> </tr> <tr> <td>$\pi/4$-DQPSK</td> <td style="text-align: center;">-80 dBm</td> <td style="text-align: center;">-70 dBm</td> </tr> <tr> <td>8DPSK</td> <td style="text-align: center;">-80 dBm</td> <td style="text-align: center;">-70 dBm</td> </tr> </tbody> </table>			Modulation	0.01% BER	0.001% BER	GFSK	-80 dBm	-70 dBm	$\pi/4$ -DQPSK	-80 dBm	-70 dBm	8DPSK	-80 dBm	-70 dBm
Modulation	0.01% BER	0.001% BER													
GFSK	-80 dBm	-70 dBm													
$\pi/4$ -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 Link Topology	Microsoft Windows Bluetooth Software														
Electrical Interface Bluetooth Software Supported Security	Point to Point, Multipoint Pico Nets up to 7 slaves Full support of Bluetooth Security Provisions														
Power Management Power Management Certifications	Microsoft Windows ACPI, and USB Bus Support Self-configurable to optimize power conservation in all operating modes, including Standby, Hold, Park, and Sniff														
Security Certifications Bluetooth Profiles Supported	All necessary regulatory approvals for supported countries, including: FCC (47 CFR) Part 15C, Section 15.247 & 15.249														
Power Management Certifications	ETS 300 328, ETS 300 826 Low Voltage Directive IEC950														
Certifications Bluetooth Profiles Supported	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)

**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 Frequency Band	Wi-Fi certified 802.11b/g/n <ul style="list-style-type: none"> • 2.402 – 2.482 GHz <p>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.</p> 802.11a <ul style="list-style-type: none"> • 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 <p>Note: Indonesia only supports 5.725 - 5.825 GHz (CH149 - CH161)</p>
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	<ul style="list-style-type: none"> • IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware



	<ul style="list-style-type: none"> • 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 Power²	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
Receiver Sensitivity³	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														
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	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.														
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Modulation	0.01% BER	0.001% BER													
GFSK	-80 dBm	-70 dBm													
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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 Link Topology	Microsoft Windows Bluetooth Software														
Electrical Interface	Point to Point, Multipoint Pico Nets up to 7 slaves														
Bluetooth Software Supported Security	Full support of Bluetooth Security Provisions														
Power Management	Microsoft Windows ACPI, and USB Bus Support														
Power Management Certifications	Self-configurable to optimize power conservation in all operating modes, including Standby, Hold, Park, and Sniff														
Security Certifications	All necessary regulatory approvals for supported countries, including: FCC (47 CFR) Part 15C, Section 15.247 & 15.249														
Bluetooth Profiles Supported	ETS 300 328, ETS 300 826														
Power Management 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) Synchronization Profile (SYNC) Hard Copy Cable Replacement (HCRP) ^{1,2} Personal Area Networking Profile (PAN) ^{1,2} Human Interface Device Profile (HID) ^{1,2}														
Certifications															
Bluetooth Profiles Supported															



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 <ul style="list-style-type: none">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 <ul style="list-style-type: none">4.9 – 4.95 GHz (Japan)5.15 – 5.25 GHz5.25 – 5.35 GHz5.47 – 5.725 GHz5.825 – 5.850 GHz Note: Indonesia only supports 5.725 - 5.825 GHz (CH149 - CH161)
Data Rates	<ul style="list-style-type: none">802.11b: 1, 2, 5.5, 11 Mbps802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps802.11n: 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
Security¹	<ul style="list-style-type: none">IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode onlyAES-CCMP: 128 bit in hardware802.1x authenticationWPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.WPA2 certificationIEEE 802.11i



	<ul style="list-style-type: none"> • Cisco Certified Extensions, all versions through CCX4 and CCX Lite • WAPI
Network Architecture Models	Ad-hoc (Peer to Peer)
Roaming	Infrastructure (Access Point Required)
Output Power²	IEEE 802.11 compliant roaming between access points <ul style="list-style-type: none"> • 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
Receiver Sensitivity³	802.11 compliant power saving mode <ul style="list-style-type: none"> 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
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	<p>Normal Mode</p> <p>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</p> <p>Power Saving Mode</p> <p>With card present, before being suspended: 40.6 mA Without card present: 380 µA After being suspended with smart card present: 380 µA</p>
Features	<ul style="list-style-type: none"> • 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 (740015)& Non-Slim 2 Prong (742313)

Dimensions	95.0 x 40.0 x 26.5mm
Input	90 to 265 VAC
Output	Input Efficiency 88% 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 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 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
	Connector	3 pin/grounded, mates with interchangeable cords	
	Environmental Design	Operating temperature	32° to 104° F (0° to 40° C)
		Non-operating (storage) temperature	-4° to 149° F (-20° to 65° C)
		Altitude	0 to 16,405 ft (0 to 5,000 m)
		Humidity	20% to 80%
		Storage Humidity	10% to 90%
	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.	
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
		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	180 g
Cells/Type	3-cell Lithium-Ion Polymer
Energy	Voltage 11.1 Amp-hour capacity 2.2 Ah 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 (50 WHr) 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

ENVIRONMENTAL



**Eco-Label
Certification
&
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**

The configuration used for the Energy Consumption and Declared Noise Emissions data for the Notebook model is based on a “Typically Configured Notebook”.

**Energy
Consumption
(in
accordance
with US
ENERGY
STAR® test
method)**

	115VAC, 60Hz	230VAC, 50Hz	100VAC, 60Hz
Normal Operation (Sort idle)	11.76 W	11.45 W	11.26 W
Normal Operation (Long idle)	5.06 W	4.97 W	4.92 W
Sleep	0.73 W	0.78 W	0.73 W
Off	0.35 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
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Normal Operation (Short idle)	40 BTU/hr	39 BTU/hr	39 BTU/hr
Normal Operation (Long idle)	17 BTU/hr	17 BTU/hr	17 BTU/hr
Sleep	2 BTU/hr	3 BTU/hr	2 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

22

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 than 1ppm 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 8.4 % post-consumer recycled plastic (by wt.)
- This product is 98.1 % recycle-able when properly disposed of at end of life.

Packaging Materials

External:	PAPER/Corrugated	475 g
Internal:	PLASTIC/EPE (Expanded Polyethylene)	47 g
	PLASTIC/Polyethylene low density	26 g

The plastic packaging material contains at least 50 % recycled content.

The corrugated paper packaging materials contains at least 70 % 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/gse.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/qcreport/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 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
	USB Graphics Adapter Dual output	C5U89AA
	DisplayPort to VGA	F7W97AA
	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
	90W Smart AC/Auto/Air Combo Adapter	AJ652AA#xxx
	90W Smart Auto/Truck Adapter	ED493AA
Batteries	HP CM03XL Notebook Battery	E7U24AA
	HP Docking Station Cable Lock	AU656AA#XXX
Security	HP UltraSlim Keyed Cable Lock	H4D73AA
	HP USB External DVDRW Drive	F2B56AA
Storage - External Storage	HP 15.6" Notebook PC Privacy Filter	J7H71AA
Misc.	HP EliteDisplay S231d 23-in IPS LED BLU Notebook Docking Monitor	F3J72AA



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