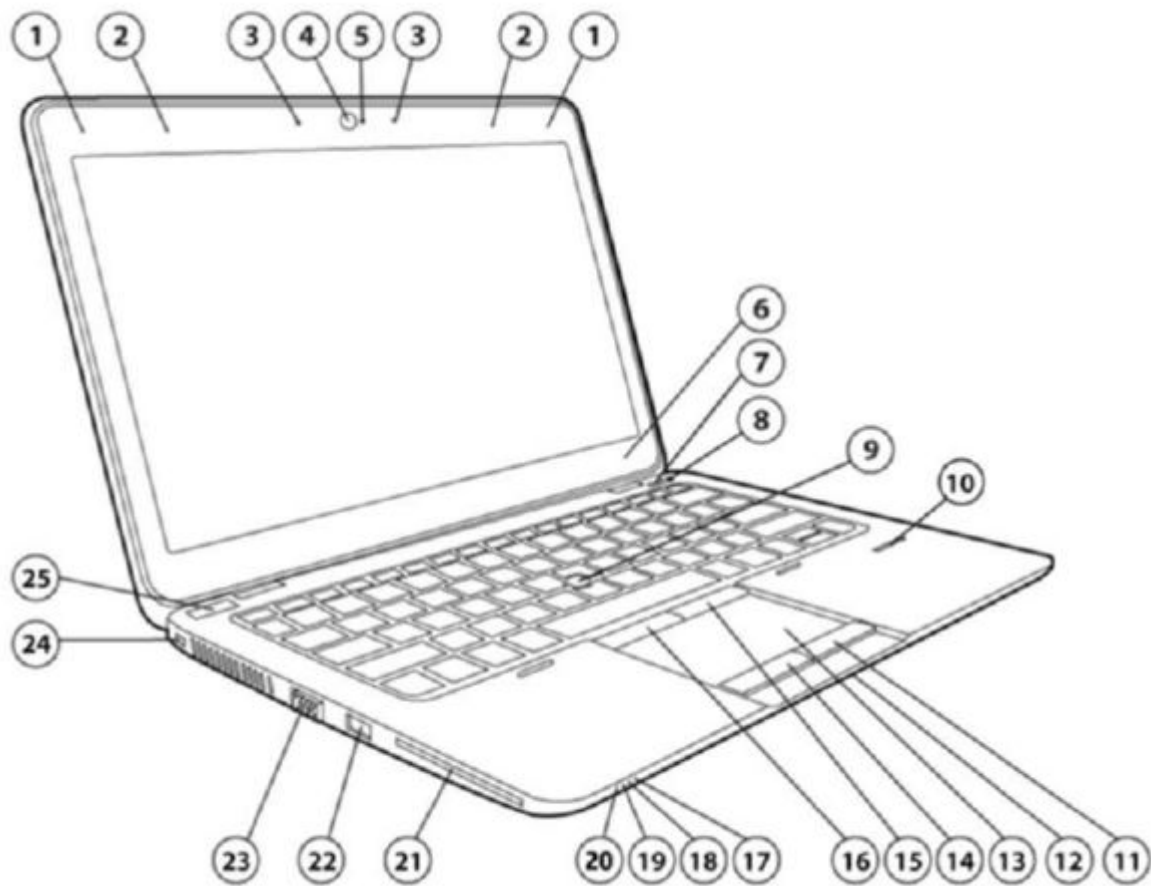


Overview

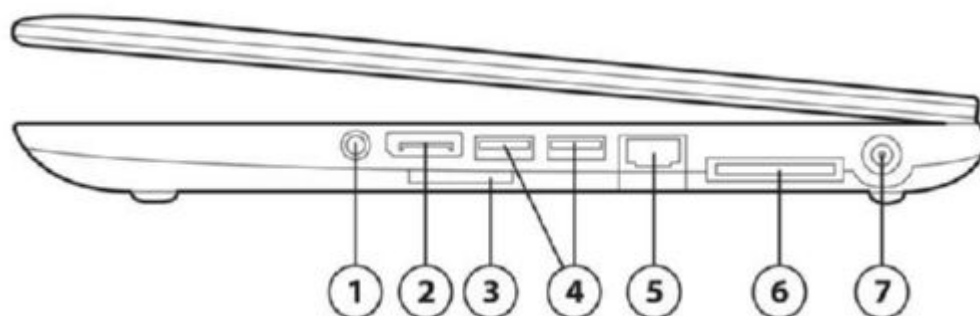
HP EliteBook 850 G2 Notebook PC



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                     |     |                             |

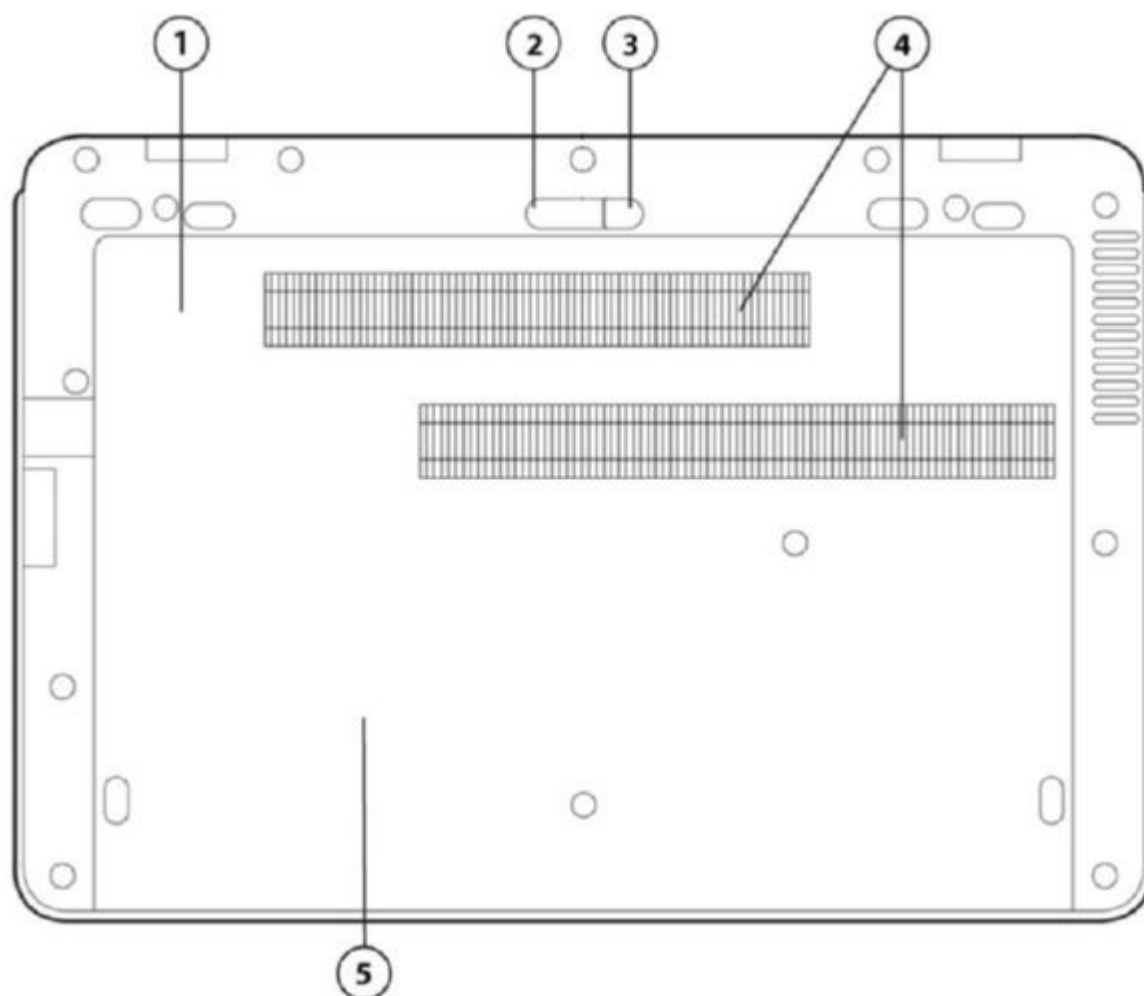
### Overview



### 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)                                    |                                   |

### Overview



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

#### Bottom

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

### Overview

#### 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 5<sup>th</sup> Generation Intel® Core™ i7, i5 and i3 processors
- Memory options up to 16 GB
- Weight starting at 4.02 lb/1.83 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 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.**



### Features

#### PRODUCT NAME

**HP EliteBook 850 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 Professionals 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

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

Features

	<p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>*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 <a href="http://www.intel.com/technology/turboboost">www.intel.com/technology/turboboost</a> for more information.</p>
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CHIPSET

	Chipset integrated with processor
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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

### Features

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 2013 UltraSlim Docking Station

Sold separately.

### STORAGE AND DRIVES



### Features

#### 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)  
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.

## MEMORY

#### Standard

DDR3L SDRAM (1600 MHz)  
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.

### Features

## 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

### Features

#### 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

### Features

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

### 3<sup>rd</sup> Party

Adobe® Flash Player (Commercial)  
Foxit PhantomPDF Express for HP  
Bing Search

### Features

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](http://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](http://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 2.0  
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.

Features

- \* 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\*

Battery	UMA Graphics	Discrete Graphics
3-cell (50 WHr)	12 hrs 15 mins	12 hrs 45 mins
3-cell (24 WHr)	7 hrs 30 mins	7 hrs
3-cell (50 WHr)	15 hrs 30 mins	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](http://www.bapco.com) for additional details.

System Standby Time\*\*

TBD

Power Conservation

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

### Features

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 4.54 lb/2.06 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

### Features

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>



Technical Specifications

System Unit

Stand-Alone Power Requirements (AC Power)	Nominal Operating Voltage	19.5 V	
	Average Operating Power	Windows 7 (64-bit)	Windows8.1 (64-bit)
	Integrated graphics	4.75 W	4.26 W
	Max Operating Power	Discrete < 90W	
Temperature	Operating	UMA < 65W	
		32° to 95° F (0° to 35° C) (not writing optical)	
Relative Humidity	Non-operating	41° to 95° F (5° to 35° C) (writing optical)	
	Operating	-4° to 140° F (-20° to 60° C)	
	Non-operating	10% to 90%, non-condensing	
		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	UL	Yes	
	CSA	Yes	
Certifications	FCC Compliance	Yes	
	ENERGY STAR®	Select models*	
	EPEAT®	Registered Gold in United States**	
	ICES	Yes	
	Australia /	Yes	
	NZ A-Tick Compliance		
	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

Technical Specifications

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)	
	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	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)	
	Surface Treatment	Anti-glare	
	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	
	Surface Treatment	Anti-glare	
	Contrast Ratio	400:1 (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)	

Technical Specifications

LCD Mode	TN
PPI	142 ppi
Viewing Angle	SVA 45/45/25/35 (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	<b>Synchronous</b> (maximum)	600 MB/s (Drive Capability)
	Seek Time (typical reads, including settling)	<b>Single Track</b>	1.5 ms-2ms
		<b>Average</b>	12 ms-13ms
		<b>Maximum</b>	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]	
500 GB* 7200 rpm SATA Hard Drive	Features	ATA Security; S.M.A.R.T. IV, NCQ, Ultra DMA	
	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	<b>Synchronous</b> (maximum)	600 MB/s (Drive Capability)
	Seek Time (typical reads, including settling)	<b>Single Track</b>	1.5 ms-2ms
		<b>Average</b>	12 ms-13ms
		<b>Maximum</b>	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	

Technical Specifications

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	<b>Synchronous</b> (maximum)	600 MB/s (Drive Capability)
	Seek Time (typical reads, including settling)	<b>Single Track</b>	1.5 ms
		<b>Average</b>	12 ms
		<b>Maximum</b>	22 ms
	Cache	32 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	<b>Synchronous</b> (maximum)	600 MB/s (Drive Capability)
	Seek Time (typical reads, including settling)	<b>Single Track</b>	2 ms
		<b>Average</b>	13 ms
		<b>Maximum</b>	15 ms
	Cache	32 GB	
	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	<b>Maximum Sequential Read</b>	<b>Maximum Sequential Write</b>
		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	

Technical Specifications

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	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	

Technical Specifications

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		



Technical Specifications

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)\*



Technical Specifications

HP It4211 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)





### Technical Specifications

<b>HP It4112 LTE/HSPA+ Gobi 4G Module**</b>	<b>Technology/Operating bands</b>	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)
	<b>Wireless protocol standards</b>	3GPP Release 8 LTE Specification WCDMA R99, 3GPP Release 5, 6 and 7 UMTS Specification
	<b>Wireless parametric standards</b>	Complies with 3GPP specifications Release 8 for LTE
	<b>Maximum data rates</b>	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)
	<b>GPS</b>	Standalone
	<b>GPS bands</b>	1575.42 MHz ( $\hat{A} \pm 1.023$ MHz), GLONASS 1596-1607MHz
	<b>Maximum output power</b>	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)
	<b>Maximum power consumption</b>	LTE: 1,200 mA (peak); <900 mA (average) WCDMA: 1,100 mA (peak); <800 mA (average) EGPRS: 2,800 mA (peak); <700 mA (average)
	<b>Power consumption, sleep mode</b>	3 mA
	<b>Power management</b>	USB selective suspend, Integrated notebook wireless button
	<b>Antenna type</b>	Dual high efficiency multi-band antennae with spatial diversity
	<b>Form Factor</b>	M.2, USB 2.0 interface
	<b>Weight</b>	6 g
	<b>Dimensions</b> (Length x Width x Thickness)	42 mm x30 mm x2.3 mm
	<b>Voltage, Operating</b>	3.135 V to 4.4 V (3.3 V +1.1V/-0.165V)
	<b>Temperature, operating</b> (from TIA/EIA/IS-98-D)	14° to 131° F (–10° to 55° C)
	<b>Temperature, non-operating, 96 hours</b> (from MIL-STD 202 Method 108)	–40° to 185° F (–40° to 85° C)
	<b>Humidity, non-operating</b>	95% relative humidity for 48 hours @ 185° F (85° C) (non-condensing)
	<b>LED activity</b>	LED Off - Radio Off; Solid LED On - Radio On

Technical Specifications

\* 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 Frequency Band	Wi-Fi certified 802.11b/g/n

Technical Specifications

- 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	<ul style="list-style-type: none"><li>• IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only</li><li>• AES-CCMP: 128 bit in hardware</li><li>• 802.1x authentication</li><li>• WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.</li><li>• WPA2 certification</li><li>• IEEE 802.11i</li><li>• Cisco Certified Extensions, all versions through CCX4 and CCX Lite</li><li>• WAPI</li></ul>
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)

Technical Specifications

	Receive:	1.6 W (max)
	Idle mode (PSP):	180 mW (WLAN Associated)
	Idle mode:	60 mW (WLAN unassociated)
Power Management	Radio disabled:	30 mW
	ACPI and PCI Express compliant power management	
	802.11 compliant power saving mode	
Receiver Sensitivity <sup>3</sup>	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
Antenna type	802.11ac, 2SS, MCS-9 :	-58dBm maximum
	High efficiency antenna with spatial diversity, mounted in the display enclosure	
Form Factor	Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications	
Dimensions	PCI-Express M.2 MiniCard	
	Type 2230 : 2.3 x 22.0 x 30.0 mm	
	Or	
Weight	Type 1630 : 2.3 x 16.0 x 30.0 mm	
	Type 2230 : 2.8g	
	Or	
Operating Voltage	Type 1630 : 2g	
Temperature	3.3v +/- 9%	
	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).	



Technical Specifications

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
	GFSK	-80 dBm
	Π/4-DQPSK	-80 dBm
	8DPSK	-80 dBm
Power Consumption	Peak (Tx) 330 mW	
	Peak (Rx) 230 mW	
	Selective Suspend 17 mW	
	Up to 33 ft (10 m)	
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	Point to Point, Multipoint Pico Nets up to 7 slaves	
Bluetooth Software Supported	Full support of Bluetooth Security Provisions	
Security	Microsoft Windows ACPI, and USB Bus Support	
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	All necessary regulatory approvals for supported countries, including FCC (47 CFR) Part 15C, Section 15.247 & 15.249	
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	ETS 300 328, ETS 300 826	
Certifications	Low Voltage Directive IEC950	
	UL, CSA, and CE Mark	
	Serial Port Profile (SPP) <sup>1</sup>	
Certifications	Service Discovery Application Profile (SDAP)	
	Dial-Up Networking (DUN) <sup>1,2</sup>	
	Generic Object Exchange Profile (GOEP) <sup>1,2</sup>	
Certifications	Object Push Profile (OPP) <sup>1,2</sup>	
	File Transfer Profile (FTP)	
	Synchronization Profile (SYNC)	
Certifications	Hard Copy Cable Replacement (HCRP) <sup>1,2</sup>	
	Personal Area Networking Profile (PAN) <sup>1,2</sup>	
	Human Interface Device Profile (HID) <sup>1,2</sup>	
Certifications	FAX Profile (FAX)	
	Basic Imaging Profile (BIP) <sup>2</sup>	
	Headset Profile (HSP)	
Bluetooth Profiles Supported	Hands Free Profile (HFP)	

Technical Specifications

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 Wi-Fi certified
Interoperability Frequency Band	802.11b/g/n <ul style="list-style-type: none"><li>2.402 – 2.482 GHz</li></ul> <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 discontinue those channels.</p> <p>802.11a</p> <ul style="list-style-type: none"><li>4.9 – 4.95 GHz (Japan)</li><li>5.15 – 5.25 GHz</li><li>5.25 – 5.35 GHz</li><li>5.47 – 5.725 GHz</li><li>5.825 – 5.850 GHz</li></ul> <p>Note:</p> <p>Indonesia only supports 5.725 - 5.825 GHz (CH149 - CH161)</p>
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 <sup>1</sup>	<ul style="list-style-type: none"><li>IEEE and WiFi compliant 64 / 128 bit WEP encryption for a mode only</li><li>AES-CCMP: 128 bit in hardware</li><li>802.1x authentication</li><li>WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and /</li><li>WPA2 certification</li><li>IEEE 802.11i</li><li>Cisco Certified Extensions, all versions through CCX4 and C Lite</li><li>WAPI</li></ul>
Sub-channels	Multinational support with frequency bands and channels compliant with 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 <sup>2</sup>	<ul style="list-style-type: none"><li>802.11b : +16dBm minimum</li><li>802.11g : +14dBm minimum</li><li>802.11a : +14dBm minimum</li><li>802.11n HT20(2.4GHz) : +13dBm minimum</li><li>802.11n HT40(2.4GHz) : +13dBm minimum</li><li>802.11n HT20(5GHz) : +12dBm minimum</li><li>802.11n HT40(5GHz) : +12dBm minimum</li></ul>

Technical Specifications

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 <sup>4</sup>	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
Form Factor	Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO and Bluetooth communications
Dimensions	PCI-Express M.2 MiniCard Type 2230 : 2.3 x 22.0 x 30.0 mm
Weight	Or Type 1630 : 2.3 x 16.0 x 30.0 mm Type 2230 : 2.8g
Operating Voltage	Or Type 1630 : 2g 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.	



Technical Specifications

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><tr><td>Modulation</td><td>0.01% BER</td><td>0.001% BER</td></tr><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></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													
Security	All necessary regulatory approvals for supported countries, including												
Certifications	FCC (47 CFR) Part 15C, Section 15.247 & 15.249												
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) <sup>1</sup> Service Discovery Application Profile (SDAP) Dial-Up Networking (DUN) <sup>1,2</sup> Generic Object Exchange Profile (GOEP) <sup>1,2</sup> Object Push Profile (OPP) <sup>1,2</sup> File Transfer Profile (FTP) Synchronization Profile (SYNC) Hard Copy Cable Replacement (HCRP) <sup>1,2</sup> Personal Area Networking Profile (PAN) <sup>1,2</sup> Human Interface Device Profile (HID) <sup>1,2</sup> FAX Profile (FAX) Basic Imaging Profile (BIP) <sup>2</sup> Headset Profile (HSP) Hands Free Profile (HFP) Advanced Audio Distribution Profile (A2DP)												



Technical Specifications

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 Wi-Fi certified
Interoperability Frequency Band	802.11b/g/n <ul style="list-style-type: none"><li>2.402 – 2.482 GHz</li></ul> <div>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.</div>
	802.11a <ul style="list-style-type: none"><li>4.9 – 4.95 GHz (Japan)</li><li>5.15 – 5.25 GHz</li><li>5.25 – 5.35 GHz</li><li>5.47 – 5.725 GHz</li><li>5.825 – 5.850 GHz</li></ul> <div>Note: Indonesia only supports 5.725 - 5.825 GHz (CH149 - CH161)</div>
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"><li>IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only</li><li>AES-CCMP: 128 bit in hardware</li><li>802.1x authentication</li><li>WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.</li><li>WPA2 certification</li><li>IEEE 802.11i</li><li>Cisco Certified Extensions, all versions through CCX4 and CCX Lite</li><li>WAPI</li></ul>
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

Technical Specifications

	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	802.11ac 80MHz(5GHz) : +11dBm minimum Transmit: 2.0 W (max)  Receive: 1.6 W (max)  Idle mode (PSP): 180 mW (WLAN Associated)  Idle mode: 60 mW (WLAN unassociated)
Power Management	Radio disabled: 30 mW ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity <sup>3</sup>	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
Form Factor	Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications
Dimensions	PCI-Express M.2 MiniCard Type 2230 : 2.3 x 22.0 x 30.0 mm
Weight	Or Type 1630 : 2.3 x 16.0 x 30.0 mm Type 2230 : 2.8g  Or  Type 1630 : 2g

<b>Operating Voltage</b>	3.3v +/- 9%
<b>Temperature</b>	Operating 14° to 158° F (–10° to 70° C) Non-operating –40° to 176° F (–40° to 80° C)
<b>Humidity</b>	Operating 10% to 90% (non-condensing) Non-operating 5% to 95% (non-condensing)
<b>Altitude</b>	Operating 0 to 10,000 ft (3,048 m) Non-operating 0 to 50,000 ft (15,240 m)
<b>LED Activity</b>	LED Amber – Radio OFF; LED White – Radio ON

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/q (OFDM modulation).

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><tr><th>Modulation</th><th>0.01% BER</th><th>0.001% BER</th></tr><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></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													
Security	All necessary regulatory approvals for supported countries, including 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) <sup>1</sup> Service Discovery Application Profile (SDAP)												

Technical Specifications

	Dial-Up Networking (DUN) <sup>1,2</sup>
	Generic Object Exchange Profile (GOEP) <sup>1,2</sup>
	Object Push Profile (OPP) <sup>1,2</sup>
Certifications	File Transfer Profile (FTP)
	Synchronization Profile (SYNC)
Bluetooth Profiles Supported	Hard Copy Cable Replacement (HCRP) <sup>1,2</sup>
	Personal Area Networking Profile (PAN) <sup>1,2</sup>
	Human Interface Device Profile (HID) <sup>1,2</sup>
	FAX Profile (FAX)
	Basic Imaging Profile (BIP) <sup>2</sup>
	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 Frequency Band	Wi-Fi certified 802.11b/g/n <ul style="list-style-type: none"><li>2.402 – 2.482 GHz</li></ul>
	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"><li>4.9 – 4.95 GHz (Japan)</li><li>5.15 – 5.25 GHz</li><li>5.25 – 5.35 GHz</li><li>5.47 – 5.725 GHz</li><li>5.825 – 5.850 GHz</li></ul>
	Note:
Data Rates	Indonesia only supports 5.725 - 5.825 GHz (CH149 - CH161) <ul style="list-style-type: none"><li>802.11b: 1, 2, 5.5, 11 Mbps</li><li>802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</li><li>802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</li><li>802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz)</li><li>802.11ac : MCS0 ~ MCS7, (1SS) (20MHz, 40MHz, and 80MHz)</li></ul>
Modulation	Direct Sequence Spread Spectrum
Security <sup>1</sup>	BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM <ul style="list-style-type: none"><li>IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only</li><li>AES-CCMP: 128 bit in hardware</li><li>802.1x authentication</li><li>WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.</li><li>WPA2 certification</li></ul>



Technical Specifications

	<ul style="list-style-type: none"><li>• IEEE 802.11i</li><li>• Cisco Certified Extensions, all versions through CCX4 and CCX Lite</li><li>• WAPI</li></ul>
<b>Network Architecture</b>	Ad-hoc (Peer to Peer)
<b>Models</b>	Infrastructure (Access Point Required)
<b>Roaming</b>	IEEE 802.11 compliant roaming between access points
<b>Output Power<sup>2</sup></b>	<ul style="list-style-type: none"><li>• 802.11b : +16dBm minimum</li><li>• 802.11g : +14dBm minimum</li><li>• 802.11a : +14dBm minimum</li><li>• 802.11n HT20(2.4GHz) : +13dBm minimum</li><li>• 802.11n HT40(2.4GHz) : +13dBm minimum</li><li>• 802.11n HT20(5GHz) : +12dBm minimum</li><li>• 802.11n HT40(5GHz) : +12dBm minimum</li><li>• 802.11ac 80MHz(5GHz) : +11dBm minimum</li></ul>
<b>Power Consumption</b>	Transmit: 2.0 W (max)
	Receive: 1.6 W (max)
	Idle mode (PSP): 180 mW (WLAN Associated)
	Idle mode: 60 mW (WLAN unassociated)
<b>Power Management</b>	Radio disabled: 30 mW
	ACPI and PCI Express compliant power management
<b>Receiver Sensitivity<sup>3</sup></b>	802.11 compliant power saving mode
	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
<b>Antenna type</b>	802.11ac, 2SS, MCS-9 : -58dBm maximum
	High efficiency antenna with spatial diversity, mounted in the display enclosure
<b>Form Factor</b>	Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications
<b>Dimensions</b>	PCI-Express M.2 MiniCard
	Type 2230 : 2.3 x 22.0 x 30.0 mm
	Or
	Type 1630 : 2.3 x 16.0 x 30.0 mm

Technical Specifications

Weight	Type 2230 : 2.8g	
	Or	
Operating Voltage	Type 1630 : 2g	
	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



Technical Specifications

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 (Â±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 Î¼A After being suspended without smart card present: 380 Î¼A
		Power Saving
		Mode
	Features	With card present, before being suspended: 40.6 mA Without card present: 380 Î¼A After being suspended with smart card present: 380 Î¼A
		• 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
		•
		•

Technical Specifications

- 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
	Input Efficiency88% min at 115 VAC / 89% min at 230VAC	
	Input frequency range47 to 63 Hz	
	Output	Input AC current1.4 A at 90 VAC and maximum load
		Output power45W
		DC output19.5V
		Hold-up time5 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 temperature32° to 95° F (0° to 35° C)
		Non-operating (storage) temperature-4° to 121° F (-20° to 85° C)
		Altitude0 to 16,405 ft (0 to 5,000 m)
		Humidity0% to 95%
		Storage Humidity0% 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.



Technical Specifications

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
	Output	Input AC current	1.7 A at 90 VAC, 0.85 A at 180 VAC
		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
	Output	Input AC current	1.7 A at 90 VAC
		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.	

Technical Specifications

Primary Battery

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

TBD

Country of Origin

China

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

Type	Description	Part #
	HP Slim Ultrabook Messenger (up to 15.6" x .88"/22/5mm)	F3W14AA
<b>Cases</b>	HP Slim Ultrabook Top Load (up to 15.6" x .88"/22/5mm)	F3W15AA
<b>Docking</b>	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
<b>Input/Output – Mice</b>	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
<b>Input/Output – Keyboards</b>	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
<b>Input/Output – Adapters</b>	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
<b>Power</b>	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
<b>Batteries</b>	HP CA06XL Notebook Battery	E7U21AA
<b>Security</b>	HP Docking Station Cable Lock	AU656AA#XXX
	HP UltraSlim Keyed Cable Lock	H4D73AA
<b>Storage - External Storage</b>	HP USB External DVDRW Drive	F2B56AA
<b>Misc.</b>	HP 15.6" Notebook PC Privacy Filter	J7H71AA
<b>Displays</b>	HP EliteDisplay S231d 23-in IPS LED BLU Notebook Docking Monitor	F3J72AA

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