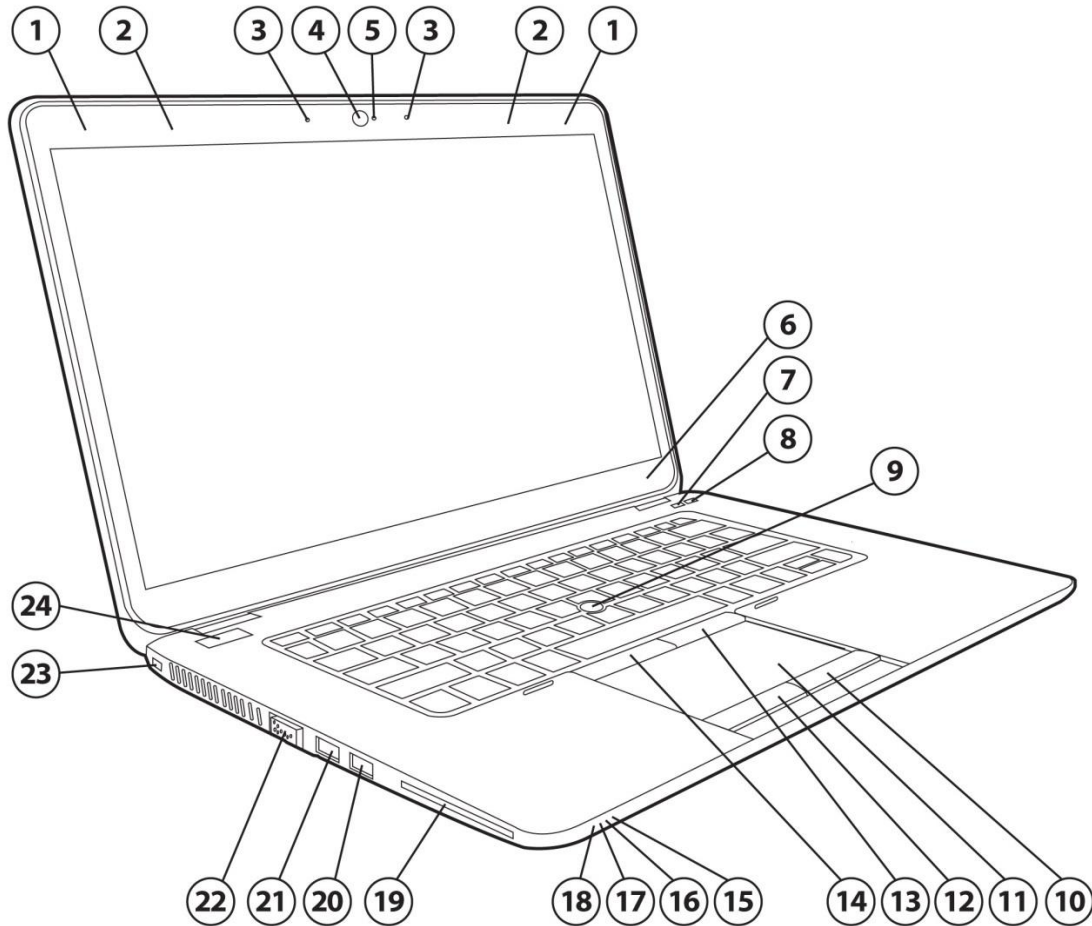


Overview

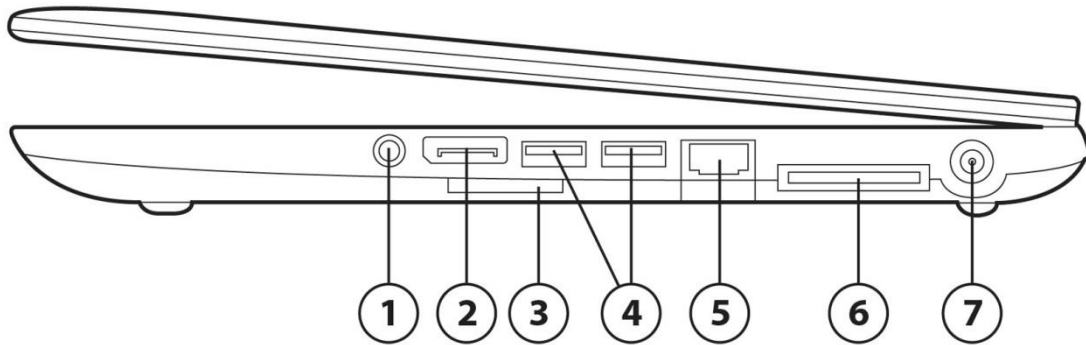
HP ZBook 15u G2 Mobile Workstation



Front/Left View

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

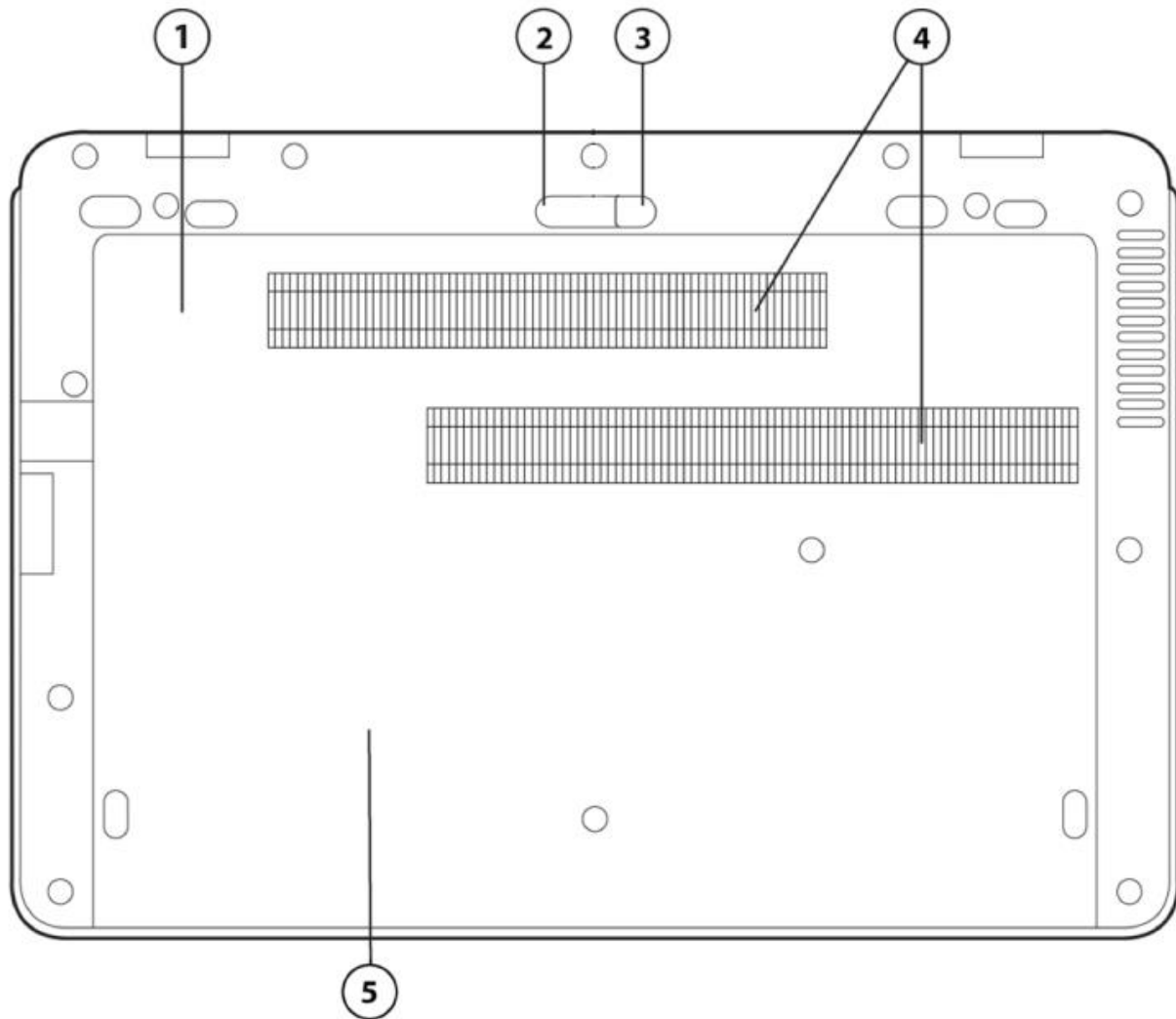
Overview



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



Bottom

1. EasyAccess panel
2. EasyAccess panel release latch
3. Security screw
4. Vents (2)
5. SIM slot (inside the panel)*

Overview

At A Glance

- Windows 10 versions, Windows 8.1 versions, Windows 7 versions, Ubuntu Linux, or FreeDOS
- Thin and light form factor and industrial design
- Durable HP Duracase with magnesium-reinforced chassis, HP DuraFinish with brushed aluminum on top cover and smooth aluminum around top, right, and left sides chassis with hematite /graphite color, HP DisplaySafe frame, latch-less design with precision aluminum-alloy hinges, optional backlight keyboard in full aluminum deck, chemically strengthened glass touchpad, and updated system functions indicators
- Passed the military standard Mil-Std-810G testing for drop, vibration, shock, high temperature, low temperature, temperature shock, dust, altitude, and humidity
- Workstation-caliber AMD® FirePro™ discrete graphics: AMD FirePro™ M4170 (1 GB dedicated GDDR5); AMD Enduro™ graphics technology enabled for improved battery life.
- ISV certified to provide fast and reliable performance with workstation applications, including manipulation of 3D textures
- Choice of 5th generation Intel® Core™ i7 and i5 processors
- Intel Core i7 with vPro and Core i5 with vPro technology (optional)
- HP Performance Advisor for optimal configuration, compatibility and performance
- Up to two DDR3L SODIMMs, for system memory up to 16GB
- Supports up to 3 independent displays via internal LCD Panel, system DisplayPort, system VGA, or using the HP UltraSlim Docking Station DisplayPort and VGA ports (sold separately). Supports DisplayPort 1.2 monitors
- DTS Studio Sound™ HD audio optimized for high fidelity audio with immersive surround sound with deep, rich bass and crystal clear dialog without distortion at high volume
- Primary 3-cell (50 WHr) HP Long Life Battery.
- 2 discrete buttons with LED indicator for convenient one touch access: Wireless On/Off, Volume Mute
- Widescreen 15-inch diagonal anti-glare LED-backlit display:
 - FHD (1920x1080) eDP with PSR with standard viewing angle, FHD (1920x1080) eDP with PSR with ultra-wide viewing angle
- Supports a broad range of WLAN and wireless WAN options, including 4G LTE, for connectivity on the go.
- Internal storage options include:
 - Choice of tool free capable, user-removable hard drive up to 1 TB with HP 3D DriveGuard protection
 - SATA 6 Gb/s 128/180/240/256/512 GB Solid State Drive or 180/256 GB SED Solid State Drive or 256 GB Z Turbo Drive (PCIe SSD)
- Security features including HP Client Security Manager, with central management
- Low halogen, ENERGY STAR certified and EPEAT® TBD registered in the U.S. EPEAT status varies by country- please see epeat.net.
- HP BIOS self-healing technology including HP Sure Start to prevent, detect, and remedy known and unknown BIOS attacks

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

Features

OPERATING SYSTEM

Preinstalled OS	Windows 10 Pro 64 ¹ Windows 10 Home 64 ¹ Windows 8.1 Pro 64 ¹ Windows 8.1 64 ¹ Windows 8.1 Professional 64 for education ¹ Windows 7 Professional 64 (available through downgrade rights from Windows 10 Pro) ² Windows 7 Professional 64 (available through downgrade rights from Windows 8.1 Pro) ³ FreeDOS 2.0 Ubuntu (64-bit) ⁴
Supported OS	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 64 (available through downgrade rights from Windows 8.1 Pro) Windows 7 Professional 64 Windows 7 Professional 32 Windows 10 Enterprise 64 Windows 8.1 Enterprise 64 Windows 7 Enterprise 64 Windows 7 Enterprise 32

¹ Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. Windows 10 is automatically updated, which is always enabled. ISP fees may apply and additional requirements may apply over time for updates. See <http://www.microsoft.com> for details.

² 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.

³ This system is preinstalled with Windows 7 Pro software and also comes with a license and media for Windows 8.1 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.

⁴ Not all features are supported in Ubuntu.

PROCESSOR*

5th Generation Intel® Core™ i7 5600U (2.6 GHz, 4 MB cache, 2 cores)* Up to 3.2 GHz with Intel Turbo Boost Technology

5th Generation Intel® Core™ i7 5500U (2.4 GHz, 4 MB cache, 2 cores)* Up to 3.0 GHz with Intel Turbo Boost Technology

5th Generation Intel® Core™ i5 5300U (2.3 GHz, 3 MB cache, 2 cores)* Up to 2.9 GHz with Intel Turbo Boost Technology

5th Generation Intel® Core™ i5 5200U (2.2 GHz, 3 MB cache, 2 cores)* Up to 2.7 GHz with Intel Turbo Boost Technology

* 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

Features

vary depending on your hardware and software configurations. Intel's numbering is not a measurement of higher performance.

CHIPSET

Non-applicable, processor specific

Features

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, a qualified Intel Centrino® 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 mobile workstations, 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 mobile workstations 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 Intel Core i5 with vPro/Core i7 with vPro technology, such as Intel Active Management technology and Intel Virtualization technology, requires additional third-party software in order to run. Availability of future "virtual appliances" applications for Intel Core i5 with vPro/Core i7 with vPro technology is dependent on third-party software providers. Compatibility with future "virtual appliances" is yet to be determined.

GRAPHICS

Intel HD 5500 Graphics*

AMD FirePro M4170 FireGL (1 GB dedicated GDDR5)

Microsoft DirectX 11.1 (Shader Model 5.0) and OpenGL 4.2 capable

AMD Enduro™ Technology supported.

* Supports up to 3 independent displays via internal LCD Panel, system DisplayPort, system VGA, or using the HP UltraSlim Docking Station DisplayPort and VGA ports (sold separately).

DISPLAY

Internal

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

15.6" diagonal LED-backlit FHD UWVA IPS eDP anti-glare + PSR (1920 x 1080)

External

Up to 30-bit (2³⁰) per pixel "Deep Color"
(total of 1,073,741,824 color variations)

VGA

Port supports resolutions up to 1920 x 1200 at 60 Hz, and lower resolutions up to 75 Hz.

DisplayPort w/MST (Multi-stream Transport)

Supports resolutions up to Full 4K 4096 x 2160, 24/30-bit color depth at 60 Hz, and WUXGA (1920 x 1200) monitors, 24/30-bit color depth at 120 Hz.

DisplayPort Features

- Multi-stream Transport (MST): Multi-stream Transport is a DP 1.2 feature that allows daisy chaining of DP 1.2 monitors (requires monitor with DP 1.2 MST capability), or the use of DP 1.2 hubs with MST to achieve a maximum of 3 active displays.

DVI-D (single link)

DVI support requires a DP-to-DVI adapter (sold separately). Dual-Link DVI is supported with an active USB powered adapter (sold separately).

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

Features

STORAGE AND DRIVES

Primary Storage Bay

Hard Drives*

1 TB 7200rpm SMART SATA III

500 GB 7200 rpm SMART SATA III

500 GB 7200 rpm SMART SATA III Self Encrypting Drive

500 GB 5400 rpm SMART SATA III I Self Encrypting Drive FIPS 140-2 compliant

Solid State Drive

128/180/240/256/512 GB SATA 6 Gb/sec

180/256 GB SATA 6 Gb/sec Self Encrypting Drive

512 GB SSD Opal 2

HP 3D DriveGuard (Windows only)

The hard drive is mounted directly to the notebook frame, reducing the transmission of shock to the hard drive. Uses three-axis digital motion detection with intelligent sensitivity to help protect the hard drive during normal use from shock and vibration. The digital accelerometer temporarily halts all data transfer and parks the hard drive when abrupt motion is detected.

Turbo Drive Storage Slot (M.2)

256 GB up to 512 GB HP Z Turbo Drive (PCIe SSD)

NOTE: If M2 PCIe drive selected, it will be set as primary storage. (Boot drive)

NOTE: If 256 GB Z Turbo Drive (PCIe SSD) is selected, it will be set as the primary storage drive, and any of the HDD and SSD can be configured as secondary storage.

NOTE: For hard drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 16 GB (for Windows 7) of system and up to 30 GB (for Windows 8.1 and 10) disk is reserved for system recovery software.

MEMORY

Standard

DDR3L 1.35V SDRAM (1600 MT/s)

Two SODIMM slots supporting dual-channel memory

4 GB and 8 GB SODIMMs

Maximum

Upgradeable to 16384 MB with optional 8192 MB SODIMMs in both slots

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

Local Area Network (LAN) options

Integrated Intel I218-LM Gigabit Network Connection (10/100/1000)*

Features

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.

Wireless LAN options**

Intel Dual Band Wireless-AN 7265 802.11a/b/g/n (2x2) WiFi + Bluetooth 4.0 Combo Adapter
Intel Dual Band Wireless-AC 7265 802.11a/b/g/n (2x2) WiFi + Bluetooth 4.0 Combo Adapter
Intel Dual Band Wireless-AC 3160 802.11ac (1x1) WiFi and Bluetooth 4.0 Combo Adapter

WWAN *** (Mobile Broadband) options

HP hs3110 HSPA+ Intel® Mobile Broadband Module
HP lt4211 LTE/EV-DO/HSPA+ Gobi™ 4G Mobile Broadband Module
HP lt4112 LTE/HSPA+ Gobi™ 4G Mobile Broadband Module

Intel® Wireless Display (WiDi)****

Intel® WiDi technology enables users to stream content wirelessly from a compatible computer to a projector, TV or monitor.

* 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.

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

*** WWAN is an optional feature and WWAN connection requires wireless data service contract, network support, and is not available in all areas. Contact your service provider to determine the coverage area and availability. Connection speeds will vary based on location, environment, network conditions and other factors. 4G LTE not available on all products, in all regions and only available on products featuring Intel processors.

**** Integrated Intel Wi-Di feature is available on select configurations only and requires separately purchased projector, TV or monitor with an integrated or external Wi-Di receiver.

NEAR FIELD COMMUNICATIONS (NFC)

Chipset	NPC100
System interface	I ² C
Frequency	13.56 MHz
NFC Modes Supported	Reader/Writer, Peer-to-Peer, Card Emulation

AUDIO/MULTIMEDIA

Audio

DTS Studio Sound HD Audio (Windows OS only)

Integrated stereo speakers

Integrated microphone (dual-microphone array when equipped with optional webcam)

Function keys for microphone mute, volume up, volume down Stereo headphone/line out

Stereo microphone/line in

Webcam

Features

720p HD* webcam (select models)

- HD format (widescreen)
- Supports videoconferencing 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

* HD content required to view HD images.

KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS

Keyboard

Optional backlit keyboard with Function key control to toggle backlit brightness setting - off/full/half brightness

The HP spill-resistant keyboard is designed using a thin layer of Mylar film under the keyboard and a drain system that funnels fluid through a hole in the bottom of the notebook. This minimizes the risk of damage to sensitive components underneath. 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, function keys, and 19.05 x 19.05 mm key pitch (center-to-center spacing). U.S. and International key layouts are available. Other features include hot keys for instant access to power conservation and brightness.

Pointing Devices

Touchpad with On/Off button, two-way scroll, gestures, two pick buttons

Point stick with two additional point stick buttons

Image sensor touchpad for enhanced performance and improved precision on scroll and gesture

Buttons and Function Keys

Separate launch buttons provide easy access to the following features: wireless on/off, volume mute. Function keys provide control of the following features: standby mode, external display, volume down, volume up, HP Power Assistant (Windows 7 only), and display brightness.

Features

SOFTWARE AND SECURITY

Preinstalled Software with Windows Operating System

Included	Windows 8	Windows 7
BIOS	HP BIOSphere ¹ HP Sure Start ² HP DriveLock ¹⁹ HP BIOS Protection ³ HP Disk Sanitizer External Edition ⁴ BIOS Update via Network Master Boot Record Security Power On Authentication Pre-Boot Security Secure Erase ⁶ Absolute Persistence Module ⁷	HP BIOSphere ¹ HP Sure Start ² HP DriveLock HP BIOS Protection ³ HP Disk Sanitizer External Edition ⁴ BIOS Update via Network Master Boot Record Security Power On Authentication Pre-Boot Security Secure Erase ⁶ Hybrid Boot Measured Boot Secure Boot Absolute Persistence Module ⁷
MultiMedia	CyberLink Power DVD, BD CyberLink YouCam BE	CyberLink Power DVD, BD
Communication	HP GPS and Location ⁸ HP Connection Manager ⁹ Intel® Wireless Display (WiDi) Software for Windows ¹¹	HP Mobile Connect HP Wireless Hotspot ¹⁰ Intel® Wireless Display (WiDi) Software for Windows ¹¹ HP Roaming Alert Native Miracast Support ¹²
HP Value Add	HP 3D DriveGuard HP ePrint Driver ¹³ HP Hotkey HP PageLift ¹⁴ HP Support Assistant HP Recovery Manager HP Recovery Disk Creator	HP 3D DriveGuard HP ePrint Driver ¹³ HP Hotkey HP PageLift ¹⁴ HP Support Assistant HP Registration App
3rd Party	Foxit PhantomPDF Express	Foxit PhantomPDF Express
Microsoft Products	Buy Office Bing Search	Buy Office Bing Search
Manageability	HP Driver Packs ¹⁵ HP SoftPaq Download Manager (SDM) HP System Software Manager (SSM) ¹⁵ HP BIOS Config Utility (BCU) ¹⁵ HP Client Catalog ¹⁵ HP CIK for Microsoft SCCM ¹⁵ LANDESK Management ¹⁶	HP Driver Packs ¹⁵ HP SoftPaq Download Manager (SDM) HP System Software Manager (SSM) ¹⁵ HP BIOS Config Utility (BCU) ¹⁵ HP Client Catalog ¹⁵ HP CIK for Microsoft SCCM ¹⁵ LANDESK Management ¹⁶

For more information on HP Client Management Solutions refer to:
<http://www.hp.com/go/clientmanagement>

Features

Client Security Software	<ul style="list-style-type: none"> HP Device Access Manager HP Drive Encryption ¹⁷ HP File Sanitizer¹⁸ HP Security Manager Microsoft Security Essentials ¹⁹ 	<ul style="list-style-type: none"> HP Device Access Manager HP Drive Encryption ¹⁷ HP File Sanitizer ¹⁸ HP Security Manager Microsoft Defender
Standard	<ul style="list-style-type: none"> TPM 1.2 Integrated Smart Card Reader Security lock slot Pre-boot Authentication 	<ul style="list-style-type: none"> TPM 1.2 Integrated Smart Card Reader Security lock slot Pre-boot Authentication

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.

For more information on HP Client Security Software Suite, refer to <http://www.hp.com/go/clientsecurity>.

Footnotes:

¹ Available only on business PCs with HP BIOS.

² HP Sure Start is the first and only self-healing technology solution created to protect against malware and virus attacks aimed at the BIOS.

³ May require a manual recovery step if all copies of BIOS are compromised or deleted.

⁴ For the use cases outlined in the DOD 5220.22-M Supplement. Only supports traditional Hard Drives.

⁵ Requires initial user set up.

⁶ For the methods outlined in the National Institute of Standards and Technology Special Publication 800-88.

⁷ 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.

⁸ 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.

⁹ HP Mobile Connect is only available on preconfigured devices with WWAN. For geographic availability refer to <http://www.hp.com/go/mobileconnect>

¹⁰ 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.

¹¹ Integrated Intel® Wi-Di Display is available on select configurations only and requires a separate projector, TV or monitor with an integrated or external Wi-Di receiver. For more information on Intel® Wi-Di Display visit <http://www.intel.com/go/wirelessdisplay>

¹² Miracast is a wireless technology your PC can use to project your screen to TVs, projectors, and streaming media players that also support Miracast. You can use Miracast to share what you're doing on your PC and present a slide show. For more information: <http://windows.microsoft.com/en-us/windows-8/project-wireless-screen-miracast>

¹³ 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 <http://www.hp.com/go/businessmobileprinting>).

¹⁴ Requires Windows 7 or higher

¹⁵ Subscription required.

¹⁶ Data is protected prior to Drive Encryption login. Turning the PC off or into hibernate logs out of Drive Encryption and prevents data access.

¹⁷ For the use cases outlined in the DOD 5220.22-M Supplement. Supports standard Hard Drives. Initial setup required.

¹⁸ Opt in and internet connection required for updates.

¹⁹ HP DriveLock does not support Self Encrypting HDs (SEDs) if the encryption PIN is enabled.

Features

Additional Software Available from the Web

HP SoftPaq Download Manager
HP Software System Manager
Vigyanlabs IPM+

Workstation ISV Certifications

Find the latest list of certifications at: <http://www.hp.com/united-states/campaigns/workstations/partnerships.html>

HP Remote Graphics Software

The remote desktop solution for serious workstation users and their most demanding applications.
Download at: <http://www.hp.com/go/RGS>

HP Performance Advisor

HP Performance Advisor enables optimal configuration of HP Mobile Workstations delivering stability and best performance. HP Performance Advisor will guide your system setup allowing a "custom" configuration that best matches the workstation to user requirements.
Download at: <http://www.hp.com/go/performanceadvisor>

HP Recovery Manager

Models shipped with Windows 7 include HP Recovery Manager. 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 36 GB (for Windows 7) of system and up to 36 GB (for Windows 8) disk is reserved for system recovery software.

Security

See Software section above.

Other Standard Security Features

Integrated Smart Card Reader
One-Step Logon
Common Criteria EAL4+ Augmented Certified Discrete TPM 1.2 Embedded Security Chip
Security lock slot
Support for Intel AT

Optional Security Features

HP Fingerprint Sensor (optional)
Absolute Data Protect* with GPS Tracking - Subscription based security solution providing the ability to track, initiate physical recovery, conduct asset management, and perform remote data delete by utilizing GPS technology. GPS functionality requires HP Mobile Broadband Module.

* The Absolute Data Protect 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.

HP Client Security

HP offers a variety of scalable hardware, software, and BIOS-based security features to help you defend your organization against viruses and other threats. These integrated security features safeguard what matters to you the most - your data,

Features

device and identity. Now, be confident your fleet of devices is protected in multiple layers of HP Client Security protection.

HP BIOS Protection keeps you up and running with enhanced protection against virus attacks and other threats. And if the BIOS is accidentally compromised, the auto recovery feature automatically restores it to its fully functional state.

HP Sure Start detects and negates a BIOS attack with automatic recovery of the BIOS even when the installation is accidentally compromised (i.e. power outage). When HP Sure Start heals the BIOS an event log is generated that an IT administrator can retrieve so the business is aware of a BIOS attack. Golden copy of BIOS is stored in protected nonvolatile memory providing redundant, hardware-based protection against a new generation of attacks. This helps to future-proof your technology and business.

An optional fingerprint reader and integrated Smart Card Reader help keep your identity secure. The security cable slot helps keep your notebook physically secure.

HP Drive Encryption+ with TPM enhanced security protects your data on your hard drive from unauthorized access. Authentication is required before Windows will even start.

Or you can even permanently destroy data on your hard drive in preparation for your system disposal or redeployment with Secure Erase.

This hardware-based solution encrypts and decrypts data as it is written or read from the hard drive and is supported by HP Drive Encryption+. You get faster encryption performance than that of software-based encryption solutions.

+ 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.

POWER

Power Supply

HP 65W Smart AC Adapter
Power cord is 6 feet (1.8 m)

Primary Battery

HP 3-cell Long Life Polymer/Prismatic Battery (50 WHr)

Battery Life

Battery life up to 11 hours and 45 minutes***

*Battery life will vary depending on the 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 MobileMark07 battery benchmark <http://www.bapco.com/products/mobilemark2007> for additional details.

Power Conservation

AMD Enduro™ Technology
Hibernation
Standby
ACPI compliance

Features

ENVIRONMENTAL

US ENERGY STAR®

IT ECO declaration

EPEAT® TBD EPEAT® registered where applicable. EPEAT registration varies by country. See <http://www.epeat.net> for registration status by country.

NOTE: 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.

WEIGHTS & DIMENSIONS

Weight – Non-touch

Starting at 4.23 lb. (1.91 kg) with 3cell 50Whr battery, without hard drive and with 256 GB Z Turbo Drive (PCIe SSD)

Dimensions (h x w x d)

0.84 x 14.78 x 9.98 in 21.42 x 375.5 x 253.6 mm

NOTE: Weight varies by configuration and components.

PORTS/SLOTS

Ports

(1) VGA

(1) DisplayPort 1.2

(1) USB 3.0 Charging Port

(3) USB 3.0 Port

(1) RJ-45 / Ethernet

(1) Side Docking connector

(1) Headphone/Microphone Combo

(1) AC Port

Digital Media Slots

SD UHS-II Flash Media slot - One (Supports next generation SD (Secure Digital), backward compatible to SDHC, SDXC, Integrated Smart Card Reader (Compatible with ISO 7816 compliant Smart Cards PC/SC interface support)

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>

Technical Specifications

SYSTEM UNIT

Stand-Alone Power Requirements (AC Power)	Nominal Operating Voltage	19.5 V dc @ 3.3 A		
	Average Operating Power		Windows 7 (32-bit)	Windows 7 (64-bit)
		AMD FirePro Graphics	16.28 W	16.8 W
Temperature	Max Operating Power	< 65 W		
	Operating	32° to 95° F (0° to 35° C) (not writing optical) 41° to 95° F (5° to 35° C) (writing optical)		
Relative Humidity	Non-operating	-4° to 140° F (-20° to 60° C)		
	Operating	10% to 90%, non-condensing		
Shock	Non-operating	5% to 95%, 101.6° F (38.7° C) maximum wet bulb temperature		
	Operating	40 G, 2 ms, half-sine		
Random Vibration	Non-operating	200 G, 2 ms, half-sine		
	Operating	0.75 grms		
Altitude (unpressurized)	Non-operating	1.50 grms		
	Operating	-50 to 10,000 ft. (-15.24 to 3,048 m)		
Industry Standard Certifications	Non-operating	-50 to 40,000 ft. (-15.24 to 12,192 m)		
	UL	Yes		
	CSA	Yes		
	FCC Compliance	Yes		
	ENERGY STAR®	Select models*		
	EPEAT	Gold target**		
	ICES	Yes		
	Australia / NZ A-Tick Compliance	Yes		
	CCC	Yes		
	Japan VCCI Compliance	Yes		
	KCC	Yes		
BSMI	Yes			
CE Marking Compliance	Yes			
MIL STD 810G	Passed***			

* Configurations that are ENERGY STAR qualified are identified as ENERGY STAR on HP websites and on <http://www.energystar.gov>.

** EPEAT registration varies by country. See <http://www.epeat.net> for registration status by country. EPEAT status listed above applies to U.S.

*** MIL STD 810G testing is not intended to demonstrate fitness for U.S. Department of Defense contract requirements or for military use. Test results are not a guarantee of future performance under these test conditions.

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

Technical Specifications

DISPLAY

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

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	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)	
LCD Mode	TN	
PPI	142 ppi	
Viewing Angle	SVA 30/30/20/10 (Left/Right/Down/Up)	

15.6" diagonal LED-backlit FHD UWVA IPS eDP anti-glare + PSR (1920 x 1080)

Outline Dimensions (W x H x D)	14.17 x 8.83 x 0.15 in (36.0. x 22.43x0.32 cm)	
Active Area	13.55 x 7.62 in (34.42 x 19.36)	
Weight	< 0.79 lb. (360g) (max)	
Diagonal Size	15.6 in (39.62 cm)	
Surface Treatment	Anti-glare	
Contrast Ratio	600:1 (typ) - AG	
Refresh Rate	60 Hz	
Brightness	300 nit (typical)	
Pixel Resolution	Format	1920 x 1080 (FHD)
	Configuration	RGB Stripe
Interface	eDP 1.3+PSR (2 lane)	
LCD Mode	IPS/MVA/FFS	
PPI	142 ppi	
Viewing Angle	UWVA 85/85/85/85	

Technical Specifications

STORAGE AND DRIVES*

Internal Storage

500 GB 5400 rpm SATA FIPS* Hard Drive	Drive Weight	0.25 lbs. (95g)	
	Capacity	500 GB	
	Height	0.28 in (7 mm)	
	Width	2.75 in (70 mm)	
	Interface	ATA-8, SATA 2.6, 3.0 Gb/s, NCQ	
	Transfer Rate	Synchronous (maximum) 300 MB/s (Drive Capability)	
	Seek Time (typical reads, including settling)	Single Track	1.5 ms
		Average	11 ms
		Maximum	22 ms
	Cache	16 MB	
	Rotational Speed	5400 rpm	
	Logical Blocks	976,773,168	
	Operating Temperature	32° to 140° F (0° to 60° C) [ambient temp]	
	Features	ATA Security, TCG Opal SSC 2.0 and FIPS 140-2-level2	
	* FIPS-certified, hardware-based AES-256 encryption image.		

1 TB 7200 rpm SATA Hard Drive	Drive Weight	0.25 lbs. (115g)	
	Capacity	1 TB	
	Height	0.37 in (9.5 mm)	
	Width	2.75 in (70 mm)	
	Interface	ATA-8, SATA 3.0	
	Transfer Rate	Synchronous (maximum) 600 MB/s (Drive Capability)	
	Seek Time (typical reads, including settling)	Single Track	2 ms
		Average	13 ms
		Maximum	15 ms
	Rotational Speed	7200 rpm	
	Logical Blocks	1,953,525,168	
	Operating Temperature	32° to 140° F (0° to 60° C) [ambient temp]	
	Features	ATA Security; S.M.A.R.T., NCQ, Ultra DMA	

500 GB 7200 rpm SATA Hard Drive	Drive Weight	0.20lbs(92g)- 0.21 lbs. (95g)	
	Capacity	500 GB	
	Height	0.28 in (7 mm)/ 0.38 in (9.7 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		

Technical Specifications

	Operating Temperature Features	32° to 140° F (0° to 60° C) [ambient temp] ATA Security; S.M.A.R.T., NCQ, Ultra DMA		
500 GB 7200 rpm SMART SATA 3 Self Encrypting Drive	Drive Weight	0.21 lbs. (115g)		
	Capacity	500 GB		
	Height	0.37 in (9.5 mm)		
	Width	2.75 in (69.85 mm)		
	Interface	ATA-8, SATA 3.0		
	Transfer Rate	Synchronous (maximum)	300 MB/s (Drive Capability)	
	Seek Time (typical reads, including settling)	Single Track	2 ms	
		Average	13 ms	
		Maximum	18 ms	
	Cache	32 MB		
	Rotational Speed	7200 rpm		
Logical Blocks	976,773,168			
Operating Temperature Features	32° to 140° F (0° to 60° C) [case temp] ATA Security; TCG OPAL v1.00			
SATA 6 Gb/s 512 GB, 2.5-inch Solid State Drive	Drive Weight	0.17lb (78g)		
	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	505 MB/s	
		Maximum Sequential Write	470 MB/s	
	Logical Blocks	1,000,215,216		
Operating Temperature Features	32° to 158°F (0° to 70°C) [case temp] ATA Security; DIPM; TRIM; DEVSLP			

Technical Specifications

SATA 6 Gb/s 256 GB, 2.5-inch Solid State Drive	Drive Weight	0.17 lb. (78 g)	
	Capacity	256 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 460 MB/s	Up to 260 MB/s
	Logical Blocks	500,118,192	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	
	Features	ATA Security; DIPM; TRIM	

SATA 6 Gb/s 256 GB, 2.5-inch SATA SED Solid State Drive	Drive Weight	0.17 lb. (78 g)	
	Capacity	256 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 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	

SATA 6 Gb/s 240 GB, 2.5-inch SATA Solid State Drive	Drive Weight	0.17 lb. (78 g)	
	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	
	Logical Blocks	468,862,128	Up to 490 MB/s
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	
	Features	ATA Security; DIPM; TRIM	

SATA 6 Gb/s 180 GB, 2.5-inch Solid State Drive	Drive Weight	0.17 lb. (78 g)	
	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

Technical Specifications

Logical Blocks	351,651,888
Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
Features	ATA Security; DIPM; TRIM; DEVSLP

SATA 6 Gb/s 128 GB, 2.5-inch Solid State Drive

Drive Weight	0.17 lb. (78 g)
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) [case temp]
Features	ATA Security; DIPM; TRIM; DEVSLP

Z Turbo Drive 128 GB, M.2 PCIe Solid State Drive

Drive Weight	0.02 lb. (10 g)
Capacity	128 GB
Height	0.24 in (6.1 mm)
Width	0.87 in (22.1 mm)
Interface	ATA-8, PCIe 2.0
Performance	Maximum Sequential Read Maximum Sequential Write
	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

Technical Specifications

Z Turbo Drive 256 GB, M.2 PCIe Solid State Drive	Drive Weight	0.02 lb. (10 g)	
	Capacity	256 GB	
	Height	0.24 in (6.1 mm)	
	Width	0.87 in (22.1 mm)	
	Interface	ATA-8, PCIe 2.0	
	Performance	Maximum Sequential Read	Maximum Sequential Write
		1.08GB/s	800 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		

Z Turbo Drive 512 GB, M.2 PCIe Solid State Drive	Drive Weight	0.02 lb. (10 g)	
	Capacity	512 GB	
	Height	0.24 in (6.1 mm)	
	Width	0.87 in (22.1 mm)	
	Interface	ATA-8, PCIe 2.0	
	Performance	Maximum Sequential Read	Maximum Sequential Write
		1.17GB/s	930 MB/s
	Endurance (Total Bytes Written):	292 TB	
Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]		
Features	ATA Security; DIPM; TRIM; DEVSLP		

*For hard drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 16 GB (for Windows 7) of system and up to 30 GB (for Windows 8.1 and 10) disk is reserved for system recovery software.

SECURITY

HP Fingerprint Sensor	Voltage	3.0-3.6V
	Operating temperature	14° - 167°F (-10° - 75°C)
	Current consumption image	36mA
	Low latency wait for finger	950 uA
	Capture rate	3000 lines/sec
	ESD Resistance	IEC 6100-4-2 4B (+/-15KV)
	Detection Matrix	200*1 (plus another secondary line); 508 dpi, sensor area 12*3 mm

Technical Specifications

NETWORKING/COMMUNICATION

Intel® I218-LM Gigabit Network Connection	Ethernet Features	<p>10 Mbit/s operation (10BASE-T; IEEE 802.3i; IEEE 802.3 clauses 13-14)</p> <p>100 10 Mbit/s operation (10BASE-T; IEEE 802.3i; IEEE 802.3 clauses 13-14)</p> <p>100 Mbit/s operation (100BASE-TX; IEEE 802.3u; IEEE 802.3 clauses 21-30)</p> <p>1000 Mbit/s operation (1000BASE-T; IEEE 802.3ab; IEEE 8023. Clauses 40)</p> <p>Auto-Negotiation (Automatic Speed Selection)</p> <p>Full Duplex Operation at all Speeds, Half Duplex operation at 10 and 100 Mbit/s</p> <p>IEEE 802.1p QoS (Quality of Service) Support</p> <p>IEEE 802.1q VLAN support</p> <p>IEEE 802.3x Flow Control (IEEE 802.3 clauses 31-32; configurable)</p> <p>IEEE 802.3az EEE(Energy Efficient Ethernet)</p> <p>Jumbo Frame 9K</p> <p>Auto MDI/MDIX Crossover cable detection</p>
	Power Management	ACPI compliant - multiple power modes
	Performance Features	<p>Energy Detect Low Power Mode(Green Ethernet)</p> <p>TCP/IP/UDP Checksum Offload (configurable)</p> <p>Protocol Offload(ARP & NS)</p> <p>Large send offload and Giant send offload</p> <p>Receiving Side Scaling</p> <p>MACSec Offload (802.3ae)</p> <p>Intel vPro</p> <p>iSCSI Boot</p>
	Manageability	<p>Wake-on-LAN from standby and hibernation (Magic Packet and Microsoft Wake-Up Frame); Wake-on-LAN from off (Magic Packet only)</p> <p>PXE 2.1 Remote Boot</p> <p>Statistics Gathering (SNMP MIB II, Ethernet-like MIB, Ethernet MIB (802.3x, clause 30))</p> <p>Comprehensive diagnostic and configuration software suite</p> <p>Virtual Cable Doctor for Ethernet cable status</p>
	Interface	<p>PCI Express 1.1 x1 to fully support ASPM L0s/L1 and CLKREQ.</p> <p>NOTE: Intel 82579 PCIe interface is not PCIe compliant. It operates at half of PCIe specification V1.1 (2.5GT/S) speed.</p>
	NIC Device Driver Name	Intel 82579LM/82579V Ethernet Network Connection

HP hs3110 HSPA+ Intel® Mobile Broadband Module*	Technology/Operating Bands	<p>HSPA+: 2100 (Band1), 1900 (Band 2), 850 (Band 5), 700 (Band 17) MHz</p> <p>E-GPRS: 1900 (Band 2), 1800 (Band 3), 850 (Band 5), 900 (Band 8) MHz</p>
	Wireless Protocol Standards	<p>WCDMA R99, 3GPP Release 5, 6 and 7 UMTS Specification</p> <p>E-GPRS: Class B, Multi-slot class 33, coding schemes CS1 - CS4 and MSC1 - MSC9</p>
	Maximum Data Rates	<p>DC-HSPA+: 42 Mbps (Download), 5.76 Mbps (Upload)</p> <p>HSPA+: 21.6 Mbps (Download), 5.76 Mbps (Upload)</p> <p>EDGE: 236.8 kbps (Download), 236.8 kbps (Upload)</p> <p>GPRS: 85.6 kbps(Download), 85.6 kbps (Upload)</p>
	GPS	Standalone, A-GPS

Technical Specifications

GPS Bands	1575.42 MHz (\pm 1.023 MHz), GLONASS 1596-1607MHz
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)

* Mobile Broadband is an optional feature. 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.

HP It4211 LTE/EV-DO/HSPA+ Gobi™ 4G Mobile Broadband 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 (\pm 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

Technical Specifications

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)

* Mobile Broadband is an optional feature. 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 not available on all products or in all countries.

Technical Specifications

HP It4112 LTE/HSPA+ Gobi™ 4G Mobile Broadband Module	Technology/Operating Bands	LTE: 2100 (Band 1), 1900 (Band 2), 1800 (Band 3), 850 (Band 5), 2600 (Band 7), 900 (Band 8), 800 MHz (Band 20, DD800) MHz HSPA+: 2100 (Band 1), 1900 (Band 2), 850 (Band 5), 900 (Band 8) MHz E-GPRS: 1900 (Band 2), 1800 (Band 3), 850 (Band 5), 900 (Band 8) 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
	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)
	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
	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)
	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)

*Mobile Broadband is an optional feature. 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 not available on all products or in all countries.

Technical Specifications

Intel Dual Band Wireless-AN 7265 802.11a/b/g/n (2x2) Wi-Fi + Bluetooth 4.0 Combo Adapter*	Wireless LAN Standards Interoperability Frequency Band	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n 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	<ul style="list-style-type: none"> • IEEE and Wi-Fi compliant 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware • 802.1x authentication • WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. • WPA2 certification • IEEE 802.11i • Cisco Certified Extensions, all versions through CCX4 and CCX Lite • WAPI
	Sub-channels	Multinational support with frequency bands and channels compliant to local regulations.
	Network Architecture 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 Watts (max) Receive: 1.6 Watts (max) Idle mode ³ (PSP): 180 mW (WLAN Associated) Idle mode: 60 mW (WLAN unassociated) Radio off: 30 mW
	Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode

Technical Specifications

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) -40° to 176° F (-40° to 80° C)
	Non-operating	
Humidity	Operating	10% to 90% (non-condensing)
	Non-operating	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 Off - Radio OFF; Solid LED On - 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 suppliers. WLAN supplier IHV extensions required for Cisco Compatible Extensions support for Microsoft Windows Vista. 	

HP Integrated Module with Bluetooth 4.0+EDR Wireless Technology	Bluetooth Specification	4.0+EDR Compliant	
	Frequency Band	2402 to 2480 MHz	
	Number of Available Channels	79 (1 MHz) available channels	
	Data Rates and Throughput	3 Mbps data rate; throughput up to 2.17 Mbps Synchronous Connection Oriented links up to 3, 64 kbps, voice channels Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric or 1306.9 kbps symmetric	
	Transmit Power	The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of +4 dBm for BR and EDR	
	Receiver Sensitivity	Modulation	0.01% BER

Technical Specifications

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
Antenna	Internally integrated within module
Range	Up to 33 ft. (10 m)
Electrical Interface	USB 2.0 compliant Microsoft Windows Plug and Play compliant
Bluetooth Software Supported	Broadcom Bluetooth for Windows Microsoft Windows Bluetooth Software
Link Topology	Point to Point, Multipoint Pico Nets up to 7 slaves
Security	Full support of Bluetooth Security Provisions
Power Management	Microsoft Windows ACPI, and USB Bus Support

Intel Dual Band Wireless-AC 7265 802.11a/b/g/n (2x2) Wi-Fi and Bluetooth 4.0 Combo Adapter

Wireless LAN Standards	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11ac
Interoperability	Wi-Fi certified
Frequency Band	802.11b/g/n 2.402 - 2.482 GHz 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 <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 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: card will support rates for NSS=1 and NSS=2 for RX and TX for 20 and 40 MHz channels. Short and long guard interval shall be supported. 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 Wi-Fi compliant 64 / 128 bit WEP encryption for a/b/g mode

Technical Specifications

- 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	<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 802.11 compliant power saving mode
Receiver Sensitivity³	802.11g:-90 dBm (6 Mbps), -89 dBm (9 Mbps), -87 dBm (12 Mbps), -85 dBm (18 Mbps), -82 dBm (24 Mbps), -79 dBm (36 Mbps), -76 dBm (48 Mbps), -74 dBm (54 Mbps) 802.11b:-95 dBm (1 Mbps), -93 dBm (2 Mbps), -91 dBm (5.5 Mbps), -88 dBm (11 Mbps) 802.11g:-90 dBm (6 Mbps), -89 dBm (9 Mbps), -87 dBm (12 Mbps), -85 dBm (18 Mbps), -82 dBm (24 Mbps), -79 dBm (36 Mbps), -76 dBm (48 Mbps), -74 dBm (54 Mbps) 802.11n:-69 dBm (150 Mbps), -66 dBm (300 Mbps)
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 Half-MiniCard
Dimensions	0.134 x 1.06 x 1.18 in (3.4 x 26.8 x 30 mm)
Weight	3.1g
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)

Technical Specifications

Altitude	Operating	0 to 10,000 ft. (3,048 m)
	Non-operating	0 to 50,000 ft. (15,240 m)

LED Activity LED Amber - Radio OFF; LED White - Radio ON

1. Check latest software/driver release for updates on supported security features.
2. Maximum output power may vary by country according to local regulations.
3. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).

HP Integrated Module with Bluetooth 4.0+EDR Wireless Technology	Bluetooth Specification	4.0+EDR Compliant	
	Frequency Band	2402 to 2480 MHz	
	Number of Available Channels	79 (1 MHz) available channels	
	Data Rates and Throughput	3 Mbps data rate; throughput up to 2.17 Mbps	
		Synchronous Connection Oriented links up to 3, 64 kbps, voice channels	
		Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric or 1306.9 kbps symmetric	
	Transmit Power	The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of +4 dBm for BR and EDR	
	Receiver Sensitivity	Better than -20 dBm at 0.1 % raw bit error rate	
	Power Consumption	Peak (Tx) 330 mW	
		Peak (Rx) 230 mW	
		Selective Suspend 17 mW	
	Antenna	Internally integrated within module	
	Range	Up to 33 ft. (10 m)	
	Electrical Interface	USB 2.0 compliant	
		Microsoft Windows Plug and Play compliant	
	Bluetooth Software Supported	Broadcom Bluetooth for Windows	
		Microsoft Windows Bluetooth Software	
	Link Topology	Point to Point, Multipoint Pico Nets up to 7 slaves	
	Security	Full support of Bluetooth Security Provisions	
Power Management	Microsoft Windows ACPI, and USB Bus Support		
	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		
	ETS 300 328, ETS 300 826		
	Low Voltage Directive IEC950		
	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}			

Technical Specifications

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)

1. Indicates the profile is supported by Microsoft Windows XP SP2

2. Indicates the profile is part of Windows Vista

* Wireless access point and internet service required. Availability of public wireless access points limited.

Technical Specifications

Intel Dual Band Wireless-AC 3160 802.11 ac (1x1) Wi-Fi and Bluetooth 4.0 Combo* Adapter	Wireless LAN Standards	<ul style="list-style-type: none"> 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/n <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	<ul style="list-style-type: none"> • 802.11b: 1, 2, 5.5, 11 Mbps • 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz) • 802.11ac : MCS0 ~ MCS7, (1SS) (20MHz, 40MHz, and 80MHz)
	Modulation	Direct Sequence Spread Spectrum BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM
	Security¹	<ul style="list-style-type: none"> • IEEE and Wi-Fi 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	<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)

Technical Specifications

	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)

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	Better than -20 dBm at 0.1 % raw bit error rate
	Power Consumption	Peak (Tx) 330 mW Peak (Rx) 230 mW

Technical Specifications

	Selective Suspend 17 mW
Antenna	Internally integrated within module
Range	Up to 33 ft. (10 m)
Electrical Interface	USB 2.0 compliant
	Microsoft Windows Plug and Play compliant
Bluetooth Software Supported	Broadcom Bluetooth for Windows Microsoft Windows Bluetooth Software
Link Topology	Point to Point, Multipoint Pico Nets up to 7 slaves
Security	Full support of Bluetooth Security Provisions
Power Management	Microsoft Windows ACPI, and USB Bus Support 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 ETS 300 328, ETS 300 826 Low Voltage Directive IEC950 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)

1. Indicates the profile is supported by Microsoft Windows XP SP2

2. Indicates the profile is part of Windows Vista

* Wireless access point and internet service required. Availability of public wireless access points limited.

Near Field Communications Controller

Dimensions (L x W x H)	Module 25 mm by 10 mm by 2.0 mm
Chipset	NPC100
System interface	I ² C
NFC RF standards	ISO/IEC 14443 A ISO/IEC 14443 B ISO/IEC 15693 ISO/IEC 18092 ECMA-340 NFCIP-1 Target and Initiator ECMA-320 NFCIP-2
NFC Forum Support	Tag Type 1, Type 2, Type3 and Type 4, NFCIP-1 and NFCIP-2

Technical Specifications

Reader (PCD-VCD) Mode(1)	ISO/IEC 14443 A ISO/IEC 14443 B ISO/IEC 15693 MIFARE 1K MIFARE 4K MIFARE DESFire FeliCa Jewel and Topaz cards												
Card Emulation (PICC-VICC) Mode(1)	ISO/IEC 14443 A ISO/IEC 14443 B and B' MIFARE FeliCa												
Frequency	13.56 MHz												
NFC Modes Supported	Reader/Writer, Peer-to-Peer, Card Emulation												
Raw RF Data Rates	106, 212, 424, 848 kbps												
Operating temperature	0°C to 70°C												
Storage temperature	-20°C to 125°C												
Humidity	10-90% operating 5-95% non-operating												
Supply Operating voltage	2.97 to 5.5 Volts												
I/O Voltage	1.8V or 3.3V												
Power Consumption (Booster enable, VBAT= 3.3V, VCC_BOOST = 5V)	<table> <thead> <tr> <th>Mode</th> <th>Power Consumption, Typical⁽²⁾</th> </tr> </thead> <tbody> <tr> <td>Polling</td> <td>7.3 mA</td> </tr> <tr> <td>Detected Test Tag Type 1</td> <td>Total 283.8 mA Net Module 236.8 mA</td> </tr> <tr> <td>Detected Test Tag Type 2</td> <td>Total 288.8 mA Net Module 241.8 mA</td> </tr> <tr> <td>Detected Test Tag Type 3</td> <td>Total 287.7 mA Net Module 240.7 mA</td> </tr> <tr> <td>Detected Test Tag Type 4</td> <td>Total 282.3 mA Net Module 235.3 mA</td> </tr> </tbody> </table>	Mode	Power Consumption, Typical ⁽²⁾	Polling	7.3 mA	Detected Test Tag Type 1	Total 283.8 mA Net Module 236.8 mA	Detected Test Tag Type 2	Total 288.8 mA Net Module 241.8 mA	Detected Test Tag Type 3	Total 287.7 mA Net Module 240.7 mA	Detected Test Tag Type 4	Total 282.3 mA Net Module 235.3 mA
Mode	Power Consumption, Typical ⁽²⁾												
Polling	7.3 mA												
Detected Test Tag Type 1	Total 283.8 mA Net Module 236.8 mA												
Detected Test Tag Type 2	Total 288.8 mA Net Module 241.8 mA												
Detected Test Tag Type 3	Total 287.7 mA Net Module 240.7 mA												
Detected Test Tag Type 4	Total 282.3 mA Net Module 235.3 mA												
Antenna	Antenna connector, 0.5mm pitch, 7 connector FPC. Antenna matching is external to module.												

AUDIO/MULTIMEDIA - DTS SOUND+

Hardware	Implementation	Realtek ALC3228
	Function Key	Volume up, volume down, and mute
	Volume Controls	
	Full Duplex	Yes
	Microphone In	Stereo
	Headphone/Line Out	Stereo
	Integrated Microphone	Yes, dual digital microphone array when equipped with optional webcam

Technical Specifications

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

Technical Specifications

POWER

HP 65W Smart AC Adapter	Dimensions	4.17 x 1.85 x 1.1 in (10.6 x 4.7 x 2.8 cm)	
	Weight	0.62 lb. (280 g)	
	Input	100 to 240 VAC	
		Input Efficiency	87% min at 115 VAC/230VAC
		Input frequency range	47 to 63 Hz
		Input AC current	1.7 A at 90 VAC, 0.85 A at 180 VAC
	Output	Output power	65W
		DC output	18.5V
		Hold-up time	5 msec at 115 VAC input
		Output current limit	<11A, Over voltage protection- 29V max automatic shutdown
	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 149° F (-20° to 65° C)
		Altitude	0 to 10,000 ft. (0 to 3,048 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.		

3-cell HP Long Life (50Whr) Lithium-Ion Polymer	Dimensions (H x W x L)	7.8 x 4.01 x 0.3 in(19.89x10.28x0.84 cm)	
	Weight	280 g	
	Cells/Type	3-cell Lithium-Ion Polymer	
	Energy	Voltage	11.1
		Amp-hour capacity	4.504Ah
		Watt-hour capacity	50Wh
	Temperature	Operating (Charging)	32° to 113° F (0° to 45° C)
		Operating (Discharging)	14° to 140° F (-10° to 60° C)
		Non-operating	-4° to 140° F (-20° to 60° C)
	Battery Re-Charge Time	System in OFF or Standby Mode	3 hours
Fuel Gauge LED	No		
Warranty	1 year or 3 years*		

*Battery warranty depends on the platform warranty.

Technical Specifications

Optional Travel Battery Available	No
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Country of Origin

China

Technical Specifications

ENVIRONMENTAL DATA

Eco-Label Certifications & declarations

This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:

- IT ECO declaration
- US ENERGY STAR®
- EPEAT Gold registered in the United States. See <http://www.epeat.net> for registration status in your country.

System Configuration

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
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

Longevity and Upgrading

This product can be upgraded, possibly extending its useful life by several years. Upgradeable features and/or components contained in the product may include:

- 4 USB ports
- 1 Memory Card reader
- 1 Docking Port
- 2 SODIMM memory slots
- Optional expansion base docking station

Spare parts are available throughout the warranty period and or for up to “5” years after the end of production.

Technical Specifications

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)

Technical Specifications

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

Packaging Usage

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

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

End-of-life Management and Recycling

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

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

Hewlett-Packard Corporate Environmental Information

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

Global Citizenship Report

<http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html>

Eco-label certifications

<http://www8.hp.com/us/en/hp-information/environment/ecolabels.html>

ISO 14001 certificates:

http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/PC_GBU_Product_Design_ISO_14K_Certificate.pdf

and

<http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf>

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

Type	Description	Part #
Memory	HP 4 GB DDR3L-1600 1.35V SODIMM	H6Y75AA#xxx
	HP 8 GB DDR3L-1600 1.35V SODIMM	H6Y77AA#xxx
Cases	HP Business Top Load Case (fits up to 15.6")	H5M92AA
	HP Business Backpack (fits up to 17.3")	H5M90AA
	HP Essential Top Load Case (up to 15.6")	H2W17AA#xxx
	HP Professional Leather Case (up to 17.3")	H4J94AA
	HP Business 4 Wheel Roller Case (fits up to 17.3")	H5M93AA
Docking	HP Adjustable Dual Monitor Stand	AW664AA#xxx
	HP Adjustable Display Stand	AW663AA#xxx
	HP UltraSlim Docking Station	D9Y32AA#xxx
Input/Output - Mice	HP Wireless Mobile Mouse	H2L63AA
	HP Stylish USB KB/Mouse	H4B80AA#xxx
Adapters	HP 90W Slim AC Adapter	H6Y83AA#xxx
	HP 65W Slim AC Adapter	H6Y82AA#xxx
	HP 90W Slim Combo Adapter w/USB Adapter	H6Y84AA#xxx
Storage - External Storage	HP External USB Optical Drive (expected availability 10/1/13)	F2B56AA#xxx
	HP External USB Optical Drive	F2B56AA
	HP 500GB 7200rpm HDD	F3B97AA
	HP 750GB 7200rpm HDD	H2P67AA
	HP 128GB Solid State Drive	F4P50AA
	HP 180GB Solid State Drive	H4T75AA
	HP 512GB Solid State Drive	J2V75AA
Health and Education	HP 20-Notebook Managed Charging Cart	QL489AA#xxx
	HP 20-Notebook Charging Cart	QL488AA#xxx
	HP 30-Notebook Managed Charging Cart	QL490AA#xxx
	HP 30-Notebook Charging Cart	H4F31AA#xxx
Security	HP Docking Station Cable Lock	AU656AA#xxx
	HP UltraSlim Keyed Cable Lock	H4D73AA
Wireless	HP hs3110 HSPA+ Mobile Module	E5M76AA

NOTE: External power supplies, power cords, cables and peripherals are not low halogen. Service parts obtained after purchase may not be low halogen.

Summary of Changes

Date of change:	Version History:		Description of change:
February 1, 2015	From v1 to v2	Added	VGA port from PORTS/SLOTS section, Environmental data.
March 1, 2015	From v2 to v3	Added	MIL STD 810G, 128GB Z Turbo Drive, 512 GB SSD Opal 2
April 1, 2015	From v3 to v4	Added	Battery life
		Changed	Memory nomenclature
		Removed	ODD and Battery options
May 1, 2015	From v4 to v5	Added	DriveLock support disclaimer in Features section
May 2, 2015	From v5 to v6	Removed	Intel Dual Band Wireless-NB 7265 802.11 a/b/g/n (2x2) WiFi Adapter
July 1, 2015	From v6 to v7	Added	HP Z Turbo Drive (PCIe SSD) 256 and 512GB, Battery life
		Removed	HP MWS HDD/SDD Bracket Only/J2D73AA and HP CM03XL - notebook battery/E7U24AA from Options and Accesories
August 17, 2015	From v7 to v8	Added	Windows 10 in Operative Systems Overview and Features sections
October 16, 2015	From v8 to v9	Changed	Full 4K Supports resolutions in Features, DisplayPort in Display section
November 24, 2015	From v9 to v10	Added	Note about Boot priority for M2 PCIe in Storage section

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