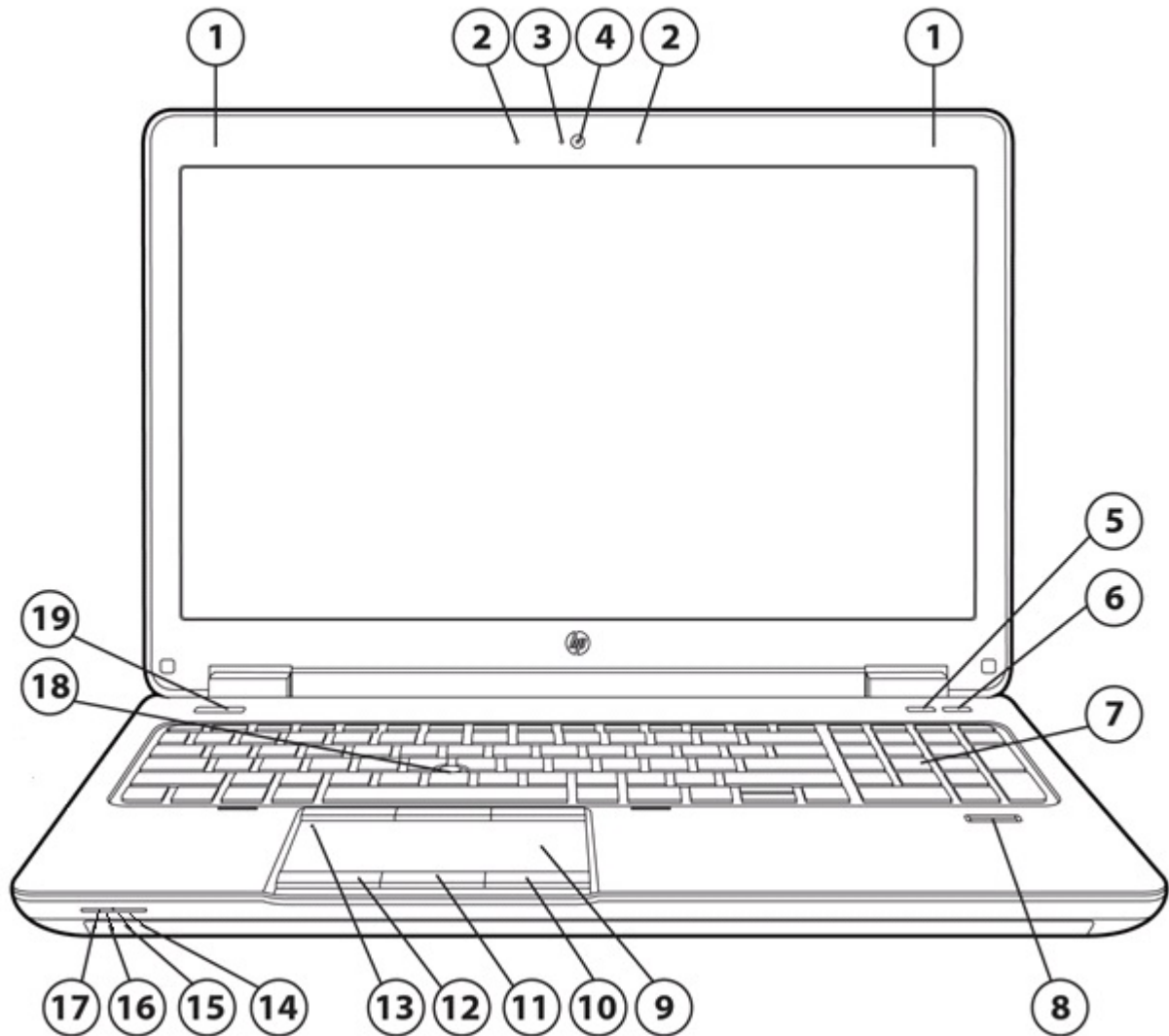
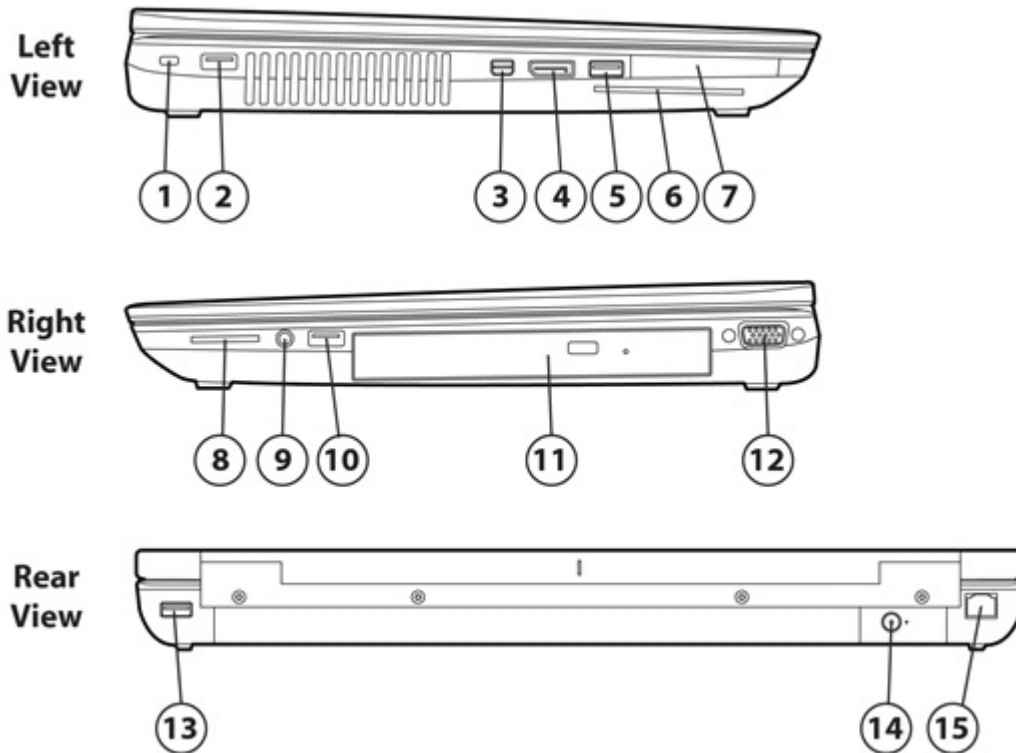


### Overview



- |  |                                     |
|--|-------------------------------------|
| 1. WLAN antennas (2)                       | 11. Center Touchpad button          |
| 2. Internal microphones (2)                | 12. Left Touchpad button            |
| 3. Webcam light (with webcam)              | 13. Touchpad on/off button with LED |
| 4. Webcam                                  | 14. Hard drive light                |
| 5. Wireless button                         | 15. AC adapter/Battery light        |
| 6. Volume mute button                      | 16. Power light                     |
| 7. Numeric keypad                          | 17. Wireless light                  |
| 8. Fingerprint reader (select models only) | 18. Pointstick                      |
| 9. Touchpad with scroll zone               | 19. Power button                    |
| 10. Right Touchpad button                  |                                     |

### Overview



- |                          |  |
|--------------------------|--|
| 1. Security cable slot   | 9. Audio-out (headphone) jack/Audio in (microphone) jack |
| 2. USB 2.0 port          | 10. USB 3.0 port   |
| 3. Thunderbolt port*     | 11. Optical drive (select models only)                   |
| 4. DisplayPort           | 12. External monitor port                                |
| 5. USB 3.0 charging port | 13. USB 3.0 port   |
| 6. Smart card reader     | 14. Power connector                                      |
| 7. ExpressCard port      | 15. RJ-45 (network) jack/lights (2)                      |
| 8. Memory card reader    |  |

\* Thunderbolt is new technology. Install all the latest drivers for your Thunderbolt device before connecting the device to the Thunderbolt port. Thunderbolt cable and Thunderbolt device (sold separately) must be compatible with Windows. To determine whether your device is Thunderbolt Certified for Windows, see <https://thunderbolttechnology.net/products>.

### Overview

#### At A Glance

- Windows 8 versions, Windows 7 versions, SuSE Linux, or FreeDOS
- All new, thinner and lighter form factor and industrial design for 2013. 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, backlight keyboard in full aluminum deck, chemically strengthened glass touchpad, and updated system functions indicators
- Designed to meet the military standard Mil-Std-810G for drop, vibration, shock, high temperature, low temperature, temperature shock, dust, altitude, and humidity\*
- Workstation-caliber NVIDIA® Quadro® discrete graphics: NVIDIA Quadro K610M (1GB GDDR5), NVIDIA Quadro K1100M (2GB GDDR5), NVIDIA Quadro K2100M (2GB GDDR5); NVIDIA Optimus technology enabled for improved battery life.
- ISV certified to provide fast and reliable performance with workstation applications, including manipulation of 3D textures
- Choice of 4th generation Intel® Core™ i7 and i5 processors
- Intel Core i7 with vPro and Core i5 with vPro technology (optional)
- Intel Smart Response Technology support for higher system performance with a hard drive
- HP Performance Advisor for optimal configuration, compatibility and performance
- Up to four SODIMMs on configurations with quad-core processor, for system memory up to 32 GB
- Supports multi-display, including up to four without a docking station (both with and without hybrid graphics enabled), up to four with HP Advanced Docking Station (sold separately) without hybrid graphics enabled and up to five with HP Advanced Docking Station (sold separately) and hybrid graphics enabled
- New Thunderbolt port\*\* for high speed data/video/audio transfer support
- Thunderbolt port can be connected to monitors supporting DisplayPort 1.2 to achieve HBR2 and MST functionality.
- 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
- Choice of battery solutions: 8-cell (83 WHr) or 8-cell (75 WHr) HP Long Life Battery, combined with optional external batteries for extended life.
- 2 discrete buttons with LED indicator for convenient one touch access - Wireless On/Off, Volume Mute
- Widescreen 15.6-inch diagonal anti-glare LED-backlit display:  
HD (1920x1080) eDP with standard viewing angle, FHD (1920x1080) eDP with PSR (Panel Self Refresh) with ultrawide viewing angle, or FHD ultrawide viewing angle with HP DreamColor Technology
- Flexible wireless connectivity options:
  - Integrated Intel Centrino® 802.11 ac 2x2 + Bluetooth 4.0 LE\*\*, Intel Centrino 802.11 a/b/g/n 2x2 + Bluetooth 4.0 LE, or Intel Centrino a/b/g/n 2x2 wireless LAN modul
  - Optional integrated wireless 3G or 4G (LTE) mobile broadband module support
- Choice of tool free capable, user-removable hard drive up to 1 TB with HP 3D DriveGuard protection, or SATA 6 Gb/s 128/180/240/256/512\*\*\* GB Solid State Drive or 256 GB SED Solid State Drive
- Security features including HP Client Security Manager, with central management
- Low halogen\*\*\*\*, ENERGY STAR qualified 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.

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

\*\* Thunderbolt is new technology. Install all the latest drivers for your Thunderbolt device before connecting the device to the Thunderbolt port. Thunderbolt cable and Thunderbolt device (sold separately) must be compatible with Windows. To determine whether your device is Thunderbolt Certified for Windows, see <https://thunderbolttechnology.net/products>.

\*\*\* Available in October, 2013.

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

### Features

#### OPERATING SYSTEM

<b>Preinstalled</b>	Windows 8 Pro 64*
	Windows 7 Professional (available through downgrade rights from Windows 8 Pro)**
	Windows 8 64*
	Windows 7 Professional 64*
	SuSE Linux Enterprise (SLED 11) SP2 64bit FreeDOS
<b>Supported</b>	Windows 8 Enterprise 64*
	Windows 7 Professional 32***
	Windows 7 Enterprise 32***
	Windows 7 Enterprise 64***
	Windows 7 Ultimate 32***
	Windows 7 Ultimate 64***
	SuSE Linux Enterprise Desktop 11 SP2 64bit
<b>Certified</b>	SuSE Linux Enterprise Desktop 11 SP2 64bit

\* Not all features are available in all editions of Windows 8. Systems may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows 8 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.

\*\*\* Not all features are available in all editions of Windows 7. This system may require upgraded and/or separately purchased hardware to take full advantage of Windows 7 functionality. See <http://www.microsoft.com/windows/windows-7/> for details.

#### PROCESSOR\*

4<sup>th</sup> Generation Intel® Core™ i7-4900MQ (2.8 GHz, 1600MHz, 8 MB L3 cache, 4 cores, 47W)\*

Up to 3.80 GHz with Intel Turbo Boost Technology

4<sup>th</sup> Generation Intel® Core™ i7-4800MQ (2.7 GHz, 1600MHz, 6 MB L3 cache, 4 cores, 47W)\*

Up to 3.70 GHz with Intel Turbo Boost Technology

4<sup>th</sup> Generation Intel® Core™ i7-4700MQ (2.4 GHz, 1600MHz, 6 MB L3 cache, 4 cores, 47W) (no vPro support)\*

Up to 3.40 GHz with Intel Turbo Boost Technology

4<sup>th</sup> Generation Intel® Core™ i7-4600M (2.90 GHz, 1600 MHz, 4 MB L3 Cache, 2 cores, 37W)

Up to 3.60 GHz with Intel Turbo Boost Technology

4<sup>th</sup> Generation Intel® Core™ i5-4330M (2.80 GHz, 1600 MHz, 3 MB L3 Cache, 2 cores, 37W)

Up to 3.50 GHz with Intel Turbo Boost Technology

Intel Dual-Core i5-4300M (2.60 GHz, 1600 MHz, 3 MB L3 Cache, 4 threads, 37W)

Up to 3.30 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 vary depending on your hardware and software configurations. Intel's numbering is not a measurement of higher performance.

**NOTE:** NVIDIA Optimus is enabled by default. If you choose to disable this functionality, Intel® integrated graphics will not be used.

### Features

#### CHIPSET

Mobile Intel® QM87

#### 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

NVIDIA Quadro K610M with 1 GB dedicated GDDR5 video memory

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

NVIDIA Quadro K1100M with 2 GB dedicated GDDR5 video memory

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

NVIDIA Quadro K2100M with 2 GB dedicated GDDR5 video memory

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

NVIDIA Optimus Technology supported

**NOTE:** NVIDIA Quadro mobile professional graphics support up to four independent displays when using an HP Advanced Docking station (sold separately) without hybrid graphics enabled, and up to 5 with Hybrid graphics enabled.

### Features

#### DISPLAY

##### Internal

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

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

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

##### External

Up to 32-bit per pixel color depth

##### Thunderbolt\*

Supported as part of the daisy chain connected with Intel approved thunderbolt cables. For additional information, please visit <https://thunderbolttechnology.net/>.

##### Thunderbolt Features

- Legacy : DP 1.1a, DVI-A/D, HDMI and VGA displays attached to the end of the thunderbolt daisy chain via Intel certified dongles
- DP 1.2 redrive: DisplayPort monitors capable of supporting DP 1.2 may be directly attached to the Thunderbolt port to achieve HBR2 and MST functionality.
- DP display with miniDP connector may be attached directly to TB (Thunderbolt) port.
- DP display with standard DP connector and other legacy displays (HDMI, DVI, VGA) may be attached to TB with the use of a dongle.
- DP1.2 MST feature ("daisy-chain" feature) is supported through TB port.

\* Thunderbolt is new technology. Install all the latest drivers for your Thunderbolt device before connecting the device to the Thunderbolt port. Thunderbolt cable and Thunderbolt device (sold separately) must be compatible with Windows. To determine whether your device is Thunderbolt Certified for Windows, see <https://thunderbolttechnology.net/products>.

##### DisplayPort w/MST (Multi-stream Transport)

Supports resolutions up to QFHD 3840 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 Feature

- Multi-stream Transport (MST): Multi-stream Transport is a DP 1.2 feature that allows daisy chaining of DP 1.2 monitors (requires built in support of DP 1.2 MST in monitor), or the use of DP 1.2 hubs with MST to achieve 4 active displays without a docking station.

##### VGA

Port supports resolutions up to 2048 x 1536 at 75 Hz, and lower resolutions at up to 100 Hz

##### DVI-D (single link)

Video signal available through DVI port in optional HP Docking Station (sold separately), as well as through DisplayPort to DVI-D; DisplayPort to DVI-D (dual link); and DisplayPort to HDMI adapters.

Supports resolutions up to 1600 x 1200 at both full and reduced blanking, and 1920 x 1200 at reduced blanking

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

### Features

#### FLASH CACHE MODULE

Optional mSATA Flash cache module support for Intel Smart Response Technology. (Available only with standard non-SED hard drive. Cannot be combined with any solid state drive.)

#### STORAGE AND DRIVES

##### mSATA Storage Bay

128GB mini-card Solid State Drive (coming soon)

(**NOTE:** cannot be combined with the mSATA Flash Cache Module)

##### Primary Storage Bay

##### Hard Drives

320/500/750 GB 7200 rpm SMART SATA II

1 TB 5400 rpm SMART SATA II

500 GB 7200 rpm SMART SATA II Self Encrypting Drive

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

##### 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.

##### Solid State Drive

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

256 GB SATA 6 Gb/sec Self Encrypting Drive

**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) disk is reserved for system recovery software.

#### OPTICAL DRIVES

##### Fixed 9.5 mm SATA optical drive

Blu-ray R/RE DVD+/-RW SuperMulti DL Drive

Blu-ray ROM DVD+/-RW SuperMulti DL Drive

DVD+/-RW SuperMulti DL Drive

DVD-ROM Drive

##### Second hard drive

750 GB 7200 rpm SMART SATA II Hard Drive

512 GB SATA 6 Gb/sec Solid State Drive

256 GB SATA 6 Gb/sec Self Encrypting Drive

RAID 0 and 1 supported

##### Weight saver

### Features

#### MEMORY

##### Standard

DDR3L 1.35V SDRAM (1600 MHz)

Two SODIMM slots (Dual-core processor) or four SODIMM slots (Quad-core processor) supporting dual-channel memory  
2 GB, 4 GB, and 8 GB SODIMMs

##### Maximum

Upgradeable to 16384 MB with optional 8192 MB SODIMMs in both slots (Dual-core processor)

Upgradeable to 32768 MB with optional 8192 MB SODIMMs in all 4 slots (Quad-core processor)

##### Dual-channel

Maximized dual-channel performance requires SODIMMs of the same size and speed in both memory slots.

**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. With Windows Starter 32-bit operating systems, the amount of usable memory is dependent upon your configuration, so that above 3 GB all memory may not be available due to system resource requirements.

#### 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.

##### Mobile Broadband options

HP hs3110 HSPA+ Mobile Broadband Module\*

HP lt4111 LTE/EV-DO/HSPA+ Gobi4G Module\*

##### All 802.11 integrated wireless LAN options

Intel Dual Band Wireless-AC 7260 802.11 ac (2x2) + Bluetooth 4.0 LE Combo

Intel Centrino® Advanced-N 6235 802.11 a/b/g/n (2x2) + Bluetooth 4.0 LE Combo

Intel Centrino® Advanced-N 6205 802.11 a/b/g/n (2x2)

##### Communications

Integrated Integrated Intel I217-LM Gigabit\*\* Network Connection (vPro configurations)

\* Wireless use requires separately purchased service contract. Check with your local vendor for coverage area and availability in your area. Connection and speeds will vary due to location, environment, network conditions, and other factors. 4G compatibility with HSPA+ and LTE.

\*\* 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.

**NOTE:** WWAN is not available with DreamColor displays.



### Features

#### AUDIO/MULTIMEDIA

##### Audio

DTS Studio Sound HD audio (Windows OS only)  
Integrated stereo speakers  
Integrated microphone (dual-microphone array when equipped with optional webcam)  
Button for volume mute; function keys for volume up and down  
Combo mic-in / stereo headphone-out jack

##### Webcam

Optional 720p HD webcam

- 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

#### 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, three pick buttons  
Pointstick with three additional pointstick 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.

#### SOFTWARE AND SECURITY

##### Preinstalled Software with Windows Operating System

##### Windows 8

##### Security

Absolute Data Protect  
Computrace\* (removed from UI on activation)  
Device Access Manager with Just In Time Authentication

##### Windows 7

##### Security

Computrace\* (removed from UI on activation)  
Device Access Manager with Just In Time Authentication  
Drive Encryption (FIPS 140-2)

### Features

DigitalPersona Fingerprint Driver  
Drive Encryption (FIPS 140-2)  
HP File Sanitizer (Activated via Wizard)  
HP Client Security (incl. Cred Mgr and Password Mgr)  
HP SpareKey  
HP Trust Circles Standard  
Microsoft Defender  
Privacy Manager (Web only)  
Validity Fingerprint Driver

#### BIOS Features

Absolute Persistence Module (for all Absolute products)  
HP Sure Start  
HP Automatic Drive Lock  
HP BIOS Protection (Follow NIST 800-147, 155 Guidelines)  
HP Disk Sanitizer (Not for SSD)  
HP DriveLock  
HP SpareKey  
Hybrid Boot  
Master Record Security (backup/restore)  
Measured Boot  
Power On Authentication  
Pre-Boot Security  
Secure Boot  
Secure Erase (SSD & HDD)  
Update via Network

#### MultiMedia

Cyberlink Power2Go  
Cyberlink PowerDVD

#### HP Value Add

Digital Energy Star Logo W8  
Getting Started with Windows 8  
HP 3D DriveGuard  
HP ePrint Driver  
HP Firmware & Driver Installer  
HP Hotkey Support  
HP Manageability  
HP PageLift App  
HP Performance Advisor  
HP Quick Start  
HP Registration App  
HP Remote Graphics  
HP Setup  
HP Software Setup  
HP Support Assistant  
HP WallPaper

HP File Sanitizer (Activated via Wizard)  
HP Client Security (incl. Cred Mgr and Password Mgr)  
HP SpareKey  
HP Trust Circles Standard  
Microsoft Security Essentials  
Privacy Manager (Web only)  
Validity Fingerprint Driver

#### BIOS Features

Absolute Persistence Module (for all Absolute products)  
HP Sure Start  
HP Automatic Drive Lock  
HP BIOS Protection (Follow NIST 800-147, 155 Guidelines)  
HP Disk Sanitizer (Not for SSD)  
HP DriveLock  
HP SpareKey  
Hybrid Boot  
Master Record Security (backup/restore)  
Measured Boot  
Power On Authentication  
Pre-Boot Security  
Secure Boot  
Secure Erase (SSD & HDD)  
Update via Network

#### MultiMedia

Cyberlink Power2Go  
Cyberlink PowerDVD  
Cyberlink YouCam BE

#### HP Value Add

HP Ceement  
HP 3D DriveGuard  
HP ePrint Driver  
HP Hotkey Support  
HP Manageability  
HP PageLift Desktop App  
HP Performance Advisor  
HP Recovery Manager  
HP Remote Graphics  
HP Setup  
HP Software Setup  
HP Support Assistant  
HP Recovery Disc Creator (HPRDC)  
HP WallPaper  
Internet Explorer 9  
Internet Explorer 10

### Features

Internet Explorer 9  
Internet Explorer 10  
IE Home  
System Default Settings for Win8  
UEFI System Diagnostics W8  
Wireless Button Driver  
Amazon Kindle App  
PDF Complete, Corporate Edition  
Box.Net (UK only)  
Box 50GB CMIT Cloud Offer  
BTB Host and ISP Stub  
BTB Host End Block  
Bing Search for IE10  
Netflix App  
Skype App  
Skype RTC Insertion (Windows 8.1)

IE Home  
Wireless Button Driver  
Adobe Flash Player (Commercial)  
PDF Complete, Corporate Edition  
Box.Net (UK only)  
Box 50GB CMIT Cloud Offer  
BTB Host and ISP Stub  
BTB Host End Block  
Bing Search for IE9  
Bing Search for IE10  
Skype Desktop App

#### Microsoft Products

Buy Office  
Lync Optimized

#### Microsoft Products

Buy Office  
Lync Optimized

#### Additional Software Available from the Web

HP SoftPaq Download Manager  
HP Software System Manager  
HP Peak Power Manager

#### Workstation ISV Certifications

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

#### HP Remote Graphics Software

The remote desktop solution for serious workstation users and their most demanding applications.  
Download at: [www.hp.com/go/RGS](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: [www.hp.com/go/performanceadvisor](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

### Features

See Software section above.

#### Other Standard Security Features

Integrated Smart Card Reader  
HP Spare Key (requires initial user setup)  
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)  
Computrace\* 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 Computrace 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.

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## HP CENTRAL MANAGEMENT

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, 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.

HP provides a separate management solution, targeted at the enterprise and the SMB:

### Features

Digital Persona Pro Workgroup: Designed for the small business customer. Provides features similar to the Active Directory version, but for workgroups. Workgroup activation is built into HP ProtectTools, and activation of up to 5 seats is completely free.

For more information on Central Management for HP ProtectTools, refer to: <http://www.hp.com/products/security>

### POWER

#### Power Supply

External HP 150W Slim Smart AC adapter  
(167.0 x 82.0 x 25.4mm)

External HP 200W Slim Smart AC adapter  
(172 x 96 x 25.4mm)

Power cord included is 6-foot (1.8 meter).

Total length including external AC adapter is 12 feet (3.66 meter).

HP Fast Charge\*

#### Primary Battery

HP 8-cell Lithium-Ion Battery (83 WHr)

HP Long Life 8-cell Lithium-Ion Battery (75 WHr) \*\*

#### Secondary Battery

HP BB09 Ultra Extended Life Notebook Battery (9-cell/100 WHr)

HP ST09 Extended Life Notebook Battery (9-cell/73 WHr)

#### Battery Life

Battery life up to 14 hours and 15 minutes\*\*\*

#### System Standby Time

In sleep mode 1 week

\* HP Fast Charge recharges your battery up to 90% within 90 minutes when the system is off. HP Fast Charge does not apply to the HP ST09 Extended Life Notebook Battery or HP BB09 Ultra Extended Life Notebook Battery.

\*\* Available with 3-year warranty only

\*\*\*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

NVIDIA Optimus technology

Hibernation

Standby

ACPI compliance

### Features

#### ENVIRONMENTAL

US Energy Star®

IT ECO declaration

EPEAT Gold where HP registers commercial desktop products. See <http://www.epeat.net> for registration status in your country

US Federal Energy Management Program (FEMP)

**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

Starting at 6.20 lb (2.82 kg) with mini-card SSD and weight saver (no optical drive)

Starting at 6.45 lb (2.93 kg) with hard drive and DVD-R/W drive

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

1.2 in (at front)/1.4 in (at rear) x 15.0 in x 10.1 in

30.5 mm (at front)/35.5 mm (at rear) x 381.5 mm x 257.0 mm

Height with DreamColor display: 1.34 in/ 34.0 mm at front; 1.54 in / 39 mm at rear

**NOTE:** Height varies depending upon where on the notebook the measurement is made. Weight varies by configuration and components. Weight includes 8-cell battery, hard drive, 1 GB memory, and no optical drive. Weight varies by configuration and components.

#### PORTS/SLOTS

##### Ports

VGA – One

DisplayPort v1.2 – One

Thunderbolt\* – One

Stereo microphone in / headphone-out combo jack – One

Power Connector – One

Secondary Battery Connector – One

Docking Connector – One

RJ-45 (Ethernet) – One

USB 3.0 – Two

USB 3.0 Charging Port – One

USB 2.0 – One

Security lock slot – One

##### Digital Media Slots

ExpressCard/54 slot – One (Supports ExpressCard/54)

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)

\*\* Thunderbolt is new technology. Install all the latest drivers for your Thunderbolt device before connecting the device to the Thunderbolt port. Thunderbolt cable and Thunderbolt device (sold separately) must be compatible with Windows. To determine whether your device is Thunderbolt Certified for Windows, see <https://thunderbolttechnology.net/products>

### Features

#### SERVICE AND SUPPORT

HP Services offers limited 3-year, 1-year and 90-day warranty options depending on country.

On-site service and warranty upgrades are also available. HP Care Pack Services extend service contracts beyond the standard 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/lookuptool>. Additional HP Care Pack Services information by product is available at:

<http://www.hp.com/hps/carepack>.

**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

<b>Stand-Alone Power Requirements (AC Power)</b>	<b>Nominal Operating Voltage</b>	19.5 V		
	<b>Average Operating Power</b>		<b>Windows 7 (32-bit)</b>	<b>Windows 7 (64-bit)</b>
		NVIDIA Graphics	16.28 W	16.8 W
	<b>Max Operating Power</b>	< 150 W or < 200 W		
<b>Temperature</b>	<b>Operating</b>	32° to 95° F (0° to 35° C) (not writing optical) 41° to 95° F (5° to 35° C) (writing optical)		
	<b>Non-operating</b>	-4° to 140° F (-20° to 60° C)		
<b>Relative Humidity</b>	<b>Operating</b>	10% to 90%, non-condensing		
	<b>Non-operating</b>	5% to 95%, 101.6° F (38.7° C) maximum wet bulb temperature		
<b>Shock</b>	<b>Operating</b>	40 G, 2 ms, half-sine		
	<b>Non-operating</b>	200 G, 2 ms, half-sine		
<b>Random Vibration</b>	<b>Operating</b>	0.75 grms		
	<b>Non-operating</b>	1.50 grms		
<b>Altitude (unpressurized)</b>	<b>Operating</b>	-50 to 10,000 ft (-15.24 to 3,048 m)		
	<b>Non-operating</b>	-50 to 40,000 ft (-15.24 to 12,192 m)		
<b>Planned Industry Standard Certifications</b>	<b>UL</b>	Yes		
	<b>CSA</b>	Yes		
	<b>FCC Compliance</b>	Yes		
	<b>ENERGY STAR®</b>	Select models*		
	<b>EPEAT</b>	< 150 W or < 200 W		
	<b>ICES</b>	Yes		
	<b>Australia / NZ A-Tick Compliance</b>	Yes		
	<b>CCC</b>	Yes		
	<b>Japan VCCI Compliance</b>	Yes		
	<b>KC</b>	Yes		
	<b>BSMI</b>	Yes		
	<b>CE Marking Compliance</b>	Yes		

\* Configurations of the HP ZBook 15 that are ENERGY STAR qualified are identified as HP ZBook 15 ENERGY STAR on HP websites and on [www.energystar.gov](http://www.energystar.gov).

\*\* EPEAT registration varies by country. See [www.epeat.net](http://www.epeat.net) for registration status by country.

EPEAT status listed above applies to U.S.

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



### Technical Specifications

#### DISPLAY

15.6" diagonal LED-backlit FHD UWVA IPS eDP anti-glare + Panel Self Refresh (PSR) (1920 x 1080)	Active Area (W x H)	13.54 x 7.59 in (34.4 x 19.4 cm)		
	Dimensions (W x H)	15.6 in (39.6 cm)		
	Weight	420 g (max)		
	Surface Treatment	Anti-glare		
	Contrast Ratio	600:1 (typical)		
	Refresh Rate	60 Hz		
	Brightness	300 nit typical		
	Pixel Resolution	Format	1920 x 1080 (FHD)	
		Configuration	RGB Stripe	
	Backlight	LED		
	PPI	142		
	Viewing Angle	UWVA 85/85/85/85		
15.6-inch LED FHD UWVA (1920 x 1080) anti-glare DreamColor	Active Area (W x H)	13.54 x 7.59 in (34.4 x 19.4 cm)		
	Diagonal Size	15.6 in (39.6 cm)		
	Surface Treatment	Anti-glare		
	Contrast Ratio	800:1 (min)		
	Refresh Rate	48 Hz, 50 Hz and 60 Hz		
	Brightness	210 nits (Typ)		
	Pixel Resolution	Pitch	0.179 mm x 0.179 mm	
		Format	1920 x 1080 (FHD)	
		Configuration	RGB Stripe	
	Backlight	RGB LED		
	PPI	142		
	Viewing Angle	±89° Horizontal, ±89° Vertical (typical)		
	Technology Type	30-bit In-Plane Switching (IPS)		
	Color Depth	10-bits/color		
	Display Colors	Over 1 billion colors (native mode)		
	Color Gamut Coverage		CIE1931 (x,y)	CIE 1976 (u',v')
		NTSC	109%	129%
		AdobeRGB	114%	127%
		sRGB	154%	148%

### Technical Specifications

<b>15.6" diagonal LED-backlit FHD SVA eDP anti-glare (1920 x 1080)</b>	<b>Active Area (W x H)</b>	13.54 x 7.59 in (34.4 x 19.4 cm)	
	<b>Dimensions (W x H)</b>	15.6 in (39.6 cm)	
	<b>Weight</b>	380 g (max)	
	<b>Surface Treatment</b>	Anti-glare	
	<b>Contrast Ratio</b>	400:1 (typical)	
	<b>Refresh Rate</b>	60 Hz	
	<b>Brightness</b>	300 nit typical	
	<b>Pixel Resolution</b>	<b>Format</b>	1920 x 1080 (FHD)
		<b>Configuration</b>	RGB Stripe
	<b>Backlight</b>	LED	
	<b>PPI</b>	142	
	<b>Viewing Angle</b>	SVA 45/45/25/35	

### STORAGE AND DRIVES

#### Internal Storage

<b>1 TB 5400 rpm SATA Hard Drive</b>	<b>Drive Weight</b>	0.25 lbs (115g)	
	<b>Capacity</b>	1 TB	
	<b>Height</b>	0.37 in (9.5 mm)	
	<b>Width</b>	2.75 in (70 mm)	
	<b>Interface</b>	ATAATA-8, SATA 2.6, 3.0 Gb/s, NCQ	
	<b>Transfer Rate</b>	<b>Synchronous (maximum)</b>	300 MB/s (Drive Capability)
	<b>Seek Time</b> (typical reads, including settling)	<b>Single Track</b>	4 ms
		<b>Average</b>	14 ms
		<b>Maximum</b>	24 ms
	<b>Cache</b>	16 MB	
	<b>Rotational Speed</b>	5400 rpm	
	<b>Logical Blocks</b>	1,953,525,168	
	<b>Operating Temperature</b>	32° to 140° F (0° to 60° C) [case temp]	
	<b>Features</b>	ATA Security	

### Technical Specifications

<b>750 GB 7200 rpm SATA Hard Drive</b>	<b>Drive Weight</b>	0.25 lbs (115g)
	<b>Capacity</b>	750 GB
	<b>Height</b>	0.37 in (9.5 mm)
	<b>Width</b>	2.75 in (70 mm)
	<b>Interface</b>	ATA-8, SATA 2.6, 3.0 Gb/s, NCQ
	<b>Transfer Rate</b>	<b>Synchronous</b> (maximum) 300 MB/s (Drive Capability)
	<b>Seek Time</b> (typical reads, including settling)	<b>Single Track</b> 1.5 ms
		<b>Average</b> 11 ms
		<b>Maximum</b> 22 ms
	<b>Cache</b>	16 MB
	<b>Rotational Speed</b>	7200 rpm
	<b>Logical Blocks</b>	1,465,149,168
	<b>Operating Temperature</b>	32° to 140° F (0° to 60° C) [case temp]
	<b>Features</b>	ATA Security

<b>500 GB 7200 rpm SATA Hard Drive</b>	<b>Drive Weight</b>	0.25 lbs (115g)
	<b>Capacity</b>	500 GB
	<b>Height</b>	0.37 in (9.5 mm)
	<b>Width</b>	2.75 in (70 mm)
	<b>Interface</b>	ATA-8, SATA 2.6, 3.0 Gb/s, NCQ
	<b>Transfer Rate</b>	<b>Synchronous</b> (maximum) 300 MB/s (Drive Capability)
	<b>Seek Time</b> (typical reads, including settling)	<b>Single Track</b> 1.5 ms
		<b>Average</b> 11 ms
		<b>Maximum</b> 22 ms
	<b>Cache</b>	16 GB
	<b>Rotational Speed</b>	7200 rpm
	<b>Logical Blocks</b>	976,773,168
	<b>Operating Temperature</b>	32° to 140° F (0° to 60° C) [case temp]
	<b>Features</b>	ATA Security

### Technical Specifications

<b>500 GB 5400 rpm SATA FIPS* Hard Drive</b>	<b>Drive Weight</b>	0.25 lbs (115g)
	<b>Capacity</b>	500 GB
	<b>Height</b>	0.28 in (7 mm)
	<b>Width</b>	2.75 in (70 mm)
	<b>Interface</b>	ATA-8, SATA 2.6, 3.0 Gb/s, NCQ
	<b>Transfer Rate</b>	<b>Synchronous</b> (maximum) 300 MB/s (Drive Capability)
	<b>Seek Time</b> (typical reads, including settling)	<b>Single Track</b> 1.5 ms
		<b>Average</b> 11 ms
		<b>Maximum</b> 22 ms
	<b>Cache</b>	16 MB
	<b>Rotational Speed</b>	5400 rpm
	<b>Logical Blocks</b>	976,773,168
	<b>Operating Temperature</b>	32° to 140° F (0° to 60° C) [case temp]
	<b>Features</b>	ATA Security, TCG Opal SSC 2.0 and FIPS 140-2-level2

\* FIPS-certified, hardware-based AES-256 encryption image.

<b>500 GB 7200 rpm SMART SATA II Self Encrypting Drive</b>	<b>Drive Weight</b>	0.25 lbs (115g)
	<b>Capacity</b>	500 GB
	<b>Height</b>	0.37 in (9.5 mm)
	<b>Width</b>	2.50 in (63.5 mm)
	<b>Interface</b>	ATA-8, SATA 2.6, 3.0 Gb/s
	<b>Transfer Rate</b>	<b>Synchronous</b> (maximum) 300 MB/s (Drive Capability)
	<b>Seek Time</b> (typical reads, including settling)	<b>Single Track</b> 1 ms
		<b>Average</b> 12 ms
		<b>Maximum</b> 20 ms
	<b>Cache</b>	16 MB
	<b>Rotational Speed</b>	7200 rpm
	<b>Logical Blocks</b>	976,773,168
	<b>Operating Temperature</b>	32° to 140° F (0° to 60° C) [case temp]
	<b>Features</b>	ATA Security

### Technical Specifications

<b>320 GB 7200 rpm SATA Hard Drive</b>	<b>Drive Weight</b>	0.25 lbs (115 g)	
	<b>Capacity</b>	320 GB	
	<b>Height</b>	0.37 in (9.5 mm)	
	<b>Width</b>	2.75 in (70 mm)	
	<b>Interface</b>	ATA-8, SATA 2.6, 3.0 Gb/s, NCQ	
	<b>Transfer Rate</b>	<b>Synchronous</b> (maximum)	300 MB/s (Drive Capability)
	<b>Seek Time</b> (typical reads, including settling)	<b>Single Track</b>	1.5 ms
		<b>Average</b>	11 ms
		<b>Maximum</b>	22 ms
	<b>Cache</b>	16 MB	
	<b>Rotational Speed</b>	7200 rpm	
	<b>Logical Blocks</b>	625,142,448	
	<b>Operating Temperature</b>	32° to 140° F (0° to 60° C) [case temp]	
	<b>Features</b>	ATA Security	
<b>SATA 6 Gb/s 512 GB, 2.5-inch Solid State Drive</b>	<b>Drive Weight</b>	73 Grams	
	<b>Capacity</b>	512 GB	
	<b>Height</b>	0.276 in (7 mm)	
	<b>Width</b>	2.76 in (70 mm)	
	<b>Interface</b>	SATA Gen 3 (6 Gb/s)	
	<b>Performance</b>	<b>Maximum Sequential Read</b>	<b>Maximum Sequential Write</b>
		460 MB/s	260 MB/s
	<b>Logical Blocks</b>	1,000,215,216	
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [case temp]	
	<b>Features</b>	ATA Security; ATA-8; SATA 3.0 DIPM; TRIM	
<b>SATA 6 Gb/s 256 GB, 2.5-inch SATA SED Solid State Drive</b>	<b>Drive Weight</b>	73 Grams	
	<b>Capacity</b>	256 GB	
	<b>Height</b>	0.276 in (7 mm)	
	<b>Width</b>	2.76 in (70 mm)	
	<b>Interface</b>	SATA 3 (6 Gb/s)	
	<b>Performance</b>	<b>Maximum Sequential Read</b>	<b>Maximum Sequential Write</b>
		Up to 460 MB/s	Up to 260 MB/s
	<b>Logical Blocks</b>	500,118,192	
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [case temp]	
	<b>Features</b>	ATA Security; ATA-8 compliant; SATA 3.0; DIPM; TRIM	

### Technical Specifications

<b>SATA 6 Gb/s 256 GB, 2.5-inch Solid State Drive</b>	<b>Capacity</b>	256GB	
	<b>Height</b>	0.28 in; 0.7 cm	
	<b>Interface</b>	SATA 6Gb/s	
	<b>Synchronous Transfer Rate (Maximum)</b>	Up to 500MB/s (Sequential Read)	
	<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)	
<b>SATA 6 Gb/s 240 GB, 2.5-inch Solid State Drive</b>	<b>Capacity</b>	240GB	
	<b>Width</b>	<b>Physical Size</b>	2.5 in; 6.36 cm
	<b>Interface</b>	6Gb/s SATA	
	<b>Synchronous Transfer Rate (Maximum)</b>	600 Mb/s	
	<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)	
<b>SATA 6 Gb/s 180 GB, 2.5-inch Solid State Drive</b>	<b>Drive Weight</b>	78 Grams	
	<b>Capacity</b>	180 GB	
	<b>Height</b>	0.276 in (7 mm)	
	<b>Width</b>	2.76 in (70 mm)	
	<b>Interface</b>	SATA Gen 3 (6 Gb/s)	
	<b>Performance</b>	<b>Maximum Sequential Read</b>	<b>Maximum Sequential Write</b>
		550 MB/s	520 MB/s
	<b>Logical Blocks</b>	351,651,888	
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [case temp]	
	<b>Features</b>	ATA Security; ATA-8, SATA 3.0; DIPM; TRIM	
<b>SATA 6 Gb/s 128 GB, 2.5-inch Solid State Drive</b>	<b>Drive Weight</b>	73 Grams	
	<b>Capacity</b>	128 GB	
	<b>Height</b>	0.276 in (7 mm)	
	<b>Width</b>	2.76 in (70 mm)	
	<b>Interface</b>	SATA 3 (6 Gb/s)	
	<b>Performance</b>	<b>Maximum Sequential Read</b>	<b>Maximum Sequential Write</b>
		415 MB/s	175 MB/s
	<b>Logical Blocks</b>	250,069,680	
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [case temp]	
	<b>Features</b>	ATA Security; ATA-8; SATA 3.0 DIPM; TRIM	

\* 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) of system and up to 30 GB (for Windows 8) disk is reserved for system recovery

### Technical Specifications

#### Optical Drives

<b>DVD-ROM Drive</b>	<b>Access Times</b>	Random	< 140 ms CD (typical) < 160 ms DVD (typical)
	<b>Max Data Transfer Rate</b>	24X CD-ROM 8X-DVD	
	<b>Transfer Mode</b>	UDMA Mode 5	
	<b>Interface</b>	Gen 1 SATA	
	<b>Supported Media (read)</b>	CD-DA, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW, DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW, DVD-RAM	
	<b>Supported Media (write)</b>	None	
	<b>Max Media Capacity (read)</b>	8.5GB	
	<b>Transport</b>	Tray Loading	
<b>DVD+/-RW SuperMulti DL Drive</b>	<b>Access Times</b>	Random	<140ms CD (typical) < 160 ms DVD (typical)
	<b>Max Data Transfer Rate</b>	24X CD-ROM 8X DVD 24X CD-R 24X CD-RW 8X DVD+R 8X DVD+RW 8X DVD-R 6X DVD-RW 6X - DVD+R Dual Layer 6X - DVD-R Dual Layer 5X DVD-RAM	
	<b>Transfer Mode</b>	UDMA Mode 5	
	<b>Interface</b>	Gen 1 SATA	
	<b>Supported Media (read)</b>	CD-DA, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW, DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW, DVD-RAM	
	<b>Supported Media (write)</b>	CD-R, CD-RW, DVD+R, DVD+RW, DVD-R, DVD-RW, DVD-RAM, DVD+R DL, DVD-R DL	
	<b>Max Media Capacity (read)</b>	8.5 GB	
	<b>Max Media Capacity (write)</b>	8.5 GB	
	<b>Transport</b>	Tray Loading	

### Technical Specifications

<b>Blu-ray ROM DVD+/-RW SuperMulti DL Drive</b>	<b>Access Times</b>	Random	<190 ms CD-ROM (typical) < 180ms DVD-ROM (typical) <230 ms BD-ROM (typical)
	<b>Max Data Transfer Rate</b>	24X CD-ROM 8X DVD-ROM 24X CD-R 16X CD-RW 8X DVD+R 8X DVD+RW 8X DVD-R 6X DVD-RW 4X - DVD+R Dual Layer 4X - DVD-R Dual Layer 5X DVD-RAM 6X BD-ROM	
	<b>Transfer Mode</b>	UDMA Mode 5	
	<b>Interface</b>	Gen 1 SATA	
	<b>Supported Media</b> (read)	CD-DA, , CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW, DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW. DVD-RAM, BD-ROM, BD-R, BD-RE	
	<b>Supported Media</b> (write)	CD-R, CD-RW, DVD+R, DVD+R DL, DVD+RW, DVD-R, DVD-R DL, DVD-RW, DVD-RAM	
	<b>Max Media Capacity</b> (read)	50.0 GB	
	<b>Max Media Capacity</b> (write)	8.5GB	
	<b>Transport</b>	Tray Loading	
<b>Blu-ray R/RE DVD+/-RW SuperMulti DL Drive</b>	<b>Access Times</b>	Random	<165 ms CD-ROM (typical) <185 ms DVD-ROM (typical) <205 ms BD-ROM (typical)
	<b>Max Data Transfer Rate</b>	24X CD-ROM 8X DVD-ROM 24X CD-R 16X CD-RW 8X DVD+R 8X DVD+RW 8X DVD-R 6X DVD+R Dual Layer 6X DVD-R Dual Layer 5X DVD-RAM	



### Technical Specifications

	6X BD-ROM
	6X BD-R
	2X BD-RE
<b>Transfer Mode</b>	UDMA Mode 5
<b>Interface</b>	Gen 1 SATA
<b>Supported Media</b> (read)	CD-DA, , CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW, DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW. DVD-RAM, BD-ROM, BD-R, BD-RE
<b>Supported Media</b> (write)	CD-R, CD-RW, DVD+R, DVD+R DL, DVD+RW, DVD-R, DVD-R DL, DVD-RW, DVD-RAM, BD-R, BD-RE
<b>Max Media Capacity</b> (read)	50.0 GB
<b>Max Media Capacity</b> (write)	50.0 GB
<b>Transport</b>	Tray Loading

### SECURITY

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

### NETWORKING/COMMUNICATIONS

### Technical Specifications

<b>Intel® I217-LM Gigabit Network Connection</b>	<b>Ethernet Features</b>	<p>10 Mbit/s operation (10BASE-T; IEEE 802.3; 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>IEEE 802.3u 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>IEEE 802.1as/1588 conformance</p> <p>Jumbo Frame 9K</p> <p>Auto MDI/MDIX Crossover cable detection</p>
	<b>Power Management</b>	<p>ACPI compliant - multiple power modes</p> <p>Energy Detect Low Power Mode(Green Ethernet)</p>
	<b>Performance Features</b>	<p>TCP/IP/UDP Checksum Offload (configurable)</p> <p>Protocol Offload( ARP &amp; 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>
	<b>Manageability</b>	<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>
	<b>Interface</b>	<p>PCI Express 1.1 x1 to fully support ASPM L0s/L1 and CLKREQ.</p> <p>NOTE: Intel® I217-LM Gigabit interface is not PCIe compliant. It operates at half of PCIe specification V1.1 (2.5GT/S) speed.</p>
	<b>NIC Device Driver Name</b>	<p>Intel Ethernet Network Connection I217-LM</p>

### Technical Specifications

<b>HP hs3110 HSPA+ Mobile Broadband Module</b>	<b>Technology/Operating Bands</b>	Modes: WCDMA/HSDPA/HSUPA/HSPA+/AWS/GSM/EDGE/GPRS Penta-band WCDMA/HSDPA/HSUPA/HSPA+/AWS: 850/900/1900/2100/AWS MHz GSM/GPRS/EDGE: 850/900/1800/1900 MHz
	<b>Wireless Protocol Standards</b>	GSM/GPRS/EDGE: Class B, Multi-slot class 33, coding schemes CS1 - CS4 and MSC1 - MSC9. UMTS/WCDMA: Release 99 and Release 7 Advanced Receiver Type 3i
	<b>Wireless Parametric Standards</b>	Complies with 3GPP specifications
	<b>Maximum Data Rates</b>	GPRS/EDGE: Multi-slot Class 33, Class B WCDMA PS: UL (384 kbps) / DL (384 kbps) UL/DL HSPA: UL (5.76 Mbps)/ DL (7.2 Mbps) UL/DL HSPA+: UL (5.76 Mbps)/ DL (21Mbps)
	<b>GPS</b>	GPS Standalone, A-GPS: L1 (Internet- and Network assisted
	<b>GPS Bands</b>	1575.42 MHz (± 1.023 MHz)
	<b>Maximum Output Power</b>	WCDMA/HSPA/HSPA+ 2100/1900/900/850/AWS MHz: +24dBm (Power Class 3) GPRS 1900/1800 MHz: +30dBm (Power Class 1) GPRS 900/850 MHz: +33dBm (Power Class 4) EDGE 1900/1800 MHz: +26dBm (Power Class E2) EDGE 900/850 MHz: +27dBm (Power Class E2)
	<b>Maximum Power Consumption</b>	2500mA (peak); 600mA (average)2700mA (peak)
	<b>Power Consumption, Sleep Mode</b>	3.6 mA
	<b>Power Management</b>	USB selective suspend, Connected Standby Integrated notebook wireless button
	<b>Antenna Type</b>	Dual high efficiency 5 band antennae with spatial diversity, mounted in the display enclosure
	<b>Form Factor</b>	M.2 Socket 2, USB 2.0 interface high speed
	<b>Weight</b>	< 6g
<b>HP lt4111 LTE/EV-DO/HSPA+ Mobile Broadband Module*</b>	<b>Technology/Operating Bands</b>	LTE FDD all bands with diversity: 1900 MHz (Band II) , 1700/2100MHz (Band IV (AWS), 850 MHz (Band V), 700MHz (Band XIII), 700MHz (Band XVII), 1900MHz G Block (Band XXV) WCDMA/HSDPA/HSUPA/HSPA+: all bands with diversity: 2100 MHz (Band I), 1900 MHz (Band II) , AWS 1700/2100MHz (Band IV), 850 MHz (Band V), 800 MHz (Band VIII) GSM/GPRS/EDGE: 1900 MHz, 1800 MHz , 850 MHz , 900 MHz CDMA: Cellular 800MHz (BC0), PCS 1900MHz (BC1)
	<b>Wireless Protocol Standards</b>	3GPP Release 8 LTE Specification WCDMA R99, 3GPP Release 5, 6 and 7 UMTS Specification EVDO Release 0 and Release A
	<b>Wireless Parametric Standards</b>	Complies with 3GPP specifications Release 8 for LTE

### Technical Specifications

<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 GPS, A-GPS, GPS XTRA
<b>GPS Bands</b>	1575.42 MHz ( $\pm 1.023$ MHz), GLONASS 1596-1607MHz
<b>Maximum Output Power</b>	LTE: +23 dBm (+/- 1 dBm) WCDMA: +23 dBm (+/- 1 dBm) GSM850/900, GMSK: +32dBm (+/- 1dBm) GSM850/900, 8PSK: +27dBm (+/- 1dBm) DCS1800 / PCS 1900, GMSK: +29dBm (+/- 1dBm) DCS1800 / PCS 1900, 8PSK: +26dBm (+/- 1dBm) CDMA: +24dBm (+/- 1dBm)
<b>Maximum Power Consumption</b>	LTE: 1,200 mA (peak); <900 mA (average) WCDMA: 1,100 mA (peak); <800 mA (average) EGPRS: 2,500 mA (peak); <700 mA (average)
<b>Power Consumption, Sleep Mode</b>	2 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, 3042-S3 Key B
<b>Weight</b>	6 g
<b>Dimensions (Length x Width x Thickness)</b>	42 mm x 30 mm x 2.3 mm
<b>Voltage, Operating</b>	3.135 V to 4.4 V (3.3 V +1.1V/-0.165V)
<b>Temperature, operating (from TIA/EIA/IS-98-D)</b>	-13° to 140° F (-25° to 60° C)
<b>Temperature, non-operating, 96 hours (from MIL-STD 202 Method 108)</b>	-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
* Not available with Dreamcolor	

<b>Intel Dual Band Wireless-AC 7260 802.11 ac (2x2) WiFi + BT 4.0 combo Adapter*</b>	<b>Wireless LAN Standards</b>	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11ac
	<b>Interoperability</b>	Wi-Fi certified
	<b>Frequency Band</b>	802.11b/g/n
		● 2.402 - 2.482 GHz

### Technical Specifications

	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><li>• 2.402 - 2.482 GHz</li></ul>
<b>Data Rates</b>	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)
<b>Modulation</b>	Direct Sequence Spread Spectrum BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM
<b>Security<sup>1</sup></b>	<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>
<b>Network Architecture Models</b>	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
<b>Roaming</b>	IEEE 802.11 compliant roaming between access points
<b>Output Power<sup>2</sup></b>	<ul style="list-style-type: none"><li>• 2.4G: +13.5dBm minimum</li><li>• 5G: +12dBm minimum</li><li>• Maximum output power must be able to achieve modular regulatory certification with notebooks that have antennas &gt;20cm from the user and peak gain of +3dBi at 2.4GHz and +4dBi at 5GHz</li></ul>
<b>Power Consumption</b>	Transmit: 2.0 W (max) Receive: 1.6 W (max) Idle mode (PSP): 250 mW (WLAN Associated) Idle mode: 100 mW (WLAN unassociated) Radio disabled: 75 mW
<b>Power Management</b>	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
<b>Receiver Sensitivity<sup>3</sup></b>	802.11b:-95 dBm (1 Mbps), -93 dBm (2 Mbps), -91 dBm (5.5 Mbps), -88 dBm (11 Mbps)  802.11a/g:-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 (72.2 Mbps), -66 dBm (300 Mbps)

### Technical Specifications

<b>Antenna type</b>	High efficiency antenna with spatial diversity, mounted in the display enclosure Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications	
<b>Form Factor</b>	PCI-Express Half-MiniCard	
<b>Dimensions</b>	0.19 x 1.06 x 1.18 in (4.75 x 26.8 x 30 mm)	
<b>Weight</b>	3.1g	
<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 Off - Radio OFF; Solid LED On - 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).		
<b>Bluetooth Specification</b>		
<b>Bluetooth Specification</b>	V4.0 High Speed, V2.1+EDR, backwards compatible with V1.1, 1.2 and 2.0	
<b>Number of Available Channels</b>	79 (1 MHz) available channels	
<b>Data Rates and Throughput</b>	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	
<b>Transmit Power</b>	-6 dBm to 4 dBm (Bluetooth Class II)	
<b>Receiver Sensitivity</b>	Better than -80 dBm at 0.1 % raw bit error rate	
<b>Power Consumption</b>	Peak (Tx) 330 mW Peak (Rx) 230 mW Sleep <17 mW	
<b>Antenna</b>	Internally integrated within module	
<b>Range</b>	Up to 33 ft (10 m)	
<b>Electrical Interface</b>	USB 2.0 compliant Microsoft Windows Plug and Play compliant	
<b>Bluetooth Software Supported</b>	Broadcom Bluetooth for Windows Microsoft Windows Bluetooth Software	
<b>Link Topology</b>	Point to Point, Multipoint Pico Nets up to 7 slaves	
<b>Security</b>	Full support of Bluetooth Security Provisions	
<b>Power Management</b>	Microsoft Windows ACPI, and USB Bus Support Self configurable to optimize power conservation in all operating modes, including Standby, Hold, Park, and Sniff	

### Technical Specifications

<b>Certifications</b>	<p>All necessary regulatory approvals for supported countries, including:</p> <p>FCC (47 CFR) Part 15C, Section 15.247 &amp; 15.249</p> <p>ETS 300 328, ETS 300 826</p> <p>Low Voltage Directive IEC950</p> <p>UL, CSA, and CE Mark</p>
<b>Bluetooth Profiles Supported</b>	<p>Generic Access Profile (GAP)</p> <p>Service Discovery Application Profile (SDAP)</p> <p>Serial Port Profile (SPP)</p> <p>Dial_Up Networking Profile (DUN)</p> <p>Generic Object Exchange Profile (GOEP)</p> <p>Object Push Profile (OPP)</p> <p>File Transfer Profile (FTP)</p> <p>Synchronization Profile (SYNC)</p> <p>Hard Copy Cable Replacement (HCRP)</p> <p>Personal Area Networking Profile (PAN)</p> <p>Human Interface Device Profile (HID)</p> <p>Generic Audio/Video Distribution Profile (GAVDP)</p> <p>Advanced Audio/Video Distribution Profile (A2DP)</p> <p>FAX Profile (FAX)</p> <p>Basic Imaging Profile (BIP)</p> <p>Headset Profile (HSP)</p> <p>Hands Free Profile (HFP)</p> <p>Basic Printing Profile (BPP)</p> <p>VDP (Video Distribution Profile)</p> <p>AVRCP (Audio Video Remote Control Profile)</p>
<p>* Wireless access point and internet service required. Availability of public wireless access points limited. The specifications for the 802.11ac WLAN are draft specifications and are not final. If the final specifications differ from the draft specifications, it may affect the ability of the notebook to communicate with other 802.11ac WLAN devices</p>	
<b>Intel Centrino Advanced-N Wireless LAN Standards 6205 (2x2)</b>	<p>IEEE 802.11a</p> <p>IEEE 802.11b</p> <p>IEEE 802.11g</p> <p>IEEE 802.11n*</p> <p>* In countries where 802.11n is not allowed, this capability is not enabled.</p>
<b>Interoperability</b>	<p>Wi-Fi certified</p> <p>Cisco Compatible Extensions Program compliant with Microsoft Windows 7, Windows Vista and XP (details at: <a href="http://www.hp.com/go/notebooks/WLAN">http://www.hp.com/go/notebooks/WLAN</a>)</p>
<b>Frequency Band</b>	2.4 GHz and 5GHz
<b>Antenna Structure</b>	2 transmit; 2 receive (2x2)
<b>Data Rates</b>	<p>802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</p> <p>802.11b: 1, 2, 5.5, 11 Mbps</p> <p>802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</p> <p>802.11n: 66 possible data rates, ranging from 6 Mbps to 300 Mbps, depending on the combination of Bandwidth, Modulation Coding Scheme, and Guard Interval used, as defined in IEEE 802.11n specification</p>

### Technical Specifications

<b>Modulation</b>	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM, BPSK, QPSK, 16-QAM, 64-QAM
<b>Security<sup>1</sup></b>	Authentication: WPA and WPA2, 802.1x (EAP_TLS, TTLS, PEAP, LEAP, EAP-FAST)  Authentication Protocols: PAP, CHAP, TLS, GTC, MS-CHAP, MS-CHAPv2  Encryption: 64 and 128-bit WEP, AES-CCMP, CKIP, TKIP  Support for Cisco Security Features (proven compatibility with Cisco Aironet infrastructure products through the Cisco Compatible Extensions Program Version 4) with Microsoft Windows Vista and XP only.
<b>Sub-channels</b>	Multinational support with frequency bands and channels compliant to local regulations.
<b>Media Access Protocol</b>	CSMA/CA (Collision Avoidance) with ACK
<b>Network Architecture Models</b>	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
<b>Roaming</b>	IEEE 802.11 compliant roaming between 2.4GHz band Access Points
<b>Output Power</b> (for CCK and OFDM) <sup>2</sup>	17 dBm max
<b>Power Consumption</b>	Transmit: 2.3 Watts (max, with two spatial streams) Receive: 1 Watt (max with two spatial streams) Idle mode <sup>3</sup> : 35 mW (average) Radio off: 20 mW (max)
<b>Power Management</b>	ACPI compliant power management 802.11 compliant power saving mode
<b>Receiver Sensitivity<sup>4</sup></b>	54 Mbps: -76 dBm, 6 Mbps: -92 dBm
<b>Antenna Connections</b>	2 U.FL type connectors, 50 ohm nominal impedance
<b>Form Factor</b>	PCI-Express Half-MiniCard
<b>Weight</b>	0.0075 lb (3.4 g)
<b>Dimensions</b>	0.12 x 1.06 x 1.18 in (3.1 x 26.8 x 30.0 mm)
<b>Operating Voltage</b>	3.3V +/- 9%
<b>Temperature</b>	Operating 32° to 176° F (0° to 80° C) Non-operating -40° to 176° F (-40° to 80° C)
<b>Humidity</b>	Operating 10% to 90% (non-condensing) Non-operating 5% to 90% (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 Off - Radio OFF; Solid LED On - 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



### Technical Specifications

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.

<b>Intel Centrino® Advanced- N 6235 802.11 a/b/g/n (2x2) + Bluetooth 4.0 LE Combo</b>	<b>Wireless LAN Standards</b>	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n
	<b>Interoperability</b>	Wi-Fi certified Cisco Compatible Extensions Program compliant with Microsoft Windows 7, Windows Vista and XP (details at: <a href="http://www.hp.com/go/notebooks/WLAN">http://www.hp.com/go/notebooks/WLAN</a> )
	<b>Frequency Band</b>	802.11b/g/n 2.402 - 2.482 GHz 802.11a/n 4.9 - 4.95 GHz (Japan) 5.15 - 5.25 GHz 5.25 - 5.35 GHz 5.47 - 5.725 GHz 5.825 - 5.850 GHz
	<b>Antenna Structure</b>	2 transmit; 2 receive (2x2)
	<b>Data Rates</b>	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)
	<b>Modulation</b>	Direct Sequence Spread Spectrum CCK, BPSK, QPSK, 16-QAM, 64-QAM
	<b>Security<sup>1</sup></b>	<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>
	<b>Sub-channels</b>	Multinational support with frequency bands and channels compliant to local regulations.
	<b>Network Architecture Models</b>	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
	<b>Roaming</b>	IEEE 802.11 compliant roaming between band Access Points
	<b>Output Power<sup>2</sup></b>	<ul style="list-style-type: none"> <li>• 2.4G: +13.5dBm minimum</li> <li>• 5G: +12dBm minimum</li> </ul>
	<b>Power Consumption</b>	Transmit: 2.0 Watts Receive: 1.6 Watts Idle mode <sup>3</sup> : 250 mW (WLAN Associated) Idle mode: 100 mW (WLAN unassociated) Radio off: 75 mW
	<b>Power Management</b>	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
	<b>Receiver Sensitivity<sup>4</sup></b>	802.11g:-90 dBm (6 Mbps), -89 dBm (9 Mbps), -87 dBm (12 Mbps), -85 dBm

### Technical Specifications

	(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)
<b>Antenna Connections</b>	2 U.FL type connectors (output impedance of 50 ± 2 ohms)
<b>Form Factor</b>	PCI-Express Half-MiniCard
<b>Weight</b>	3.1g
<b>Dimensions</b>	0.12 x 1.06 x 1.18 in (3.1 x 26.8 x 30.0 mm)
<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
<ol style="list-style-type: none"> <li>1. Check latest software/driver release for updates on supported security features.</li> <li>2. Maximum output power may vary by country according to local regulations.</li> <li>3. In Power Save Polling mode and on battery power.</li> <li>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).</li> <li>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.</li> </ol>	

### HP Integrated Module with Bluetooth 4.0+EDR Wireless Technology

<b>Bluetooth Specification</b>	4.0+EDR Compliant
<b>Dimensions</b>	1.18 x 0.26 x 0.13 in (30 x 6.5 x 3.25 mm)
<b>Frequency Band</b>	2402 to 2480 MHz
<b>Number of Available Channels</b>	79 (1 MHz) available channels
<b>Data Rates and Throughput</b>	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
<b>Transmit Power</b>	-1.5 dBm to 4 dBm (Bluetooth Class II)
<b>Receiver Sensitivity</b>	Better than -20 dBm at 0.1 % raw bit error rate
<b>Power Consumption</b>	Peak (Tx) 330 mW
	Peak (Rx) 230 mW
	Sleep <17 mW

### Technical Specifications

<b>Antenna</b>	Internally integrated within module
<b>Range</b>	Up to 33 ft (10 m)
<b>Electrical Interface</b>	USB 2.0 compliant Microsoft Windows Plug and Play compliant
<b>Bluetooth Software Supported</b>	Broadcom Bluetooth for Windows Microsoft Windows Bluetooth Software
<b>Link Topology</b>	Point to Point, Multipoint Pico Nets up to 7 slaves
<b>Security</b>	Full support of Bluetooth Security Provisions
<b>Power Management</b>	Microsoft Windows ACPI, and USB Bus Support Self configurable to optimize power conservation in all operating modes, including Standby, Hold, Park, and Sniff
<b>Certifications</b>	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
<b>Bluetooth Profiles Supported</b>	Serial Port Profile (SPP) Service Discovery Application Profile (SDAP) Dial-Up Networking (DUN) Generic Object Exchange Profile (GOEP) Object Push Profile (OPP) File Transfer Profile (FTP) Synchronization Profile (SYNC) Hard Copy Cable Replacement (HCRP) Personal Area Networking Profile (PAN) Human Interface Device Profile (HID) FAX Profile (FAX) Basic Imaging Profile (BIP) Headset Profile (HSP) Hands Free Profile (HFP) Advanced Audio Distribution Profile (A2DP)

### AUDIO/MULTIMEDIA

### AUDIO/MULTIMEDIA - DTS SOUND+

### Technical Specifications

<b>Hardware</b>	<b>Implementation</b>	IDT 92HD91
	<b>Function Key</b>	Volume up, volume down, and mute
	<b>Volume Controls</b>	
	<b>Full Duplex</b>	Yes
	<b>Microphone In</b>	Stereo
	<b>Headphone/Line Out</b>	Stereo
	<b>Integrated Microphone</b>	Yes, dual digital microphone array when equipped with optional webcam
<b>Audio Output Quality</b>	<b>Frequency Response</b>	20 Hz - 20 kHz
	<b>Signal to Noise Ratio</b>	>85 dB
	<b>Total Harmonic Distortion</b>	0.01%
	<b>Noise Floor</b>	-110 dB
	<b>Play/Record Sampling Rate(s)</b>	8 kHz - 48kHz
	<b>DAC</b>	16, 20 or 24-bit
	<b>ADC</b>	16 or 20-bit
<b>Internal Stereo Speaker</b>	<b>Power Rating</b>	2 Watts
	<b>Impedance</b>	4 ohms

### POWER

<b>HP 200W Slim Smart AC Adapter</b>	<b>Dimensions</b>	6.77 x 3.80 x 1.0 in (172 x 96 x 25.4 mm)	
	<b>Weight</b>	1.65 lb (748 g)	
	<b>Input</b>	100 to 240 VAC	
		Input Efficiency	87% min at 115 VAC
		Input frequency range	47 to 63 Hz
	<b>Output</b>	Input AC current	2.9 A at 90 VAC, 1.45 A at 180 VAC
		Output power	200W
		DC output	19.5V
		Hold-up time	5 msec at 115 VAC input
		Output current limit	<16A, Over voltage protection- 29V max automatic shutdown
	<b>Connector</b>	3 pin/grounded, mates with interchangeable cords	
	<b>Environmental Design</b>	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 10,000 ft (0 to 3,048 m)
		Humidity	20% to 80%

### Technical Specifications

	<b>EMI and Safety Certifications</b>	Storage Humidity	10% to 90%
		CE Mark- full compliance with LVD and EMC directives; Worldwide safety standards- IEC950, EN60950, UL1950, Class 1, SELV; Agency approvals- C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCIB, NOM-1 NYCE; MTBF- over 200,000 hours at 25°C ambient condition.	
<b>HP 150W Slim Smart AC adapter</b>	<b>Dimensions</b>	6.59 x 3.23 x 1.0 in (167.5 x 82 x 25.4 mm)	
	<b>Weight</b>	1.25 lb (565 g)	
	<b>Input</b>	100 to 240 VAC	
		Input Efficiency	87% min at 115 VAC
	<b>Output</b>	Input frequency range	47 to 63 Hz
		Input AC current	<2.7 A at 90 VAC
		Output power	150W
		DC output	19.50V +5.0%/-5.0%
		Hold-up time	5 msec at 115 VAC input
		Output current limit	<15A, Over voltage protection- 29V max automatic shutdown
	<b>Connector</b>	3 pin/grounded, mates with interchangeable cords	
	<b>Environmental Design</b>	Operating temperature	41° to 95° F (5° to 35° C)
		Non-operating (storage) temperature	-4° to 185° F (-20° to 85° C)
		Altitude	0 to 10,000 ft (0 to 3,048 m)
		Humidity	10% to 95%
		Storage Humidity	10% to 95%
	<b>EMI and Safety Certifications</b>	Worldwide safety and EMC approvals including CE, UL, CSA or cUL, GS, Australian Electric Permit, C-tick, NOM, CCC, KC, GOST, SABS, S mark, BSMI, ISC, PSE, PSB and SII.	

### Technical Specifications

<b>HP 8-cell Lithium-Ion Battery (83 WHr)</b>	<b>Dimensions</b> (H x W x L)	0.8 x 2.1 x 10.6 in (2 x 5.3 x 27cm)	
	<b>Weight</b> (max)	0.99lb (0.442 kg)	
	<b>Cells/Type</b>	Lithium-Ion	
	<b>Energy</b>	Voltage	14.8V
		Amp-hour capacity	5.6Ah
		Watt-hour capacity	83Wh
	<b>Temperature</b>	Operating (Charging)	32° to 113° F (0° to 45° C)
		Operating (Discharging)	14° to 122° F (-10° to 50° C)
		Non-operating	-4° to 122° F (-20° to 50° C)
	<b>Battery Re-Charge Time</b>	System in OFF or Standby Mode	2.5 hours
		System ON	3 to 5 hours
	<b>Fuel Gauge LED</b>	No	
	<b>Warranty</b>	1 year	
	<b>Compatible with optional Travel Battery</b>	Yes	

<b>HP Long Life 8-cell Lithium-Ion Battery (75 WHr)</b>	<b>Dimensions</b> (H x W x L)	0.8 x 2.1 x 10.6 in (2 x 5.3 x 27cm)	
	<b>Weight</b> (max)	0.99lb (0.442 kg)	
	<b>Cells/Type</b>	8-cell; Lithium-Ion	
	<b>Energy</b>	Voltage	14.4V
		Amp-hour capacity	5.1Ah
		Watt-hour capacity	75Wh
	<b>Temperature</b>	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)
	<b>Battery Re-Charge Time</b>	System in OFF or Standby Mode	2.5 hours
		System ON	3 to 5 hours
	<b>Fuel Gauge LED</b>	No	
	<b>Warranty*</b>	3 year	
	<b>Compatible with optional Travel Battery</b>	Yes	

\* 3-year platform warranty is required for a 3-year Long Life Battery warranty.

### Technical Specifications

#### Optional HP BB09 Ultra Extended Life Notebook Battery (secondary battery)

<b>Dimensions (H x W x L)</b>	1.2 x 5.9 x 11.4 in (3x15x29cm)
<b>Weight (max)</b>	1.5lb, (.682kg)
<b>Cells/Type</b>	Lithium-Ion
<b>Energy</b>	<b>Voltage</b> 11.25V <b>Amp-hour capacity</b> 8.85Ah <b>Watt-hour capacity</b> 100Wh
<b>Temperature</b>	<b>Operating (Charging)</b> 32° to 113° F (0° to 45° C) <b>Operating (Discharging)</b> 14° to 122° F (-10° to 50° C) <b>Non-operating</b> -4° to 122° F (-20° to 50° C)
<b>Battery Re-Charge Time</b>	<b>System in OFF or Standby Mode</b> 3.5 to 5 hours <b>System ON</b> 4 to 7 hours
<b>Fuel Gauge LED</b>	Yes
<b>Warranty</b>	1 year
<b>Compatible with optional Travel Battery</b>	No

#### Optional HP ST09 Extended Life Notebook Battery ("Travel Battery") (secondary battery)

<b>Dimensions (H x W x L)</b>	1.2 x 6.1 x 12 in (3x15.5x30.5cm)
<b>Weight (max)</b>	1.2lb, (.550kg)
<b>Cells/Type</b>	Lithium-Ion Polymer
<b>Energy</b>	<b>Voltage</b> 11.1V <b>Amp-hour capacity</b> 6.6Ah <b>Watt-hour capacity</b> 73Wh
<b>Temperature</b>	<b>Operating (Charging)</b> 32° to 113° F (0° to 45° C) <b>Operating (Discharging)</b> 14° to 122° F (-10° to 50° C) <b>Non-operating</b> -4° to 122° F (-20° to 50° C)
<b>Battery Re-Charge Time</b>	<b>System in OFF or Standby Mode</b> 3.5 to 5 hours <b>System ON</b> 4 to 7 hours
<b>Fuel Gauge LED</b>	Yes
<b>Warranty</b>	1 year
<b>Compatible with optional Travel Battery</b>	Yes

### ENVIRONMENTAL

TBD

### Technical Specifications

#### **COUNTRY OF ORIGIN**

China



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

Type	Description	Part #
<b>Memory</b>	HP 4 GB DDR3L-1600 1.35V SODIMM	H6Y75AA#xxx
	HP 8 GB DDR3L-1600 1.35V SODIMM	H6Y77AA#xxx
<b>Cases</b>	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
<b>Docking</b>	HP Adjustable Dual Monitor Stand	AW664AA#xxx
	HP Adjustable Display Stand	AW663AA#xxx
	HP 230W Docking Station	A7E34AA#xxx
	HP 120W Advanced Docking Station	A7E36AA#xxx
	HP 230W Advanced Docking Station	A7E38AA#xxx
<b>Input/Output - Mice</b>	HP Wireless Mobile Mouse	H2L63AA
	HP Stylish USB KB/Mouse	H4B80AA#xxx
<b>Adapters</b>	HP 90W Slim AC Adapter	H6Y83AA#xxx
	HP 150W Smart AC Adapter (slim)	AL192AA#xxx
	HP 90W Slim Combo Adapter w/USB Adapter	H6Y84AA#xxx
<b>Storage - External Storage</b>	HP External USB Optical Drive (expected availability 10/1/13)	F2B56AA#xxx
<b>Batteries</b>	HP ST09 Extended Life Notebook Battery	QK639AA
	HP BB09 Ultra Extended Life Notebook Battery	QK640AA
	HP AR08XL Notebook Battery	E7U26AA
<b>Health and Education</b>	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
<b>Security</b>	HP Docking Station Cable Lock	AU656AA#xxx
	HP UltraSlim Keyed Cable Lock	H4D73AA
<b>Wireless</b>	HP hs3110 HSPA+ Mobile Module	E5M76AA

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

HP It4112 LTE/HSPA+ 4G Mobile Module (EMEA, APJ only)

E5M74AA

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