QuickSpecs

Overview

HP ZBook 17 G2 Mobile Workstation

FRONT VIEW
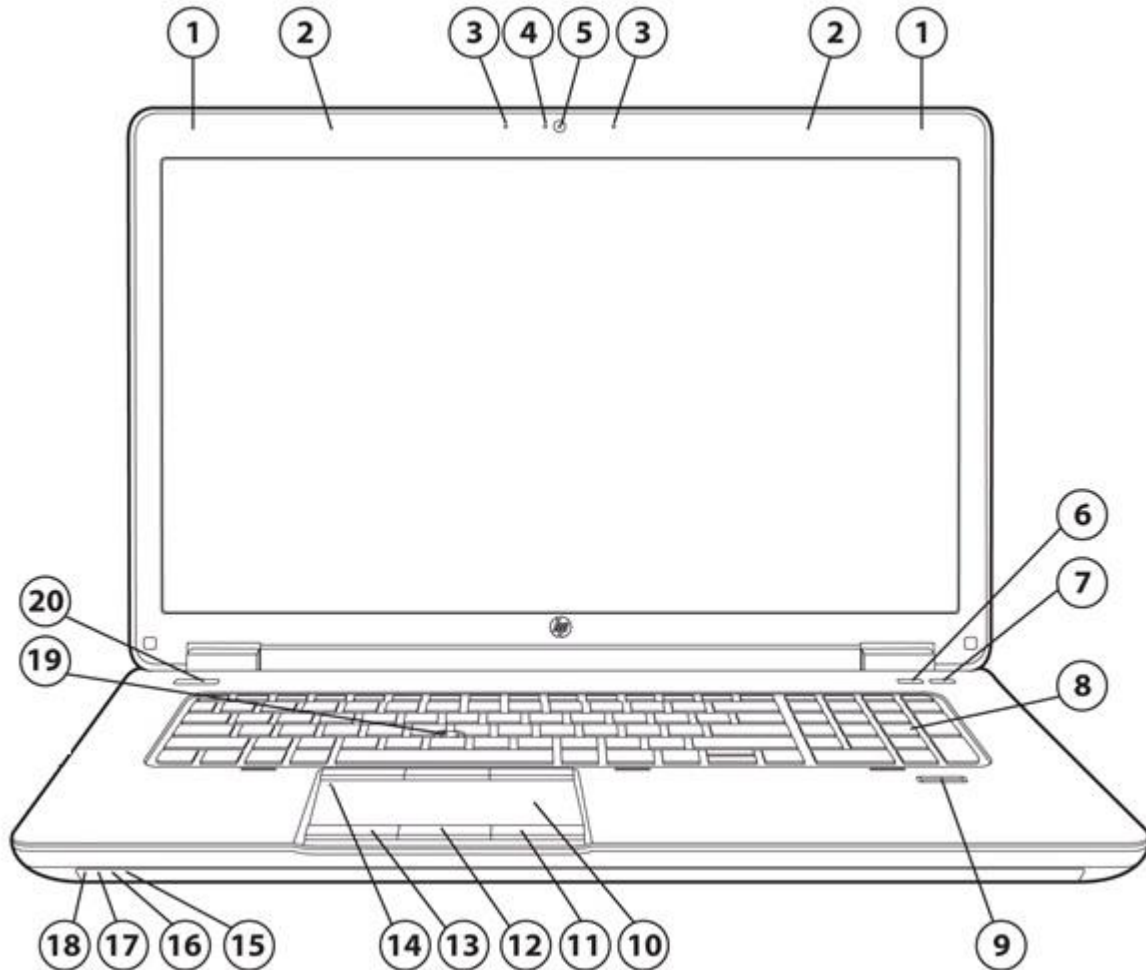
1. WWAN antennas (2)
2. WLAN antennas (2)
3. Internal microphones (2)
4. Webcam light (with webcam)
5. Optional 720p HD Webcam
6. Wireless button
7. Volume mute button
8. Numeric keypad
9. Fingerprint reader (select models only)
10. Touchpad with scroll zone
11. Right Touchpad button
12. Center Touchpad button
13. Left Touchpad button
14. Touchpad on/off button with LED
15. Hard drive light
16. AC adapter/Battery light
17. Power light
18. Wireless light
19. Pointstick
20. Power button

Overview
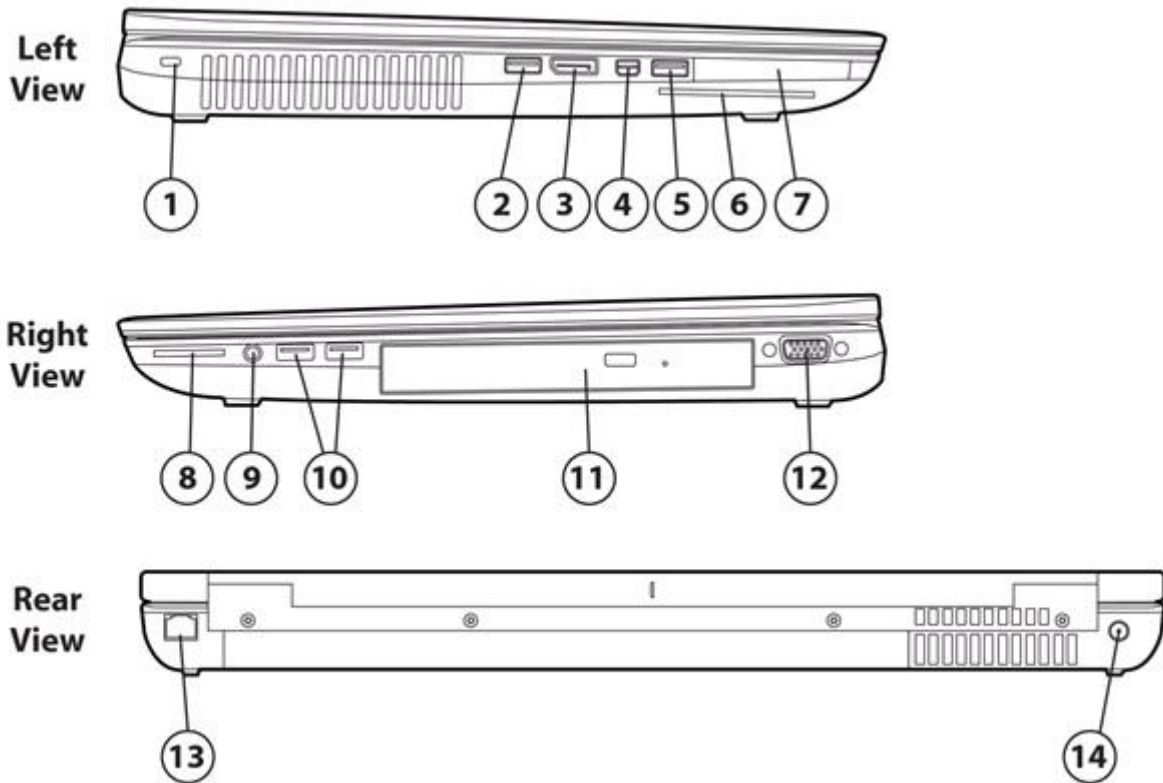
1. Security cable slot
2. USB 2.0 port
3. DisplayPort
4. Thunderbolt™ 2 port*
5. USB 3.0 charging port
6. Smart card reader
7. ExpressCard port
8. Memory card reader
9. Audio-out (headphone) jack/Audio in (microphone) jack
10. USB 3.0 ports (2)
11. Optical drive (select models only)
12. VGA port
13. RJ-45 (network) jack
14. AC Adapter/Battery light

Overview

BOTTOM VIEW
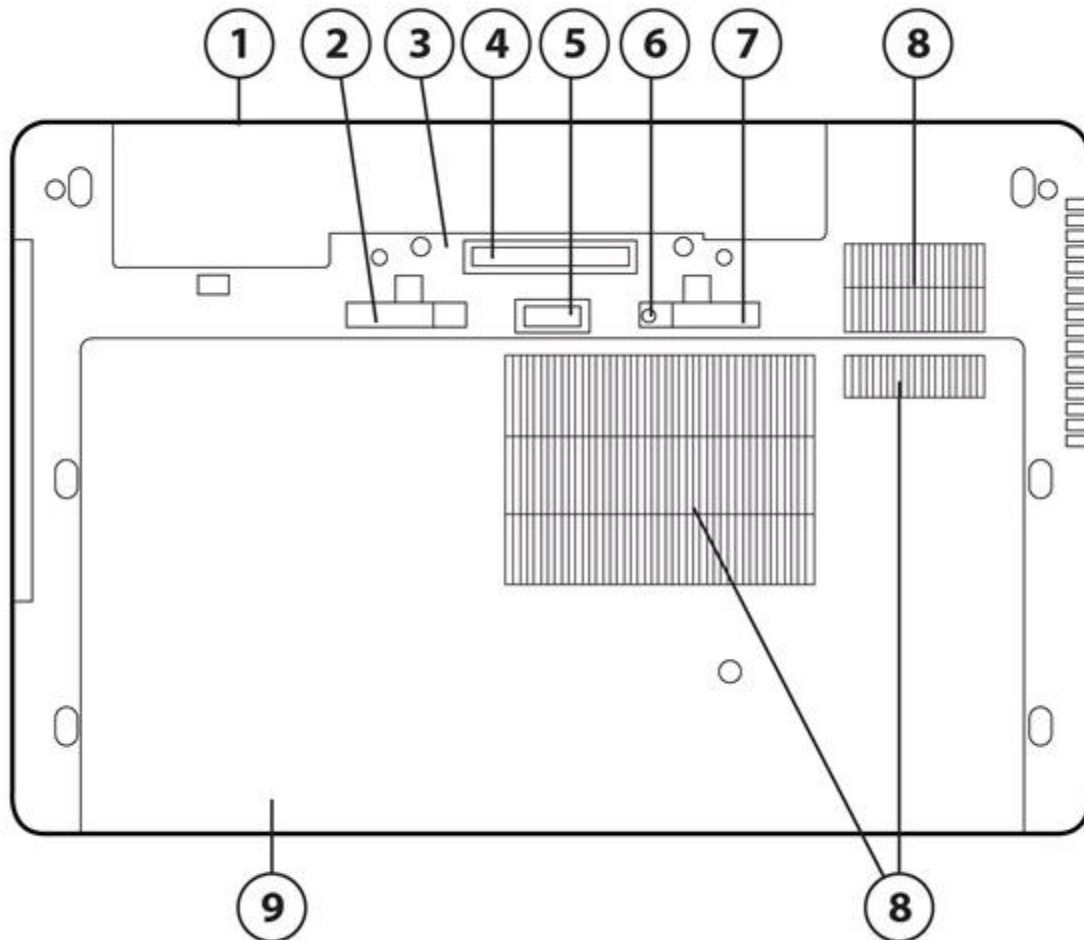
1. Battery bay
2. Battery release latch
3. SIM slot for WWAN (select models)*
4. Docking connector
5. Accessory battery connector
6. Service door release lock
7. Service door release latch
8. Vents
9. Service Door

* SIM slot is accessed through battery bay

QuickSpecs

Overview

At A Glance

- 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, 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 NVIDIA ® Quadro® discrete graphics: NVIDIA Quadro K1100M (2GB GDDR5), AMD FirePro™ M6100 (2GB GDDR5), NVIDIA Quadro K2200M (2GB GDDR5), NVIDIA Quadro K3100M (4GB GDDR5), NVIDIA Quadro K4100M (4GB GDDR5), NVIDIA Quadro 5100M (8GB GDDR5); NVIDIA Optimus or AMD Enduro™ 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. Supports Extreme processor.
- 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™ 2 port for high speed data/video/audio transfer support
- Thunderbolt™ 2 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 17.3-inch diagonal anti-glare LED-backlit display:
  HD+ (1600x900) with standard viewing angle, FHD (1920x1080) wide viewing angle, or FHD (1920x1080) ultrawide viewing angle with HP DreamColor Technology
- Upgrade Bay for optional second hard drive or weight saver
- Flexible wireless connectivity options:
  - Intel® Dual Band Wireless-NB 7260 802.11 a/b/g/n (2x2) WiFi ; Intel® Dual Band Wireless-AC 7260 802.11 a/b/g/n/ac (2x2) WiFi and Bluetooth 4.0 combo; Intel® Dual Band Wireless-AN 7260 802.11 a/b/g/n (2x2) WiFi and Bluetooth 4.0 combo
  - Optional integrated wireless 3G or 4G (LTE) mobile broadband module support
- Two dedicated drive slots. 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, 256 GB SED Solid State Drive or 256 GB Z Turbo Drive (PCIe SSD)
- Security features including HP Client Security Manager, managed via single console
- Low halogen HP BIOS technology, including HP Sure Start to identify and recover from unknown BIOS attacks.

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

Features

OPERATING SYSTEM

Preinstalled	Windows 8.1 Pro 64*
	Windows 7 Professional 64 (available through downgrade rights from Windows 8.1 Pro)**
	Windows 7 Professional 64**
	Ubuntu Linux***
	FreeDOS
Supported	Windows 7 Professional 32**
	Windows 8.1 Enterprise 64*
	Windows 7 Enterprise 32/64**
	Windows 7 Ultimate 32/64**

* Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows functionality. See http://www.microsoft.com for details.

** This system is preinstalled with Windows® 7 Pro software and also comes with a license and media for Windows 8 Pro software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.

*** Not available when using WWAN

PROCESSOR*

4th Generation Intel® Core™ i7-4940MX (3.10 GHz, 1600 MHz, 8 MB L3 Cache, 4 cores, 57W)
  Up to 4.00 GHz with Intel Turbo Boost Technology
4th Generation Intel® Core™ i7-4910MQ (2.9 GHz, 1600MHz, 8 MB L3 cache, 4 cores, 47W)*
  Up to 3.90 GHz with Intel Turbo Boost Technology
4th Generation Intel® Core™ i7-4810MQ (2.8 GHz, 1600MHz, 6 MB L3 cache, 4 cores, 47W)*
  Up to 3.80 GHz with Intel Turbo Boost Technology
4th Generation Intel® Core™ i7-4710MQ (2.5 GHz, 1600MHz, 6 MB L3 cache, 4 cores, 47W) (no vPro support)*
  Up to 3.50 GHz with Intel Turbo Boost Technology
4th Generation Intel® Core™ i7-4610M (3.00 GHz, 1600 MHz, 4 MB L3 Cache, 2 cores, 37W)
  Up to 3.70 GHz with Intel Turbo Boost Technology
4th Generation Intel® Core™ i5-4340M (2.90 GHz, 1600 MHz, 3 MB L3 Cache, 2 cores, 37W)
  Up to 3.60 GHz with Intel Turbo Boost Technology
4th Generation Intel® Core™ i5-4310M (2.70 GHz, 1600 MHz, 3 MB L3 Cache, 2 cores, 4 threads, 37W)
  Up to 3.40 GHz with Intel Turbo Boost Technology
4th Generation Intel® Core™ i5-4210M (2.6 GHz, 1600 MHz, 3 MB L3 Cache, 4 threads, 37W)
  Up to 3.20 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 system required. Performance will vary depending on your hardware and software configurations. Intel's numbering is not a measurement of higher performance.

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,

Features

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 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

AMD FirePro™ M6100 with 2 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 K2200M with 2 GB dedicated GDDR5 video memory
  Microsoft DirectX 11.1 (Shader Model 5.0) and OpenGL 4.2 capable
NVIDIA Quadro K3100M with 4 GB dedicated GDDR5 video memory
  Microsoft DirectX 11.1 (Shader Model 5.0) and OpenGL 4.2 capable
NVIDIA Quadro K4100M with 4 GB dedicated GDDR5 video memory
  Microsoft DirectX 11.1 (Shader Model 5.0) and OpenGL 4.2 capable
NVIDIA Quadro K5100M with 8 GB dedicated GDDR5 video memory
  Microsoft DirectX 11.1 (Shader Model 5.0) and OpenGL 4.2 capable

NVIDIA Optimus Technology and AMD Enduro™ Technology supported

NOTE: NVIDIA Quadro mobile professional graphics support up to five independent displays when using an HP Advanced Docking station (sold separately). AMD FirePro™ professional graphics support up to five independent displays when using an HP Advanced Docking station (sold separately).

Multi-Display Support
Without Docking Station:

HP ZBook 17 without the use of a Docking Station supports up to a maximum of four independent displays. These four displays are the internal panel plus three external displays connected to the VGA, the DisplayPort (DP), and the Thunderbolt™ Port connectors.

With Docking Station*:

The Advanced Docking Station has VGA and four digital display output connectors (two DVI and two DP). Of those four digital display connectors, only two may be used at a time (two DVI, two DP or one DP and one DVI). When used together with the HP ZBook 17, a maximum of five independent displays are supported. These five displays are the internal panel plus four external displays connected to three display outputs connectors from the standard or Advanced Docking Station*, and the Thunderbolt™ connector from the ZBook.

DP 1.2 "daisy-chain" feature:

On HP ZBook 17, the maximum number of independent displays is increased to six with the use of DP1.2 "daisy-chain" feature.   This requires Hybrid Graphics to be enabled, one monitor connected to the dock VGA, and at least one daisy chain connection on (A) System DP, (B) Docking Station DP 1, (C) Docking Station DP 2.

Features

* Advanced docking station sold separately.

DISPLAY

Internal
17.3" diagonal LED-backlit HD+SVA anti-glare (1600 x 900)
17.3" diagonal LED-backlit FHD WVA anti-glare (1920 x 1080)
17.3" diagonal LED-backlit FHD DreamColor UWVA IPS anti-glare (1920 x 1080)

External
Up to 30-bit (2^30) per pixel "Deep Color"
(total of 1,073,741,824 color variations)

Thunderbolt™ 2*
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™ 2 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 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.
- Optimal configurations for enabling the maximum number of displays (up to five independent displays when using an HP Advanced Docking station (sold separately) with hybrid graphics enabled):
  - With Port Replicator:
    - Dock DP + Dock DVI + Internal Display + Thunderbolt DP port (enabling VGA will drop one digital display)
  - With Advanced Port Replicator:
    - Dock DP1 + Dock DP2 + Internal Display + Thunderbolt DP port (enabling VGA will drop one digital display)

VGA

Features

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 DP to DVI adapters to use without the optional HP Docking Station
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.

STORAGE AND DRIVES

Z Turbo Drive Storage Bay
HP 128 GB Z Turbo Drive (PCIe Solid State Drive)
HP 256 GB Z Turbo Drive (PCIe Solid State Drive)

Primary Storage Bay

Hard Drives*
500/750 GB, 1 TB 7200 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
256/512 GB SATA 6 Gb/sec Secure Encrypted Drive (SED) Opal 2

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, 1, and 5 supported

*For storage 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.

Weight saver

Features

DRIVE CONTROLLERS

Primary drive, secondary drive, and upgrade bay:	SATA-3 or SATA-2 for HDD and SATA-3 for SSD
Z Turbo Drive:	PCIe SSD
RAID:	0, 1 and 5 supported

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**

*With Blu-Ray, certain disc, digital connection, compatibility and/or performance issues may arise, and do not constitute defects in the product. Flawless playback on all systems is not guaranteed. In order for some Blu-ray titles to play, they may require a DVI or HDMI digital connection and your display may require HDCP support. HD-DVD movies cannot be played.

**Double Layer discs can store more data than single layer discs. However, double-layer discs burned with this drive may not be compatible with many existing single-layer DVD drives and players The DVD-RAM cannot read or write to 2.6GB Single Sided/5.2 GB Double Sided – Version 1.0 media.

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. Maximum memory capacities assume Windows 64-bit operating systems or Linux.

NETWORKING/COMMUNICATIONS

Wireless
Support for a broad range of secure, integrated wireless LAN and wireless WAN options featuring support for the latest industry standards. Optional 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 Module

HP lt4112 LTE/HSPA+ Qualcomm® Gobi™ 4G Module

Features

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

All 802.11 integrated wireless LAN options

Intel Dual Band Wireless-NB 7260 802.11 a/b/g/n (2x2) WiFi
Intel Dual Band Wireless-AC 7260 802.11 a/b/g/n/ac (2x2) WiFi and Bluetooth 4.0 combo
Intel Dual Band Wireless-AN 7260 802.11 a/b/g/n (2x2) WiFi and Bluetooth 4.0 combo

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

* Broadband wireless is an optional feature and 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 LTE not available on all products, in all regions.
** 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.
*** Integrated Intel Wi-Di feature is available on select configurations only and requires separately purchased projector, tv or computer monitor with an integrated or external Wi-Di receiver. External Wi-Di receivers connect to the projector, tv or computer monitor via a standard HDMI cable, also sold separately.
****802.11 requires access point and internet service. Availability of public wireless access points limited.

NOTE: WWAN not available with DreamColor displays.

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

Features

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

HP Device Access Manager with Just In Time Authentication
DigitalPersona Fingerprint Driver
HP Drive Encryption
HP File Sanitizer
HP Client Security Manager
HP SpareKey
Microsoft Defender
Validity Fingerprint Driver

BIOS Features

Absolute Persistence Module
HP Sure Start
HP Automatic Drive Lock
HP BIOS Protection
HP Disk Sanitizer (Not for SSD)
HP DriveLock
HP SpareKey
Hybrid Boot
Master Boot Record Security
Measured Boot
Power On Authentication
Pre-Boot Security
Secure Boot
Secure Erase (SSD & HDD)
BIOS Update via Network

MultiMedia

Cyberlink Power2Go
Cyberlink PowerDVD

HP Value Add

Windows 7

Security

HP Device Access Manager with Just In Time Authentication
HP Drive Encryption
HP File Sanitizer
HP Client Security Manager
HP SpareKey
Microsoft Security Essentials
Validity Fingerprint Driver

BIOS Features

Absolute Persistence Module
HP Sure Start
HP Automatic Drive Lock
HP BIOS Protection
HP Disk Sanitizer (Not for SSD)
HP DriveLock
HP SpareKey
Hybrid Boot
Master Boot Record Security
Measured Boot
Power On Authentication
Pre-Boot Security
Secure Boot
Secure Erase (SSD & HDD)
BIOS Update via Network

MultiMedia

Cyberlink Power2Go
Cyberlink PowerDVD
Cyberlink YouCam BE

HP Value Add

Features

Getting Started with Windows 8
HP 3D DriveGuard
HP ePrint Driver
HP Hotkey Support
HP Manageability
HP PageLift App
HP Support Assistant
Box 50GB Offer
Foxit PhantomPDF *Express* for HP
Skype

HP 3D DriveGuard
HP ePrint Driver
HP Hotkey Support
HP Manageability
HP PageLift
HP Recovery Manager
HP Support Assistant
HP Recovery Disc Creator (HPRDC)
Box 50GB
Foxit PhantomPDF *Express* for HP
Skype

Microsoft Products

Buy Office

Microsoft Products

Buy Office

Additional Software Available from the Web

HP SoftPaq Download Manager
HP Software System 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

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

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
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

Features

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.

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 accidently 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:

- 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

Features

POWER

Power Supply

External HP 200W Slim Smart AC adapter
(172 x 96 x 25.4mm)
External HP 230W Slim Smart AC adapter
(200 x 100 x 25.4 mm)

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 9 hours and 45 minutes***

System Standby Time

Up to TBD weeks****

* 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 limited warranty only
***Windows 7 MM07 battery life will vary depending on various factors including product model, configuration, loaded applications, features, use, wireless functionality, and power management settings. The maximum capacity of the battery will naturally decrease with time and usage. See www.bapco.com for additional details.
****Standby life will vary depending on various factors including battery, Memory, CPU, EC and LAN chip. The maximum capacity of the battery will naturally decrease with time and usage.

Power Conservation

NVIDIA Optimus or AMD Enduro™ technology
Hibernation
Standby
ACPI compliance

ENVIRONMENTAL

US ENERGY STAR ®
IT ECO declaration
EPEAT®

WEIGHTS & DIMENSIONS

Weight

Starting at 7.42 lb (3.36 kg) with Z Turbo Drive and weight saver (no optical drive)
Starting at 7.67 lb (3.46 kg) with hard drive and DVD-R/W drive

Dimensions (w x d x h)

Features

1.33 in (at front) x 16.37 in x 10.7 in
34 mm (at front) x 416 mm x 272 mm
Height with DreamColor display: 1.34 in / 34.0 mm at front; 1.57in / 40.0 mm at rear

NOTE: Height varies depending upon where on the notebook the measurement is made. Weight varies by configuration and components. Weight includes Dual Core CPU, HD+, NVIDIA Kepler, DVD R/W, 2GBx1 SODIMM, , wLAN, FPR, 8-cell battery, no wWAN, no BlueTooth.

PORTS/SLOTS

Ports

VGA – One
DisplayPort v1.2– One
Thunderbolt™ 2* – 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 Port – 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™ 2 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

SERVICE AND SUPPORT

HP Services offers 3-year and1-year limited 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

Stand-Alone Power Requirements (AC Power)	**Nominal Operating Voltage**	19.5 V	
	Average Operating Power	DreamColor	**Windows 7 (64-bit)**
		Without DreamColor	25 W
	Max Operating Power	< 200 W or < 230 W	
Temperature	**Operating**	32° to 95° F (0° to 35° C) (not writing optical) 41° to 95° F (5° to 35° C) (writing optical)	
	Non-operating	-4° to 140° F (-20° to 60° C)	
Relative Humidity	**Operating**	10% to 90%, non-condensing	
	Non-operating	5% to 95%, 101.6° F (38.7° C) maximum wet bulb temperature	
Shock	**Operating**	40 G, 2 ms, half-sine	
	Non-operating	200 G, 2 ms, half-sine	
Random Vibration	**Operating**	0.75 grms	
	Non-operating	1.50 grms	
Altitude (unpressurized)	**Operating**	-50 to 10,000 ft (-15.24 to 3,048 m)	
	Non-operating	-50 to 40,000 ft (-15.24 to 12,192 m)	
Industry Standard Certifications	**UL**	Yes	
	CSA	Yes	
	FCC Compliance	Yes	
	ENERGY STAR®	Select models*	
	EPEAT	Gold **	
	ICES	Planned	
	Australia / NZ A-Tick Compliance	Planned	
	CCC	Planned	
	Japan VCCI Compliance	Planned	
	KC	Planned	
	BSMI	Planned	
	CE Marking Compliance	Planned	
	MIL STD 810G	Passed***	

* Configurations of the HP ZBook 17 that are ENERGY STAR qualified are identified as HP ZBook 17 G2 ENERGY STAR® on HP websites and on www.energystar.gov.

** EPEAT® registered where applicable. EPEAT registration varies by country. See www.epeat.net for registration status by country.

*** 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.

DISPLAY

17.3-inch HD+ SVA LED	**Dimensions** (W x H)	15.0 x 8.5 in (38.2 x 21.5 cm)

Technical Specifications

anti-glare			
	Diagonal Size	17.3 in (43.9 cm)	
	Surface Treatment	Anti-glare	
	Contrast Ratio	300:1 (min)	
	Refresh Rate	60 Hz	
	Brightness	200 nits (typ)	
	Pixel Resolution	**Pitch**	0.3287 x 0.3287 mm
		Format	1600x900
		Configuration	RGB Stripe
	Backlight	LED	
	PPI	106	
	Viewing Angle	±30° Horizontal, ±10° Vertical (minimum) 30/30/10/20 (Left/Right/Down/Up) (minimum)	

17.3-inch FHD WVA LED anti-glare			
	Dimensions (W x H)	15.0 x 8.5 in (38.2 x 21.5 cm)	
	Diagonal Size	17.3 in (43.9 cm)	
	Surface Treatment	Anti-glare	
	Contrast Ratio	500:1 (min)	
	Refresh Rate	60 Hz	
	Brightness	300 nits (typ)	
	Pixel Resolution	**Pitch**	0.1989 x 0.1989 mm
		Format	1920x1080
		Configuration	RGB Stripe
	Backlight	LED	
	PPI	127	
	Viewing Angle	±60° Horizontal, ±50° Vertical (minimum) 60/60/50/50 (Left/Right/Down/Up) (minimum)	

17.3-inch FHD UWVA LED anti-glare Dreamcolor				
	Dimensions (W x H)	15.0 x 8.5 in (38.2 x 21.5 cm)		
	Diagonal Size	17.3 in (43.9 cm)		
	Surface Treatment	Anti-glare		
	Contrast Ratio	600:1 (min)		
	Refresh Rate	60 Hz		
	Brightness	300 nit typical		
	Pixel Resolution	**Pitch**	0.1989 x 0.1989 mm	
		Format	1920x1080	
		Configuration	RGB Stripe	
	Backlight	LED		
	PPI	127		
	Viewing Angle	80° Horizontal, ±80° Vertical (minimum) 80/80/80/80 (Left/Right/Down/Up) (min)		
	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%

Technical Specifications

	AdobeRGB	114%	127%
	sRGB	154%	148%

STORAGE AND DRIVES

Internal Storage

750 GB 7200 rpm SATA Hard Drive	**Drive Weight**	0.25 lbs (115g)	
	Capacity	750 GB	
	Height	0.37 in (9.5 mm)	
	Width	2.75 in (69.85 mm)	
	Interface	ATA-8, SATA 3.0 Gb/s	
	Transfer Rate	**Synchronous** (maximum) 600 MB/s (Drive Capability)	
	Seek Time (typical reads, including settling)	**Single Track**	1.5 ms ~ 2 ms
		Average	11 ms ~ 13 ms
		Maximum	15 ms ~ 21 ms
	Cache	Up To 32 MB	
	Rotational Speed	7200 rpm	
	Logical Blocks	1,465,149,168	
	Operating Temperature	32° to 140° F (0° to 60° C) [top cover temp]	
	Features	ATA Security, S.M.A.R.T., NCQ, Ultra DMA	
500 GB 7200 rpm SATA Hard Drive	**Drive Weight**	0.20 lbs (92 g) ~ 0.25 lbs (115 g)	
	Capacity	500 GB	
	Height	0.28 in (7 mm)/0.38 in (9.7 mm)	
	Width	2.75 in (69.85mm)	
	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 ~ 2 ms
		Average	11 ms ~ 13 ms
		Maximum	18 ms ~ 22 ms
	Cache	Up To 32 MB	
	Rotational Speed	7200 rpm	
	Logical Blocks	976,773,168	
	Operating Temperature	32° to 140° F (0° to 60° C) [top cover temp]	
	Features	ATA Security, S.M.A.R.T., NCQ, Ultra DMA	
500 GB 5400 rpm SATA FIPS* Hard Drive	**Drive Weight**	0.21 lbs (95g)	
	Capacity	500 GB	
	Height	0.28 in (7 mm)	
	Width	2.75 in (69.85 mm)	
	Interface	ATA-8, SATA 3.0	
	Transfer Rate	**Synchronous** (maximum) 600 MB/s (Drive Capability)	
	Seek Time (typical reads, including	**Single Track**	1.5 ms
		Average	12 ms

Technical Specifications

settling)	**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) [top cover temp]	
Features	ATA Security; TCG Opal 2.x, FIPS, S.M.A.R.T., NCQ, Ultra DMA	

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

500 GB 7200 rpm SMART SATA II Self Encrypting Drive	**Drive Weight**	0.21 lbs (95g)	
	Capacity	500 GB	
	Height	0.28 in (7 mm)	
	Width	2.75 in (69.85 mm)	
	Interface	ATA-8, SATA 2.6	
	Transfer Rate	**Synchronous** (maximum)	300 MB/s (Drive Capability)
	Seek Time (typical reads, including settling)	**Single Track**	2 ms
		Average	13 ms
		Maximum	18 ms
	Cache	32 MB	
	Rotational Speed	7200 rpm	
	Logical Blocks	976,773,168	
	Operating Temperature	32° to 140° F (0° to 60° C) [case temp]	
	Features	ATA Security, TCG OPAL v1.00, S.M.A.R.T., NCQ, Ultra DMA	

SATA 6 Gb/s 512 GB, 2.5-inch Solid State Drive	**Drive Weight**	0.17 lb (78 g)	
	Capacity	512 GB	
	NAND Type	MLC	
	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**
		505 MB/s	470 MB/s
	Logical Blocks	1,000,215,216	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	
	Features	ATA Security; DIPM; TRIM; DEVSLP	

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

Technical Specifications

		Up to 515 MB/s	Up to 465 MB/s
	Logical Blocks	500,118,192	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	
	Features	ATA Security; DIPM; TRIM; DEVSLP	

SATA 6 Gb/s 240 GB, 2.5-inch Solid State Drive	**Drive Weight**	0.17 lb (78 g)	
	Capacity	240GB	
	NAND Type	MLC	
	Height	0.28 in (7 mm)	
	Width	2.75 in (69.85 mm)	
	Interface	ATA-8, SATA 3.0	
	Performance	**Maximum Sequential Read**	**Maximum Sequential Write**
		Up to 540 MB/s	Up to 490 MB/s
	Logical Blocks	468,862,128	
	Operating Temperature	32° to 158° F (0° to 70° C) (ambient temp)	
	Features	ATA Security; DIPM; TRIM; DEVSLP	

SATA 6 Gb/s 180 GB, 2.5-inch Solid State Drive	**Drive Weight**	0.17 lb (78 g)	
	Capacity	180 GB	
	NAND Type	MLC	
	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	490 MB/s
	Logical Blocks	351,651,888	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	
	Features	ATA Security; DIPM; TRIM; DEVSLP	

SATA 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) [ambient temp]	
	Features	ATA Security; DIPM; TRIM; DEVSLP	

HP Z Turbo Drive 128 GB, PCIe Solid State Drive	**Drive Weight**	0.02 lb (10 g)
	Capacity	128 GB
	Height	0.24 in (60 mm)

Technical Specifications

Width	0.87 in (22 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) [case temp]	
Features	ATA Security; DIPM; TRIM; DEVSLP	

HP Z Turbo Drive 256 GB, PCIe Solid State Drive	**Drive Weight**	0.02 lb (10 g)	
	Capacity	256 GB	
	Height	0.24 in (60 mm)	
	Width	0.87 in (22 mm)	
	Interface	ATA-8, PCIe 2.0	
	Performance	**Maximum Sequential Read**	**Maximum Sequential Write**
		730 MB/s	620 MB/s
	Logical Blocks	500,118,192	
	Operating Temperature	32° to 158°F (0° to 70°C) [case temp]	
	Features	ATA Security; DIPM; TRIM; DEVSLP	

* 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 software.

Technical Specifications

Optical Drives

DVD+/-RW SuperMulti DL Drive	**Access Times**	Random	<140ms CD (typical)
			< 160 ms DVD (typical)
	Max Data Transfer Rate	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	
	Transfer Mode	UDMA Mode 5	
	Interface	Gen 1 SATA	
	Supported Media (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	
	Supported Media (write)	CD-R, CD-RW, DVD+R, DVD+RW, DVD-R, DVD-RW, DVD-RAM, DVD+R DL, DVD-R DL	
	Max Media Capacity (read)	8.5 GB	
	Max Media Capacity (write)	8.5 GB	
	Transport	Tray Loading	
Blu-ray ROM DVD+/-RW SuperMulti DL Drive	**Access Times**	Random	<190 ms CD-ROM (typical)
			< 180ms DVD-ROM (typical)
			<230 ms BD-ROM (typical)
	Max Data Transfer Rate	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	
	Transfer Mode	UDMA Mode 5	
	Interface	Gen 1 SATA	

Technical Specifications

	Supported Media (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	
	Supported Media (write)	CD-R, CD-RW, DVD+R, DVD+R DL, DVD+RW, DVD-R, DVD-R DL, DVD-RW, DVD-RAM	
	Max Media Capacity (read)	50.0 GB	
	Max Media Capacity (write)	8.5GB	
	Transport	Tray Loading	
Blu-ray R/RE DVD+/-RW SuperMulti DL Drive	**Access Times**	Random	<165 ms CD-ROM (typical) <185 ms DVD-ROM (typical) <205 ms BD-ROM (typical)
	Max Data Transfer Rate	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 6X BD-ROM 6X BD-R 2X BD-RE	
	Transfer Mode	UDMA Mode 5	
	Interface	Gen 1 SATA	
	Supported Media (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	
	Supported Media (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	
	Max Media Capacity (read)	50.0 GB	
	Max Media Capacity (write)	50.0 GB	
	Transport	Tray Loading	

SECURITY

HP Fingerprint Sensor	**Mobile Voltage Operation**	3.0V-3.6V Single Supply
	Operating Temperature	14° - 167°F (-10° - 75°C)

Technical Specifications

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

NETWORKING/COMMUNICATIONS

Intel® I217-LM Gigabit Network Connection	**Ethernet Features**	10 Mbit/s operation (10BASE-T; IEEE 802.3; IEEE 802.3 clauses 13-14) 100 Mbit/s operation (100BASE-TX; IEEE 802.3u; IEEE 802.3 clauses 21-30) 1000 Mbit/s operation (1000BASE-T; IEEE 802.3ab; IEEE 8023. Clauses 40) IEEE 802.3u Auto-Negotiation (Automatic Speed Selection) Full Duplex Operation at all Speeds, Half Duplex operation at 10 and 100 Mbit/s IEEE 802.1p QoS (Quality of Service) Support IEEE 802.1q VLAN support IEEE 802.3x Flow Control (IEEE 802.3 clauses 31-32; configurable) IEEE 802.3az EEE(Energy Efficient Ethernet) IEEE 802.1as/1588 conformance Jumbo Frame 9K Auto MDI/MDIX Crossover cable detection
	Power Management	ACPI compliant - multiple power modes Energy Detect Low Power Mode(Green Ethernet)
	Performance Features	TCP/IP/UDP Checksum Offload (configurable) Protocol Offload(ARP & NS) Large send offload and Giant send offload Receiving Side Scaling MACSec Offload (802.3ae) Intel® vPro iSCSI Boot
	Manageability	Wake-on-LAN from standby and hibernation (Magic Packet and Microsoft Wake-Up Frame); Wake-on-LAN from off (Magic Packet only) PXE 2.1 Remote Boot Statistics Gathering (SNMP MIB II, Ethernet-like MIB, Ethernet MIB (802.3x, clause 30)) Comprehensive diagnostic and configuration software suite Virtual Cable Doctor for Ethernet cable status
	Interface	PCI Express 1.1 x1 to fully support ASPM L0s/L1 and CLKREQ. NOTE: Intel® I217-LM Gigabit interface is not PCIe compliant. It operates at half of PCIe specification V1.1 (2.5GT/S) speed.
	NIC Device Driver Name	Intel® Ethernet Network Connection I217-LM

HP hs3110 HSPA+ Mobile Module*	**Technology/Operating Bands**	HSPA+: 2100 (Band 1), 1900 (Band 2), 850 (Band 5), 700 (Band 17) MHz E-GPRS: 1900 (Band 2), 1800 (Band 3), 850 (Band 5), 900 (Band 8) MHz
	Wireless Protocol Standards	WCDMA R99, 3GPP Release 5, 6 and 7 UMTS Specification E-GPRS: Class B, Multi-slot class 33, coding schemes CS1 - CS4 and MSC1 -

Technical Specifications

		MSC9
	GPS	Standalone, A-GPS
	GPS Bands	1575.42 MHz ± 1.023 MHz, GLONASS 1596–1607MHz
	Maximum Data Rates	DC-HSPA+: 42 Mbps (Download), 5.76 Mbps (Upload) HSPA+: 21.6 Mbps (Download), 5.76 Mbps (Upload) EDGE: 236.8 kbps (Download), 236.8 kbps (Upload) GPRS: 85.6 kbps(Download), 85.6 kbps (Upload)
	Maximum Output Power	HSPA+: 23.5 dBm E-GPRS 1900/1800: 26.5 dBM E-GPRS 900/850: 27.5 dBM GPRS 1900/1800: 29.5 dBm GPRS 900/850: 32.5 dBm
	Maximum Power Consumption	HSPA+: 1,100 mA (peak); 800 mA (average) E-GPRS: 2,800 mA (peak); 700 mA (average)
	Form Factor	M.2, 3042-S3 Key B
	Weight	6g
	Dimensions (Length x Width x Thickness)	1.65 x 1.18 x 0.09 in (42 x 30 x 2.3 mm)

 * 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.

HP lt4112 LTE/HSPA+ Qualcomm® Gobi™ 4G 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)

Technical Specifications

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.

Intel® Dual Band Wireless-NB 7260 802.11 ac (2x2) WiFi Adapter*	**Wireless LAN Standards**	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n
	Interoperability	Wi-Fi certified
	Frequency Band	802.11b/g/n

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
- 2.402 - 2.482 GHz

	Data Rates	802.11b: 1, 2, 5.5, 11 Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz)
	Modulation	Direct Sequence Spread Spectrum BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM

Security[1]

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

	Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
	Roaming	IEEE 802.11 compliant roaming between access points

Output Power[2]

- 2.4G: +13.5dBm minimum

Technical Specifications

- 5G: +12dBm minimum
- Maximum output power must be able to achieve modular regulatory certification with notebooks that have antennas >20cm from the user and peak gain of +3dBi at 2.4GHz and +4dBi at 5GHz

Power Consumption	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
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity[3]	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)
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	0.19 x 1.06 x 1.18 in (4.75 x 26.8 x 30 mm)
Weight	3.1g
Operating Voltage	3.3v +/- 9%

Temperature	Operating Non-operating	14° to 158° F (-10° to 70° C) -40° to 176° F (-40° to 80° C)
Humidity	Operating Non-operating	10% to 90% (non-condensing) 5% to 95% (non-condensing)
Altitude	Operating Non-operating	0 to 10,000 ft (3,048 m) 0 to 50,000 ft (15,240 m)
LED Activity	LED 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).

Bluetooth Specification

Bluetooth Specification	V4.0 High Speed, V2.1+EDR, backwards compatible with V1.1, 1.2 and 2.0
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	-6 dBm to 4 dBm (Bluetooth Class II)
Receiver Sensitivity	Better than -80 dBM at 0.1 % raw bit error rate

Technical Specifications

Power Consumption	Peak (Tx) 330 mW
	Peak (Rx) 230 mW
	Sleep <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	Generic Access Profile (GAP)
	Service Discovery Application Profile (SDAP)
	Serial Port Profile (SPP)
	Dial_Up Networking Profile (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)
	Generic Audio/Video Distribution Profile (GAVDP)
	Advanced Audio/Video Distribution Profile (A2DP)
	FAX Profile (FAX)
	Basic Imaging Profile (BIP)
	Headset Profile (HSP)
	Hands Free Profile (HFP)
	Basic Printing Profile (BPP)
	VDP (Video Distribution Profile)
	AVRCP (Audio Video Remote Control Profile)

* 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

Intel® Dual Band Wireless-N 7260AC 802.11 a/b/g/n (2x2) WiFi + Bluetooth 4.0 Combo Adaptor*	**Wireless LAN Standards**	IEEE 802.11a
		IEEE 802.11b
		IEEE 802.11g
		IEEE 802.11n
		IEEE 802.11ac
	Interoperability	Wi-Fi certified

Technical Specifications

	Cisco Compatible Extensions Program compliant with Microsoft Windows 7, Windows Vista and XP (details at: http://www.hp.com/go/notebooks/WLAN)	
Frequency Band	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

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
CCK, BPSK, QPSK, 16-QAM, 64-QAM

Security[1]

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

Sub-channels
Multinational support with frequency bands and channels compliant to local regulations.

Network Architecture Models
Ad-hoc (Peer to Peer)
Infrastructure (Access Point Required)

Roaming IEEE 802.11 compliant roaming between band Access Points

Output Power[2]

- 2.4G: +13.5dBm minimum
- 5G: +12dBm minimum

Power Consumption
Transmit: 2.0 Watts
Receive: 1.6 Watts
Idle mode[3]: 250 mW (WLAN Associated)
Idle mode: 100 mW (WLAN unassociated)
Radio off: 75 mW

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

Receiver Sensitivity[4]
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

Technical Specifications

	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 Connections	2 U.FL type connectors (output impedance of 50 ± 2 ohms)	
Form Factor	PCI-Express Half-MiniCard	
Dimensions	0.12 x 1.06 x 1.18 in (3.1 x 26.8 x 30.0 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)
Altitude	Operating	0 to 10,000 ft (3,048 m)
	Non-operating	0 to 50,000 ft (15,240 m)
LED Activity	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 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.

Intel Dual Band Wireless-N 7260AN 802.11 a/b/g/n (2x2) WiFi + Bluetooth 4.0 Combo Adaptor*	**Wireless LAN Standards**	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n
	Interoperability	Wi-Fi certified Cisco Compatible Extensions Program compliant with Microsoft Windows 7, Windows Vista and XP (details at: http://www.hp.com/go/notebooks/WLAN)
	Frequency Band	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
	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.
	Modulation	Direct Sequence Spread Spectrum CCK, BPSK, QPSK, 16-QAM, 64-QAM
	Security[1]	• IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g

Technical Specifications

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 Power[2]	- 2.4G: +13.5dBm minimum - 5G: +12dBm minimum
Power Consumption	Transmit: 2.0 Watts Receive: 1.6 Watts Idle mode[3]: 250 mW (WLAN Associated) Idle mode: 100 mW (WLAN unassociated) Radio off: 75 mW
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity[4]	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 Connections	2 U.FL type connectors (output impedance of 50 ± 2 ohms)
Form Factor	PCI-Express Half-MiniCard
Dimensions	0.12 x 1.06 x 1.18 in (3.1 x 26.8 x 30.0 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)
Altitude	Operating 0 to 10,000 ft (3,048 m) Non-operating 0 to 50,000 ft (15,240 m)
LED Activity	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.

Technical Specifications

3. In Power Save Polling mode and on battery power.
4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CCK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).
5. WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows XP. WLAN may also be compatible with certain third-party software supplicants. WLAN supplier IHV extensions required for Cisco Compatible Extensions support for Microsoft Windows Vista.

HP Integrated Module with Bluetooth 4.0+EDR Wireless Technology	Bluetooth Specification	4.0+EDR Compliant
	Dimensions	1.18 x 0.26 x 0.13 in (30 x 6.5 x 3.25 mm))
	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	-1.5 dBm to 4 dBm (Bluetooth Class II)
	Receiver Sensitivity	Better than -20 dBM at 0.1 % raw bit error rate
	Power Consumption	Peak (Tx) 264 mW Peak (Rx) 231 mW Sleep <1 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)

Technical Specifications

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.

AUDIO/MULTIMEDIA

AUDIO/MULTIMEDIA - DTS SOUND+

Hardware	**Implementation**	Realtek ALC3228
	Function Key Volume Controls	Volume up, volume down, and mute
	Full Duplex	Yes
	Microphone In	Stereo
	Headphone/Line Out	Stereo
	Integrated Microphone	Yes, dual digital microphone array when equipped with optional webcam
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
Internal Stereo Speaker	**Power Rating**	2 Watts
	Impedance	4 ohms

POWER

HP 230W Slim Smart AC Adapter	**Dimensions**	7.87 x 3.94 x 1.0 in (200 x 100mm x 25.4mm)	
	Weight	1.85 lb (840 g)	
	Input	100 to 240 VAC	
		Input Efficiency	87% min at 115 VAC
		Input frequency range	47 to 63 Hz

Technical Specifications

	Input AC current	3.5 A at 90 VAC, 1.75 A at 180 VAC
Output	Output power	230W
	DC output	19.5V
	Hold-up time	5 msec at 115 VAC input
	Output current limit	<18A, Over voltage protection- 29V max automatic shutdown
Connector	3 pin/grounded, mates with interchangeable cords	
Environmental Design	Operating temperature	32° to 104° F (0° to 40° C)
	Non-operating (storage) temperature	-4° to 149° F (-20° to 65° C)
	Altitude	0 to 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- 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.	

HP 200W Slim Smart AC Adapter	**Dimensions**	6.77 x 3.80 x 1.0 in (172 x 96 x 25.4 mm)	
	Weight	1.65 lb (748 g)	
	Input	100 to 240 VAC	
		Input Efficiency	87% min at 115 VAC
		Input frequency range	47 to 63 Hz
		Input AC current	2.9 A at 90 VAC, 1.45 A at 180 VAC
	Output	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
	Connector	3 pin/grounded, mates with interchangeable cords	
	Environmental Design	Operating temperature	32° to 104° F (0° to 40° C)
		Non-operating (storage) temperature	-4° to 149° F (-20° to 65° C)
		Altitude	0 to 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- 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.	

HP 8-cell Lithium-Ion Battery (83 WHr)	**Dimensions** (H x W x L)	0.8 x 2.1 x 10.6 in (2 x 5.3 x 27cm)	
	Weight (max)	0.99lb (0.442 kg)	
	Cells/Type	Lithium-Ion	
	Energy	Voltage	14.8V

Technical Specifications

		Amp-hour capacity	5.6Ah
		Watt-hour capacity	83Wh
	Temperature	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)
	Battery Re-Charge Time	System in OFF or Standby Mode	2.5 hours
		System ON	3 to 5 hours
	Fuel Gauge LED	No	
	Warranty	1 year	
	Compatible with optional Travel Battery	Yes	
HP Long Life 8-cell Lithium-Ion Battery (75 WHr)	**Dimensions** (H x W x L)	0.8 x 2.1 x 10.6 in (2 x 5.3 x 27cm)	
	Weight (max)	0.99lb (0.442 kg)	
	Cells/Type	8-cell; Lithium-Ion	
	Energy	Voltage	14.4V
		Amp-hour capacity	5.1Ah
		Watt-hour capacity	75Wh
	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	2.5 hours
		System ON	3 to 5 hours
	Fuel Gauge LED	No	
	Warranty*	3 year	
	Compatible with optional Travel Battery	Yes	

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

Optional HP BB09 Ultra Extended Life Notebook Battery (secondary battery)	**Dimensions** (H x W x L)	1.2 x 5.9 x 11.4 in (3x15x29cm)	
	Weight (max)	1.5lb, (.682kg)	
	Cells/Type	Lithium-Ion	
	Energy	**Voltage**	11.25V
		Amp-hour capacity	8.85Ah
		Watt-hour capacity	100Wh
	Temperature	**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)
	Battery Re-Charge Time	**System in OFF or Standby Mode**	3.5 to 5 hours
		System ON	4 to 7 hours
	Fuel Gauge LED	Yes	
	Warranty	1 year	

Technical Specifications

	Compatible with optional Travel Battery	No	
Optional HP ST09 Extended Life Notebook Battery ("Travel Battery") (secondary battery)	**Dimensions** (H x W x L)	1.2 x 6.1 x 12 in (3x15.5x30.5cm)	
	Weight (max)	1.2lb, (.550kg)	
	Cells/Type	Lithium-Ion Polymer	
	Energy	**Voltage**	11.1V
		Amp-hour capacity	6.6Ah
		Watt-hour capacity	73Wh
	Temperature	**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)
	Battery Re-Charge Time	**System in OFF or Standby Mode**	3.5 to 5 hours
		System ON	4 to 7 hours
	Fuel Gauge LED	Yes	
	Warranty	1 year	
	Compatible with optional Travel Battery	Yes	

ENVIRONMENTAL DATA

Eco-Label Certifications	US ENERGY STAR ® IT ECO declaration EPEAT®
System Configuration	The configuration used for the Energy Consumption and Declared Noise Emissions data for the Commercial Notebook model is based on a "Typically Configured Notebook"

Energy Consumption	**115 VAC**	**230 VAC**	**100 VAC**
Normal Operation	16.64 W	16.78 W	15.87 W
Sleep (Energy Star low power mode)	1.01 W	1.07 W	1.01 W
Off	0.31 W	0.34 W	0.31 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*	**115 VAC**	**230 VAC**	**100 VAC**
Normal Operation	57 BTU/hr	57 BTU/hr	54 BTU/hr
Sleep	3 BTU/hr	4 BTU/hr	3 BTU/hr
Off	1 BTU/hr	1 BTU/hr	1 BTU/hr

* 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)

QuickSpecs

Technical Specifications

System Fan Off	Sound Power (LWAd, bels)	Sound Pressure (LpAm, decibels)
Typically Configured - Idle	2.9	23
Fixed Disk – Random writes	2.9	23

Batteries

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

Batteries used in the product do not contain:
Mercury greater the 5ppm by weight
Cadmium greater than 10ppm by weight

Battery size: CR2025 (coin cell)
Battery type: Lithium
Battery size: 6-cell high capacity Lithium-Ion battery (optional 8 cell available)

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).
- Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.
- This product contains 3.6 % post-consumer recycled plastic (by wt.)
- This product is 95.60 % recycle-able when properly disposed of at end of life.

  Packaging Materials
- External:
  - PAPER/Corrugated - 493
- Internal:
  - PLASTIC/EPE (Expanded Polyethylene) - 55 g
  - PLASTIC/Polyethylene low density - 26.6 g
- The PAPER/Corrugated packaging materials contains at least 85% recycled content.
- The PLASTIC/EPE (Expanded Polyethylene) foam packaging material is made from 0 % recycled content.
- The PLASTIC/Polyethylene low density foam packaging material is made from 0 % recycled content.

Material Usage

This product does not contain any of the following substances in excess of regulatory limits (for reference of these limits please refer to the HP General Specification of the Environment(http://www.hp.com/hpinfo/globalcitizenship/ environment/supplychain/gen_specifications.html):

- 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

Technical Specifications

- Lead and Lead compounds
- Mercuric Oxide Batteries
- Nickel - finishes must not be used on the external surface designed to be frequently handled or carried by the user.
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Biphenyl Ethers (PBBEs)
- Polybrominated Biphenyl Oxides (PBBOs)
- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) - except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.
- Radioactive Substances
- Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

Packaging Usage

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

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

End-of-life Management and Recycling

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

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

Hewlett-Packard Corporate Environmental Information

For more information about HP's commitment to the environment:
Global Citizenship Report
http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html
Eco-label certifications
http://www8.hp.com/us/en/hp-information/environment/ecolabels.html
ISO 14001 certificates:
http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/PC_GBU_Product_Design_ISO_14K_Certificate.pdf
and
http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf

COUNTRY OF ORIGIN

China

QuickSpecs

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 Backpack (fits up to 17.3")	H5M90AA
	HP Professional Slim Top Load Case (fits up to 17.3")	H4J91AA
	HP Essential Messenger Case (up to 17.3")	H1D25AA
	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 Dual Hinge II Notebook Stand	E8F99AA
	HP Display and Notebook II Stand	E8G00AA
	HP 230W Docking Station	A7E34AA#xxx
	HP 230W Advanced Docking Station	A7E38AA#xxx
	HP 3005pr USB 3.0 Port Replicator	H1L08AA
	HP 3001pr USB 3 Port Replicator	F3S42AA
	HP Universal Port Replicator	E6D70AA#xxx
Input/Output – Mice	Comfort Grip Mouse	H2L63AA
	HP Stylish USB KB/Mouse	H4B80AA#xxx
	HP Slim Bluetooth Keyboard	H4Q44AA#xxx
	HP 3-Button Laser Mouse	H4B81AA#xxx
	HP USB Essential Keyboard and Mouse	H6L29AA#xxx
	HP Ultra Mobile Wireless Mouse	H6F25AA#xxx
	HP Wireless Keyboard and Mouse	G1K29AA#xxx
	HP X4000 Bluetooth Mouse	H3T50AA#xxx
	USB Graphics Adapter	NL571AT
	HP Slim Bluetooth Mouse	F3J92AA#xxx
	HP USB Smart Card Reader	F6V67AA
Power Adapters	HP 230W Slim Adapter	H1D36AA
	HP 150W Smart AC Adapter (slim)	AL192AA#xxx
	HP Smart 230W AC Adapter	AT895AA#xxx
	HP 230W Slim Adapter	H1D36AA#xxx
Adapters	HP Wireless display adapter	J1V25AA#xxx
	USB dual output graphics adapter	C5U89AA

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

	DisplayPort to DVI Adapter	F7W96AA
	DisplayPort to VGA Adapter	F7W97AA
	DisplayPort to HDMI Adapter	F3W43AA
	Adapter, USB Graphics - dual output (Monitor Accy)	C5U89AA/AT
Storage - External Storage	HP 2013 MWS Upgrade Bay DVD	G1Y57AA
	HP 2013 MWS Upgrade Bay 750GB	G1Y56AA
	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 256GB SED Solid State Drive	H2C38AA
	HP 512GB Solid State Drive	J2V75AA
	HP MWS HDD/SDD Bracket Only	J2D73AA

* If you are not replacing an existing drive in your system, separate HP MWS HDD/SDD Bracket (J2D73AA) required for installation of this drive.

Batteries	HP ST09 Extended Life Notebook Battery	QK639AA
	HP BB09 Ultra Extended Life Notebook Battery	QK640AA
	HP AR08XL Notebook Battery	E7U26AA
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+ W 8.1 WWAN	J8F05AA
	HP lt4211 LTE/EV-DO/HSPA+ WWAN	J8F06AA
	HP lt4112 LTE/HSPA+ W8.1 WWAN	J8F07AA

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

QuickSpecs

Summary of Changes

Date of change:	Version History:		Description of change:
August 25, 2014	v1	Added	Styles and specifications through all document
Sept 15, 2014	From v1 to v2	Removed	Dreamcolor references, Win 8.1 Remote Graphics note
October 1, 2014	From v2 to v3	Removed	Change URL from ISV, AMD FirePro naming, partnership link
		Changed	Remove 90 watt AC adapter from "options" and box 50 GB
November 24, 2014	From v3 to v4	Added	Bracket note for External Storage, Options and Accessories section.
December 8, 2014	From v4 to v5	Added	DreamColor Display configurable option
		Removed	FCC and UL from Planned Industry Standard Certifications, System Unit
December 16, 2014	From v5 to v6	Changed	Ordering to Industry Standard Certifications, System Unit section.
February 5, 2015	From v6 to v7	Added	Battery life and disclosure
		Changed	Notes styles throughout the document.
March 1, 2015	From v7 to v8	Added	NVIDIA K2200M, Intel i5-4310M, 512 GB SSD opal 2, 128 GB Z Turbo Drive
		Changed	Preinstalled and Suported OS, Audio hardware implementation, Realtek ALC3228
		Removed	90W power adapters