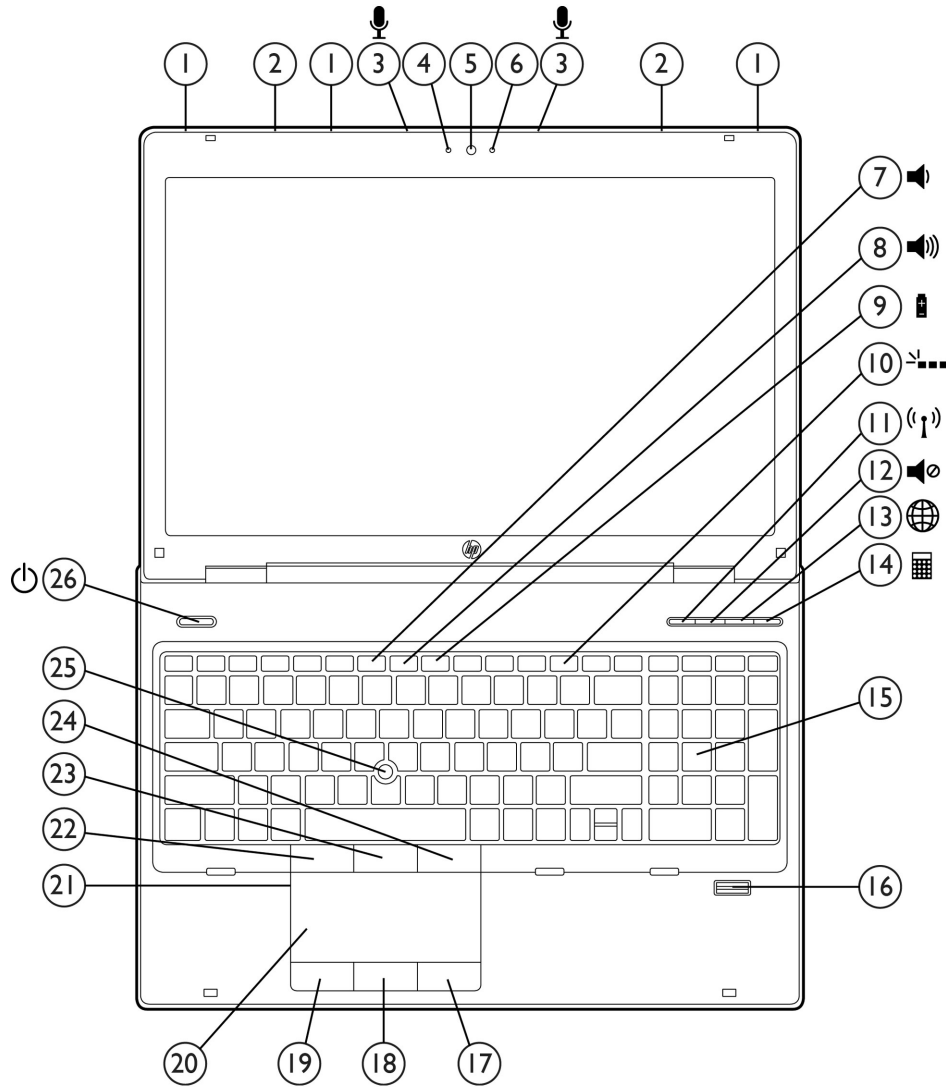
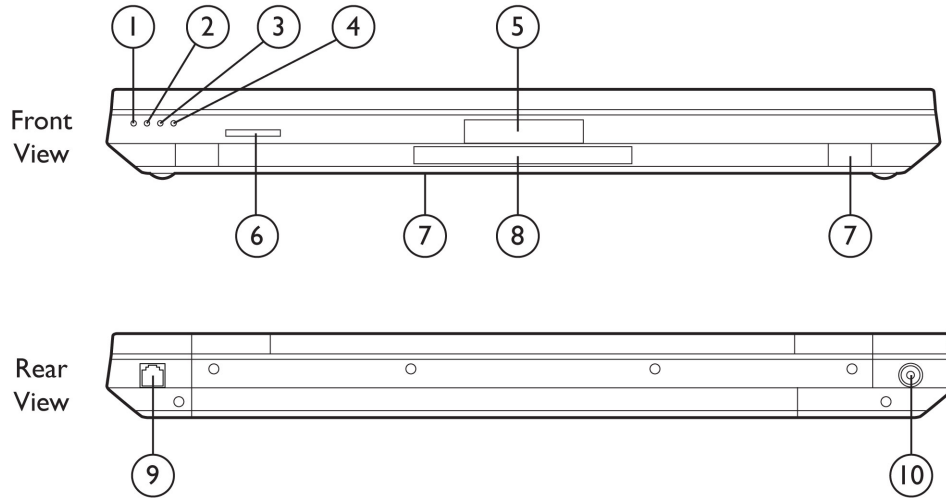


Overview

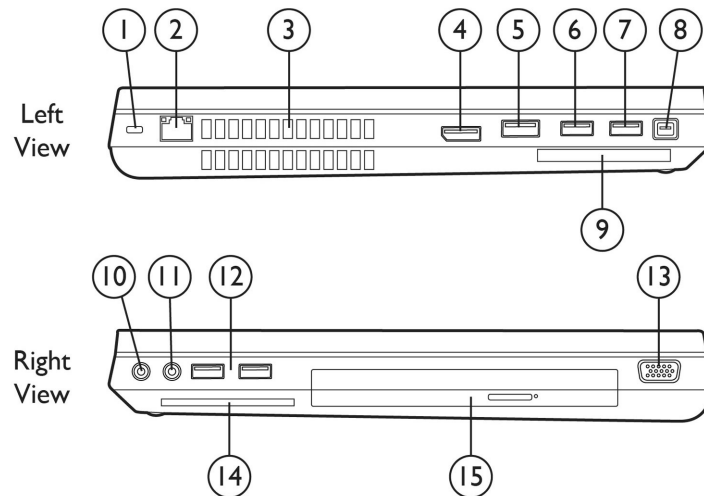


- | | | |
|------------------------------------|---|-------------------------------------|
| 1. WLAN antennas (3) | 10. Not available in EMEA | 18. Center Touchpad button |
| 2. WWAN antennas (2) | 11. Wireless on/off button with LED indicator | 19. Left Touchpad button |
| 3. Dual-microphone array | 12. Volume mute button with LED indicator | 20. Touchpad with scroll zone |
| 4. Webcam light (with webcam) | 13. HP QuickWeb button with LED indicator | 21. Touchpad on/off button with LED |
| 5. Optional 720p HD webcam | 14. Calculator button with LED indicator | 22. Left Pointstick button |
| 6. Ambient Light Sensor | 15. Numeric keypad | 23. Center Pointstick button |
| 7. Volume down function key | 16. HP Fingerprint Sensor | 24. Right Pointstick button |
| 8. Volume up function key | 17. Right Touchpad button | 25. Pointstick |
| 9. HP Power Assistant function key | | 26. Power button with LED indicator |

Overview



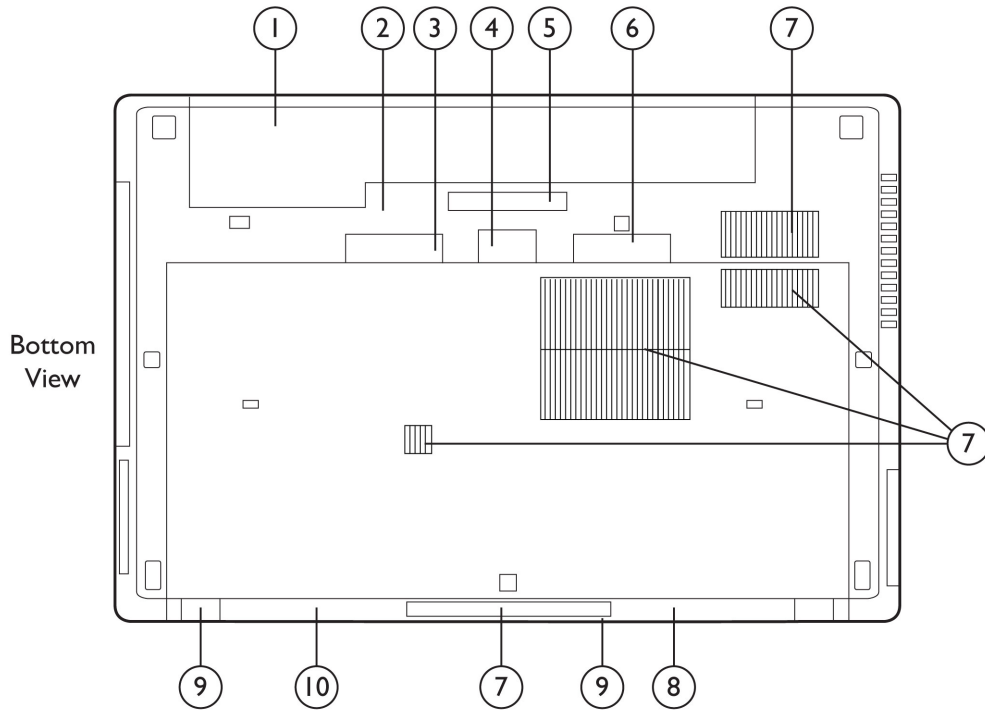
- | | |
|---|--|
| 1. Wireless LED indicator | 6. Secure Digital/MultiMedia Card slot |
| 2. Power/standby LED indicator | 7. Stereo speakers |
| 3. Battery charging LED indicator | 8. Vent |
| 4. Hard drive activity / HP 3D DriveGuard LED indicator | 9. RJ-11/modem port |
| 5. Display release latch | 10. Power connector |



- | | |
|-----------------------------|------------------------------------|
| 1. Security lock slot | 9. ExpressCard/54 slot |
| 2. RJ-45/Ethernet port | 10. Stereo headphone/line out |
| 3. Vents | 11. Stereo microphone/line in |
| 4. DisplayPort | 12. (2) USB 3.0 ports |
| 5. eSATA/USB 2.0 combo port | 13. VGA/external monitor connector |
| 6. USB 2.0 port | 14. Smart Card Reader |

Overview

- 7. USB 2.0 charging port
- 8. 1394a port
- 15. Upgrade Bay (optical drive, additional hard drive, or weight saver)



- 1. Battery bay
- 2. SIM slot for WWAN (select models)
- 3. Battery release latch
- 4. Secondary battery connector
- 5. Docking connector
- 6. Bottom cover release latch
- 7. Vents and spill-resistant keyboard drain hole
- 8. Stereo Speakers
- 9. Bluetooth module compartment
- 10. Hard drive, memory, and wireless compartments under bottom cover

* SIM slot is accessed through battery bay.

Overview

At A Glance

- Genuine Windows 7 versions, Genuine Windows Vista Home Basic, or FreeDOS
- All new chiseled design with enhanced DuraCase, wear-resistant DuraFinish, HP DisplaySafe frame, precision aluminum-alloy hinges, cast titanium-alloy display latches, signature gunmetal color tone, keyboard in full aluminum deck, radial-spun display cover with HP backlit logo, and chemically strengthened glass touchpad
- Designed to meet the military standard MIL-STD-810G for vibration, dust, altitude, and high and low temperature operation*
- Workstation-caliber discrete graphics: AMD FirePro M5950, NVIDIA Quadro 1000M, or NVIDIA Quadro 2000M
- Widescreen 15.6-inch diagonal LED-backlit display:
 - HD+ wide viewing angle, FHD wide viewing angle, or FHD ultra wide viewing angle with HP DreamColor
- 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
- AMD Eyefinity Technology for multi-monitor support
- DisplayPort for high resolution support
- SRS Premium Sound optimized for high fidelity audio
- Choice of 2nd generation Intel® Core™ i7 and i5 processors
- Intel Core i7 with vPro and Core i5 with vPro technology (optional)
- Flexible wireless connectivity options:
 - Optional integrated HP hs2340 HSPA+ Mobile Broadband Module connects to both HSPA and HSPA+ (UMTS) networks and provides GPS functionality
 - Optional integrated HP un2430 EV-DO/HSPA Mobile Broadband Module (Gobi 3000) provides GPS functionality (availability expected May, 2011)
 - Optional integrated HP lt2510 EV-DO/LTE Mobile Broadband Module (US only)
 - Integrated Intel Centrino® 802.11 a/b/g/n 2x2 or 3x3, or Atheros 802.11 a/b/g/n 3x3 wireless LAN module
 - Bluetooth® v2.1+EDR
 - HP Connection Manager 4.0
- Security features including HP ProtectTools, with central management across HP and non-HP client PCs
- HP QuickWeb for convenient online access without long boot-up times
- HP Power Assistant allows you to conserve power, stretch battery run-time, accurately monitor the energy usage of the PC and up to four select HP external monitors, and report workforce power consumption.
- Upgrade Bay for optical drive, optional second hard drive, or weight saver
- Choice of 7200 rpm user-removable hard drive up to 750 GB with HP 3D DriveGuard protection, or 128/256 GB Solid State Drive
- 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.
- BFR/PVC-free**, ENERGY STAR qualified and EPEAT TBD registered in the U.S. EPEAT status varies by country- please see epeat.net.

* Testing was not intended to demonstrate fitness for DOD contracts requirements or for military use. Test results are not a guarantee of future performance under these test conditions.

** Meeting the industry definition of 'BFR/PVC-free' per the INEMI Position Statement on "Low Halogen" Electronics. Plastic parts incorporated into the chassis generally contain < 1000 ppm (0.1%) of bromine or chlorine. Printed circuit board and substrate laminates generally contain < 1500 ppm (0.15%) of total bromine and chlorine. Service parts after purchase may not be BFR/PVC-free. External accessories, including power supplies, power cords, and peripherals as well as the following customer-configurable internal components: ATT SIM card and DreamColor displays are not BFR/PVC-free.

Standard Features (availability may vary by country)

Processors

2nd Generation Intel Core i7 Processors

- Intel Core i7-2860QM Processor (2.50 GHz, 8 MB L3 cache, 4 cores/8 threads, 45W)*
Up to 3.60 GHz with Intel Turbo Boost Technology. Supports a maximum of 32 GB system memory.
- Intel Core i7-2820QM Processor (2.30 GHz, 8 MB L3 cache, 4 cores/8 threads, 45W)*
Up to 3.40 GHz with Intel Turbo Boost Technology. Supports a maximum of 32 GB system memory.
- Intel Core i7-2760QM Processor (2.40 GHz, 6 MB L3 cache, 4 cores/8 threads, 45W)*
Up to 3.50 GHz with Intel Turbo Boost Technology. Supports a maximum of 32 GB system memory.
- Intel Core i7-2720QM Processor (2.20 GHz, 6 MB L3 cache, 4 cores/8 threads, 45W)*
Up to 3.30 GHz with Intel Turbo Boost Technology. Supports a maximum of 32 GB system memory.
- Intel Core i7-2640M Processor (2.80 GHz, 4 MB L3 cache, 2 cores/4 threads, 35W)*
Up to 3.50 GHz with Intel Turbo Boost Technology. Supports a maximum of 16 GB system memory.
- Intel Core i7-2630QM Processor (2.00 GHz, 6 MB L3 cache, 4 cores/8 threads, 45W)* †
Up to 2.90 GHz with Intel Turbo Boost Technology. Supports a maximum of 32 GB system memory.
- Intel Core i7-2620M Processor (2.70 GHz, 4 MB L3 cache, 2 cores/4 threads, 35W)*
Up to 3.40 GHz with Intel Turbo Boost Technology. Supports a maximum of 8 GB system memory.

2nd Generation Intel Core i5 Processors

- Intel Core i5-2540M Processor (2.60 GHz, 3 MB L3 cache, 2 cores/4 threads, 35W)*
Up to 3.30 GHz with Intel Turbo Boost Technology. Supports a maximum of 16 GB system memory.
- Intel Core i5-2520M Processor (2.50 GHz, 3 MB L3 cache, 2 cores/4 threads, 35W)*
Up to 3.20 GHz with Intel Turbo Boost Technology. Supports a maximum of 16 GB system memory.

* Intel's numbering is not a measurement of higher performance.

† Not available with vPro.

NOTE: Processor speed denotes maximum performance mode; processors will run at lower speeds in battery optimization mode.

Operating System

Preinstalled

Genuine Windows 7 Professional 32*
Genuine Windows 7 Professional 64*
Genuine Windows 7 Home Premium 64*
FreeDOS

Supported

Genuine Windows 7 Enterprise 32*
Genuine Windows 7 Enterprise 64*
Genuine Windows 7 Ultimate 32*
Genuine Windows 7 Ultimate 64*
Genuine Windows Vista Enterprise 32**
Genuine Windows Vista Enterprise 64**
Genuine Windows Vista Business 32**
Genuine Windows Vista Business 64**
Genuine Windows Vista Home Basic 32**†
Genuine Windows XP Professional 32
Genuine Windows XP Professional 64
SuSE Linux Enterprise Desktop 11
Red Hat Enterprise Linux 6.x

Certified

SuSE Linux Enterprise Desktop 11
Red Hat Enterprise Linux 6.x

* System may require upgraded and/or separately purchased hardware and/or a DVD drive to install the

Standard Features (availability may vary by country)

Windows 7 software and take full advantage of Windows 7 functionality. See <http://www.microsoft.com/windows/windows-7/> for details.

** Certain Windows Vista product features require advanced or additional hardware. See: <http://www.microsoft.com/windowsvista/getready/hardwarereqs.msp> and <http://www.microsoft.com/windowsvista/getready/capable.msp> for details. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: <http://www.windowsvista.com/upgradeadvisor>.

† Windows Vista Home Basic will not be a configuration choice after 9/30/11.

Chipset

Mobile Intel QM67 Express Chipset

Intel Core i5 with vPro/Core i7 with vPro technology capable

Intel Core i5 with vPro and Core i7 with vPro technology is a selectable feature that is available on units configured with select processors, an Intel Centrino® Advanced-N or Ultimate-N WLAN module and a preinstalled Windows operating system. It provides advances in remote manageability, security, energy efficient performance, and wireless connectivity. Intel Active Management Technology 7.0 (iAMT) offers built-in manageability and proactive security for networked notebook PCs, even when they are powered off* or when the operating system is inoperable. It can help identify threats before they reach the network, isolate infected systems, and update PCs regardless of their power state.

*Requires a Windows operating system, network hardware and software, connection with a power source, and a direct (non-VPN) corporate network connection which is either cable or wireless LAN.

NOTE: Some functionality of 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 M5950 with 1 GB dedicated GDDR5 video memory
Microsoft DirectX 11 (Shader Model 5.0) and OpenGL 4.0 capable
AMD Eyefinity Technology supports up to five independent displays
when using an HP Advanced Docking station

NVIDIA Quadro 1000M with 2 GB dedicated DDR3 video memory
Microsoft DirectX 11 (Shader Model 5.0) and OpenGL 4.0 capable
NVIDIA Quadro 2000M with 2 GB dedicated DDR3 video memory
Microsoft DirectX 11 (Shader Model 5.0) and OpenGL 4.0 capable

Standard Features (availability may vary by country)

Display	Internal	15.6-inch diagonal LED-backlit HD+ WVA anti-glare (1600 x 900 resolution) 15.6-inch diagonal LED-backlit FHD WVA anti-glare (1920 x 1080 resolution) 15.6-inch diagonal LED-backlit FHD UWVA anti-glare DreamColor* (1920 x 1080 resolution) Ambient Light Sensor Optional HP Privacy Filter
	External	Up to 32-bit per pixel color depth DisplayPort supports resolutions up to 2560 x 1600, 30-bit color depth at 60 Hz, and full HD (1920 x 1080) monitors, 24-bit color depth at 120 Hz 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) 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.

Memory	Standard	DDR3 PC3-10600 SDRAM (1333 MHz) Two or four SODIMM slots supporting dual-channel memory 2 GB, 4 GB, and 8 GB SODIMMs NOTE: Four memory slots only on models with quad-core processor.
	Maximum	Upgradeable to 32 GB with (4) 8 GB SODIMMs
	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. Full availability of 4 GB or more of memory requires a Windows 64-bit operating system or Linux. With Windows 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.

Communications	Integrated Intel 82579LM Gigabit* Network Connection 56K V.92 modem** * 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. ** Designed for downloads from 56K modem compliant sources. Maximum achievable download transmission rates currently do not reach 56 KB/s, and will vary with line conditions. Modem availability is subject to country regulatory approval.
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Standard Features (availability may vary by country)

Wireless Devices

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 or an after market option. 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	Two 850/900/1575/1700/1800/1900/2100 MHz antennas integrated in the top of the display panel support current and future WWAN technologies. NOTE: Separately purchased mobile network operator service is required.
HP hs2340 HSPA+ Mobile Broadband Module	Integrated mobile broadband module that provides connectivity to both HSPA and HSPA+ (UMTS) networks. It also provides standalone, Internet and network assisted GPS functionality for various mapping applications and security applications such as Computrace Pro for HP ProtectTools.
HP un2430 EV-DO/HSPA Mobile Broadband Module (availability expected May, 2011)	Integrated mobile broadband module with Gobi global mobile Internet technology that provides connectivity to both CDMA (EVDO) and UMTS (HSPA) networks. It also provides GPS functionality for various mapping applications and security applications such as Computrace Pro Premium for HP ProtectTools.
HP lt2510 EV-DO/LTE Mobile Broadband Module	Integrated mobile broadband module with the latest network technology providing connectivity to both LTE and CDMA (EVDO) networks.
All 802.11 integrated wireless LAN options	Wi-Fi Certified* Cisco Compatible Extensions support Wired Equivalent Privacy (WEP) support up to 128-bit keys Wi-Fi Protected Access (WPA) and WPA2 support 802.1x authentication support, including EAP-TLS, EAP-TTLS, PEAP-GTC, PEAP-MSCHAPv2, and LEAP Advanced Encryption Standard (AES) support Dual antennas integrated in the display enclosure
Intel Centrino Ultimate-N 6300 (3x3)	Integrated support for 802.11a, b, g, and n* 3 transmit, 3 receive antennas Up to 450 mbps data rate
Intel Centrino Advanced-N 6205 (2x2)	Integrated support for 802.11a, b, g, and n* 2 transmit, 2 receive antennas Up to 300 mbps data rate
Atheros HB112AGN 802.11a/b/g/n (3x3) WiFi Adapter	Integrated support for 802.11a, b, g, and n* 3 transmit, 3 receive antennas
HP Integrated Module with Bluetooth 2.1+EDR Wireless Technology	Bluetooth Specification v2.1+EDR compliant Works with a wide range of Bluetooth devices

Standard Features (availability may vary by country)

Keyboard

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 and a separate numeric keypad.

HP DuraKeys

HP DuraKeys is a clear coating applied over the notebook keyboard that helps protect the finish and the printed characters on the keys.

Launch Buttons and Function Keys

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

Pointing device

Touchpad with on/off button (double-tap to activate/de-activate), two-way scroll, gestures, three pick buttons
Pointstick with three additional pointstick buttons

Internal Storage

Hard drives

320/500/750 GB 7200 rpm SMART SATA II
320 GB 7200 rpm SMART SATA II Self Encrypting Drive

NOTE: These hard drives are customer removable and will withstand multiple insertion/removal cycles. Up to 15 GB is reserved for the system recovery software.

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

128/256 GB

Upgrade Bay

Fixed 12.7 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

500 GB 7200 rpm SMART SATA II Hard Drive
Supports RAID 1 Mirroring or RAID 0 Striping

Weight saver

Standard Features (availability may vary by country)

Expansion card slots	ExpressCard/54 slot	Supports ExpressCard/54 and ExpressCard/34
	Integrated Smart Card Reader	Compatible with ISO 7816 compliant Smart Cards PC/SC interface support
	Secure Digital/MMC slot	Supports SD (Secure Digital), SDHC (Secure Digital High Capacity), SDXC (Secure Digital Extended Capacity), MMC (MultiMedia Card), MMC+

Interfaces	External monitor	Two - (1) DisplayPort, (1) VGA
	1394a	One
	Stereo microphone in	One
	Stereo headphone/line out	One
	Power connector	One
	RJ-11/modem	One
	RJ-45/Ethernet	One
	USB 3.0	Two
	USB 2.0	Two (includes one charging port)
	eSATA/USB 2.0 combo	One
	Docking connector	One
	Secondary battery connector	One

Audio/Visual

SRS Premium Sound™
Integrated stereo speakers
Dual-microphone array
Button for volume mute; function keys for volume up and down
Stereo headphone/line out
Stereo microphone/line in

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

Standard Features (availability may vary by country)

Software

Preinstalled software with Windows operating system

HP Performance Advisor
HP Mobile Display Assistant (with HP DreamColor Technology)
HP Recovery Manager
HP Support Assistant
HP ProtectTools Security Manager
HP ProtectTools for Central Management
HP Hotkey Support
HP QuickWeb
HP Power Assistant
HP Connection Manager 4.0
HP DayStarter
Microsoft Office 2010 preloaded (purchase of a Product Key required to activate a full Office 2010 suite)*
Norton Internet Security 2011**
PDF Complete Special Edition***
Intervideo WinDVD - DVD Player (select models)
Roxio Burn Secure (select models)
Roxio MyDVD 10 SE (select models)
HP Webcam Software (select models)
Skype

Additional software available from the web

HP SoftPaq Download Manager
HP Client Manager Software
HP Client Configuration Management Agent

Workstation ISV Certifications

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

* Microsoft Office 2010 Preloaded includes reduced functionality versions of Word and Excel. Purchase of Product Key required to activate full Office 2010 suite available at participating resellers/retailers and <http://www.office.com>.

** Norton Internet Security 2011 includes 60 days of complimentary live updates; subscription required for live updates thereafter. Internet access required to receive updates.

*** PDF Complete Special Edition 60 day trial; purchase license afterwards for full functionality.

Planned Workstation ISV Certifications

MCAD

(Mechanical CAD/Architectural Engineering and Construction)

Autodesk AutoCAD
Autodesk AutoCAD Mechanical
Autodesk AutoCAD Electrical
Autodesk Inventor
Autodesk AutoCAD Architecture
Autodesk AutoCAD Plant3D
Autodesk AutoCAD P&ID
Autodesk AutoCAD Structural Detailing
Autodesk Alias Automotive
Autodesk Alias Design
Autodesk Alias Surface
Autodesk AutoCAD MEP
Autodesk AutoCAD Raster Design
Autodesk Showcase
Autodesk Moldflow
Aveva PDMS & Marine
Bentley InRoads XM

Standard Features (availability may vary by country)

	Bentley Microstation
	Bentley Navigator
	PTC Creo Elements Direct
	Dassault Systemes CATIA V5, V6
	DS Solidworks
	ICEM Surf
	MSC Software MSC.Patran
	MSC Software SimXpert
	PTC Pro/ENGINEER Wildfire (Creo Elements Pro & Creo 1.0)
	SensAble
	Siemens PLMS NX
	Siemens PLMS NX I-deas
	Siemens PLMS Solid Edge
	Siemens PLMS TeamCenter Visualization
	Siemens Tecnomatix
	HSMWorks
DCC (Digital Content Creation)	Adobe Premiere
	Adobe After effects
	Adobe Encore
	Adobe Photoshop
	Autodesk 3DS MAX
	Autodesk MotionBuilder
	Autodesk Mudbox
	Autodesk Maya
	Autodesk SoftImage
	Avid Media Composer
	Avid Pro Tools
GIS (Geographic Information Systems) / Oil and Gas	ESRI ArcGIS
	Paradigm GoCAD, SKUA
	Schlumberger Petrel
	SeismicMicro Technology Kingdom
	Dynamic Graphics Inc. EarthVision, CoVis4D
	Landmark Decision Space Desktop
	Roxar RMS
	Transform TerraSuite
	Headwave Headwave2
	ffA SVI Pro
	Autodesk AutoCAD Map 3D
GIS (Geographic Information Systems) / Oil and Gas (Linux if available)	Landmark Decision Space Desktop
	Paradigm EPOS, GOCAD, SKUA
	Schlumberger GeoFrame
	Dynamic Graphics Inc. EarthVision
	Roxar RMS
	Transform TerraSuite
	Headwave Headwave2
AEC	Autodesk Navisworks Manage
	Autodesk Navisworks Simulate
	Autodesk Navisworks Review
	Autodesk Revit Architecture
	Autodesk Revit MEP

Standard Features (availability may vary by country)

Autodesk Revit Structure
Autodesk AutoCAD Civil 3D

NOTE: This is a tentative list, and some certifications may only be completed on specific graphics solutions.

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.

HP Recovery Manager Models shipped with Windows 7 or Windows Vista 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 20 GB of the hard drive is reserved for the system recovery software.

Security

Standard Features

HP ProtectTools Security Manager (standard modules include)

- Credential Manager
- Computrace* Pro
- Device Access Manager
- Drive Encryption
- Face Recognition (webcam configurations only)
- File Sanitizer
- Privacy Manager
- Embedded Security

HP Fingerprint Sensor
Integrated Smart Card Reader
Enhanced Pre-Boot Security (Multiuser / Multifactor)
HP SpareKey
One-Step Logon
TPM 1.2 Embedded Security Chip**
HP Disk Sanitizer
Security lock slot
Security screw for bottom access door
Support for Intel AT***

Optional Features

HP Privacy Filter

Narrows viewing area so that screen data is visible only to persons directly in front of the monitor.

Computrace** Pro for HP ProtectTools 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 with terms ranging from one to five years.

** TPM module disabled where use is restricted by law, for example, Russia and China.

Standard Features (availability may vary by country)

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

*** Intel AT security requires a separately purchased Absolute Computrace service subscription and must be activated and configured. Check with Absolute for availability in your country. Intel and HP assume no liability for lost or stolen data and/or systems or any other damages resulting therefrom. See

<http://www.intel.com/technology/anti-theft/>

HP ProtectTools Security Manager with Central Management

HP ProtectTools Security Manager is the security platform for business notebooks and desktops. The HP ProtectTools Security Manager is an extensible client security console that delivers enhanced security capabilities through add-on software modules. The ProtectTools modules are available on the hard drive (also downloadable from the web) and can be configured in Software Setup.

HP ProtectTools is centrally manageable with the capability to manage notebooks from a single point. HP ProtectTools is management ready out of the box, in partnership with Digital Persona. Features address requirements that customers expect from a centrally managed security solution such as user provisioning, credential reset, and credential revocation.

HP ProtectTools provides two separate management solutions, targeted at the enterprise and the SMB:

- Digital Persona Pro AD: Designed for the enterprise customer. Integrates with Active Directory and gives IT Managers the ability to provision users, create login policies based on passwords, biometrics or smartcards. Management features also include remote credential recovery in case the user forgets the password, loses the smartcard or cannot use the fingerprint reader for any reason. In addition, advanced auditing capabilities are also built in. Digital Persona Pro AD is available now.
- 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 Supply

External HP 120W Smart AC adapter
Slim (148.0 x 75.5 x 25.4mm); Standard (149.5 x 65 x 36mm)

External HP 150W Smart AC adapter
Slim (167.0 x 82.0 x 25.4mm); Standard (167.5 x 70 x 40.5mm)

External HP 200W Smart AC adapter
Slim (172 x 96 x 25.4mm); Standard (170 x 85 x 35mm)

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

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

Battery

Primary battery

HP 8-cell (83 WHr) Li-Ion battery
HP Long Life 8-cell (75 WHr) Li-Ion battery

Secondary battery Options

HP BB09 Ultra Extended Life Notebook Battery (9-cell 100 WHr)
HP ST09 Extended Life Notebook Battery (9-cell 73 WHr)

Standard Features (availability may vary by country)

Battery Life	8-cell (83 WHr)	Up to 6 hours and 30 minutes
	with optional HP ST09 Extended Life Notebook Battery	Up to 12 hours and 15 minutes
	with optional HP BB09 Ultra Extended Life Notebook Battery	Up to 14 hours and 45 minutes

NOTE: 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 www.bapco.com/products/mobilemark2007 for additional details.

System Standby Time	Up to 1 week
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Power Conservation	AMD PowerPlay technology NVIDIA PowerMizer technology Hibernation Standby ACPI compliance
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Docking and Stands	HP 230W Docking Station HP 230W Advanced Docking Station HP USB 2.0 Docking Station HP Essential USB 2.0 Port Replicator HP LAN and USB Travel Hub
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NOTE: Some HP Docking stations may not support every feature of some HP Notebook models. Please refer to the individual docking station documentation for specific information about supported features.

Service and Support	HP Services offers limited 3-year. 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 .
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Options (availability may vary by country)

NOTE: Options/capabilities listed in the QuickSpecs represent those capabilities available through Base Units or Build to Order configurations. The various product features and capabilities will vary in terms of configurable vs. aftermarket options (AMOs). There may be options and capabilities available through CTO that are not available as AMOs.

Memory	HP 2 GB (DDR3 1333 MHz) SODIMM	AT912AA#AC3
	HP 4 GB (DDR3 1333 MHz) SODIMM	AT913AA#AC3
	HP 8 GB (DDR3 1333 MHz) SODIMM	QP013AA#AC3
Storage	HP Mobile USB DVDRW	BU516AA#AC3
	HP Upgrade Bay DVDRW	LZ835AA
	HP Upgrade Bay 500GB 7200 rpm Hard Drive	LX733AA
Expansion Solutions	HP 230W Docking Station	VB043AA#xxx
	HP 230W Advanced Docking Station	NZ223AA#xxx
	HP USB 2.0 Docking Station	AY052AA#AC3
	HP Essential USB 2.0 Port Replicator	AQ731AA#ABB
	HP LAN and USB Travel Hub	BM868AA#AC3
	HP Display & Notebook Stand	AW662AA#AC3
	HP Adjustable Display Stand	AW663AA#AC3
HP Adjustable Dual Display Stand	AW664AA#AC3	
Power	HP ST09 Extended Life Notebook Battery	QK639AA
	HP BB09 Ultra Extended Life Notebook Battery	QK640AA
	HP VH08XL Long Life Notebook Battery	QK641AA
	HP 230W AC Smart Adapter	AT895AA#xxx
Carrying Cases	HP Basic Messenger	AP355AA
	HP Professional Slim Top Load Case	AY530AA
	HP Executive Leather Case - 43,9 cm (17,3")	RR316AA
Security	HP Combination Cable Lock	AY475AA#AC3
	HP Keyed Notebook Cable Lock	BV411AA
	HP 15.6-inch Display Privacy Filter	AU103AA#AC3
Input/Output Devices	HP USB Optical Travel Mouse	RH304AA
	HP USB/PS2 Optical 2-Button Scroll Mouse	DC369A

Technical Specifications

System Unit	Dimensions (HxWxD)	34.5 mm (at front)/38.4 mm (at rear) x 382.0 mm x 257.5 mm 1.36 in (at front)/1.51 in (at rear) x 15.0 in x 10.1 in Height with DreamColor display: 36.5 mm / 1.44 in at front 40.4 mm / 1.59 in at rear
	Weight	Starting at 3.0 kg (6.69 lb) with SSD and weight saver (no optical drive) Starting at 3.1 kg (6.94 lb) with hard drive and DVD-ROM drive
	NOTE: Height varies depending upon where on the notebook the measurement is made. Weight varies by configuration and components. Weight includes 8-cell battery and WLAN.	
	Stand-Alone Power Requirements (AC Power)	Nominal Operating Voltage 19.5 V Average Operating Power 42 W Max Operating Power < 120 W or < 150 W or < 200 W
	Temperature	Operating 0° to 35° C (32° to 95° F) (not writing optical) 5° to 35° C 41° (41° to 95° F) (writing optical) Non-operating -20° to 60° C (-4° to 140° F)
	Relative Humidity	Operating 10% to 90%, non-condensing Non-operating 5% to 95%, 38.7° C (101.6° F) maximum wet bulb temperature
	Shock	Operating 125 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 -15.24 to 3,048 m (-50 to 10,000 ft) Non-operating -15.24 to 12,192 m (-50 to 40,000 ft)
	Planned Industry Standard Certifications	UL Yes CSA Yes FCC Compliance Yes ENERGY STAR® Select models* EPEAT Gold target** ICES Yes Australia / NZ A-Tick Compliance Yes CCC Yes Japan VCCI Compliance Yes KCC Yes BSMI Yes CE Marking Compliance Yes

* Configurations of the HP EliteBook 8560w that are ENERGY STAR qualified are identified as HP EliteBook 8560w ENERGY STAR on HP websites and on www.energystar.gov.

Technical Specifications

** EPEAT Registered TBD in U.S. EPEAT registration varies by country. See www.epeat.net for registration status by country.

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

Audio	SRS Premium Sound
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Hardware	Implementation	IDT 92HD87 High Definition CODEC
	Touch-Sensitive 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

Integrated Stereo Speakers	Power Rating	2 Watts
	Impedance	4 Ohms

Power

Technical Specifications

HP 200W Slim Smart AC Adapter	Dimensions	17.0 x 8.5 x 3.5 cm (6.69 x 3.35 x 1.38 in)	
	Weight	920 g (2.03 lb)	
	Input	Input	100 to 240 VAC
		Input Efficiency	87% min at 115 VAC
		Input frequency range	47 to 63 Hz
	Output	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
	Connector	3 pin/grounded, mates with interchangeable cords	
	Environmental Design	Operating temperature	32° to 104° F (0° to 35° C)
		Non-operating (storage) temperature	-4° to 149° F (-20° to 65° C)
		Altitude	0 to 10,000 ft (0 to 3,048 m)
		Humidity	20% to 80%
EMI and Safety Certifications	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.		

HP 150W Smart AC Adapter	Dimensions	6.65 x 2.76 x 1.57 in (16.9 x 7.0 x 4.0 cm)	
	Weight	1.54 lb (700 g)	
	Input	Input	100 to 240 VAC
		Input Efficiency	83% min at 115 VAC
		Input frequency range	47 to 63 Hz
	Output	Input AC current	2.2 A at 90 VAC, 1.1 A at 180 VAC
		Output power	150W
		DC Output Voltage	19.0V
		Hold-up time	5 msec at 115 VAC input
		Output current limit	<15A, 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 35° C)
		Non-operating (storage) Temperature	-4° to 149° F (-20° to 65° C)
		Altitude	0 to 10,000 ft (0 to 3,048 m)
		Humidity	20% to 80%
	Storage Humidity	10% to 90%	

Technical Specifications

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.
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HP 120W Smart AC Adapter

Weight	1.52 lb (0.69 kg) (adapter) 0.29 lb (0.13 kg) (power cord)
Dimensions	6.65 x 2.56 x 1.50 in (16.9 x 6.5 x 3.8 cm)
Input	Operating Input Voltage 100 to 240 VAC Operating Input Current PFC Version: 2.20 A at 90 VAC 1.10 A at 180 VAC Non-PFC Version: 2.5 A at 110 VAC 1.25 A at 180 VAC
Output	Operating Frequency Range 47 to 63 Hz AC Efficiency 83% minimum at 115 VAC Output power 120 W DC Output Voltage 18.5 V
Environmental Design	Operating Temperature 0° to 35° C (32° to 104° F) Non-operating (storage) Temperature -20° to 65° C (-4° to 149° F) Altitude 0 to 3,048 m (0 to 10,000 ft) Humidity 20% to 80% Storage Humidity 10% to 90%
EMI and Safety Certifications	CE Mark: full compliance with LVD and EMC directives Worldwide safety standards: IEC60950, EN60950, UL60950, Class2, SELV Agency approvals: C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE, S-Mark, Australian Electric Permit, PSB, eK, BSMI, BNCI, KONCAR, GS, GOST, SASO, SABS, UKRSERTCOMPUTER; MTBF- over 200,000 hours at 25°C ambient condition.

NOTE: Unless otherwise noted, temperature limits listed in the following component specifications relate to the internal temperatures of these components and not to the environment in which the PC is operating.

Technical Specifications

Optional HP BB09 Ultra Extended Life Notebook Battery	Dimensions (H x W x L)	3 x 15 x 29cm (1.2 x 5.9 x 11.4 in)	
	Weight (max)	.682kg, (1.5lb)	
	Cells/Type	Lithium-Ion	
	Energy	Voltage	11.25V
		Amp-hour capacity	8.85Ah
		Watt-hour capacity	100Wh
	Temperature	Operating (Charging)	0° to 45° C (32° to 113° F)
		Operating (Discharging)	-10° to 50° C (14° to 122° F)
		Non-operating	-20° to 50° C (-4° to 122° F)
	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	
Optional Travel Battery Available	NA		

Optional HP ST09 Extended Life Notebook Battery	Dimensions (H x W x L)	3 x 15.5 x 30.5cm (1.2 x 6.1 x 12 in)	
	Weight (max)	.550kg, (1.2lb)	
	Cells/Type	Lithium-Ion Polymer	
	Energy	Voltage	11.1V
		Amp-hour capacity	6.6Ah
		Watt-hour capacity	73Wh
	Temperature	Operating (Charging)	0° to 45° C (32° to 113° F)
		Operating (Discharging)	-10° to 50° C (14° to 122° F)
		Non-operating	-20° to 50° C (-4° to 122° F)
	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	
Optional Travel Battery Available	NA		

Displays

Technical Specifications

15.6-inch FHD WVA LED anti-glare	Active Area (W x H)	34.4 x 19.4 cm (13.54 x 7.59 in)		
	Diagonal Size	39.6 cm (15.6 in)		
	Surface Treatment	Anti-glare		
	Contrast Ratio	300:1 (typical)		
	Refresh Rate	60 Hz		
	Brightness	220 nit typical		
	Pixel Resolution	Pitch	0.17925 mm x 0.17925 mm	
		Format	1920x1080	
		Configuration	RGB Stripe	
	Backlight	LED		
	PPI	142		
	Viewing Angle	±60° Horizontal, ±50° Vertical (minimum) 60/60/50/50 (Left/Right/Down/Up) (minimum)		
	<hr/>			
15.6-inch LED FHD UWVA (1920 x 1080) anti-glare DreamColor	Active Area (W x H)	34.4 x 19.4 cm (13.54 x 7.59 in)		
	Diagonal Size	39.6 cm (15.6 in)		
	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	
		Configuration	RGB Strip	
	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

15.6-inch LED HD+ WVA (1600 x 900) anti-glare	Active Area (W x H)	34.4 x 19.4 cm (13.54 x 7.59 in)		
	Diagonal Size	39.6 cm (15.6 in)		
	Surface Treatment	Anti-glare		
	Contrast Ratio	300:1 (typical)		
	Refresh Rate	60 Hz		
	Brightness	200 nit (typical)		
	Pixel Resolution	Pitch	0.215 mm	
		Format	1600 x 900	
		Configuration	RGB Stripe	
	Backlight	LED		
PPI	118 ppi			
Viewing Angle	±60° Horizontal, ± 50° Vertical (minimum) or ±70° Horizontal, ±60° Vertical (typical)			

Internal Storage

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

Technical Specifications

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

320 GB 7200 rpm SATA Hard Drive	Drive Weight	115 g (0.25 lbs)	
	Capacity	320 GB	
	Height	9.5 mm (0.37 in)	
	Width	70 mm (2.75 in)	
	Interface	ATA-8, SATA 2.6, 3.0 Gb/s, NCQ	
	Transfer Rate	Synchronous (maximum) 300 MB/s (Drive Capability)	
	Seek Time (typical reads, including settling)	Single Track	1.5 ms
		Average	11 ms
		Maximum	22 ms
	Rotational Speed	7200 rpm	
	Logical Blocks	625,142,448	
	Operating Temperature	0° to 60° C (32° to 140° F) [case temp]	
	Features	ATA Security	

Technical Specifications

256 GB 2.5-inch SATA Solid State Drive	Drive Weight	73 Grams (Max)	
	Capacity	128 GB	
	Height	7 mm (0.276 in)	
	Width	70 mm (2.76 in)	
	Interface	SATA Gen 2	
	Performance	Maximum Sequential Read	Maximum Sequential Write
		Up to 265 MB/s	Up to 220 MB/s
	Logical Blocks	500,118,192	
	Operating Temperature	0° to 70°C (32° to 158°F) [case temp]	
Features	ATA Security; ATA-7compliant ;SATA 2.6; DIPM; TRIM		

128 GB 2.5-inch SATA Solid State Drive	Drive Weight	75 Grams	
	Capacity	128 GB	
	Height	7 mm (0.276 in)	
	Width	70 mm (2.76 in)	
	Interface	SATA Gen 2	
	Performance	Maximum Sequential Read	Maximum Sequential Write
		250 MB/s	140 MB/s
	Logical Blocks	250,069,680	
	Operating Temperature	0° to 70°C (32° to 158°F) [case temp]	
Features	ATA Security; ATA-7; SATA 2.6; DIPM; TRIM		

Optical Drives

DVD-ROM Drive	Access Times	Random	< 140 ms CD (typical) < 160 ms DVD (typical)
	Max Data Transfer Rate	24X CD-ROM 8X-DVD	
	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)	None	
	Max Media Capacity (read)	8.5GB	
	Transport	Tray Loading	

Technical Specifications

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	
	<hr/>		
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	

Technical Specifications

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
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-RW 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	

Technical Specifications

Security

HP Fingerprint Sensor	Mobile Voltage Operation	3.0V-3.6V Single Supply
	Operating Temperature	0° – 70°C (32° – 158°F)
	Current Consumption @ 3.3V	Less than 70 mA peak imaging and scrolling Less than 25 mA hardware finger detection Advanced Power Management
	High-Rate Image Capture	Up to 240 image frames /sec
	ESD Resistance	IEC 61000-4-2 Level 4 (±15KV)
	Detection Matrix	192 x 16 Pixels 9.7 mm x 0.81 mm 500 ppi High-Resolution Images

Communications

Intel® 82579LM Gigabit Network Connection	Ethernet Features	10 Mbit/s operation (10BASE-T; IEEE 802.3i; IEEE 802.3 clauses 13-14) 100 10 Mbit/s operation (10BASE-T; IEEE 802.3i; 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) 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) 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

Technical Specifications

Interface	PCI Express 1.1 x1 to fully support ASPM L0s/L1 and CLKREQ. NOTE: Intel 82579 PCIe interface is not PCIe compliant. It operates at half of PCIe specification V1.1 (2.5GT/S) speed.
NIC Device Driver Name	Intel 82579LM/82579V Ethernet Network Connection

V.92 56K Data/Fax Modem Form Factor	MDC 1.5 Daughtercard
Power Management Support	APM Revision 1.2, ACPI
Approvals/Certifications	UL, CSA, NEMKO, CCIB, Industry Canada, FCC Part 68, CTR21, FCC Part 15 Class B, Canadian ICES-003 Class B, C.I.S.P.R.22, Australian ACA, CE Mark, Other Countries
Data Mode Capabilities	V.92 data V.8bis V.80 V44, V.42bis, MNP5 (Compression) V.42 (LAPM, MNP2-4) (Error Correction) Optional symbol rates: 2800, 3429 Asymmetric Symbol rates Synchronous primary channel data signaling rates: 3600, 31200 Automatic rate re-negotiation V.34 V.32bis V.32 V.23 V.22bis V.22 V.21 Bell 212A Bell 103J
Fax Mode Capabilities	TIA/EIA-578-B (Class 1) T.30, T.4 (Group 3) V.17 V.29 V.27ter V.21 Channel 2
Command Set	V.250 (Partial) TIA-602 Identification: +GMI, +GMM, +GMR Port control: +IPR, +ICF, +IFC, +ILRR Modulation: +MS, +MR, +MA Error control: +ES, +ER, +EB, +ESR, +ETBM Data compression: +DS, +DR V.251

Technical Specifications

HP un2430 EV-DO/HSPA Mobile Broadband Module	Technology/Operating Bands	GSM/GPRS/EDGE: 850MHz(Cell), 900MHz(EGSM), 1800MHz(DCS), 1900MHz (PCS) UMTS/WCDMA with receive diversity: 2100MHz (UTRA FDD Band I), 1900MHz (UTRA FDD Band II), AWS (UTRA FDD Band IV), 900MHz(UTRA FDD Band VIII), 850MHz (UTRA FDD Band V) 1xEVDO/1xRTT with receive diversity: 850MHz (Band Class0-Cell), 1900MHz (Band Class1-PCS)
	Wireless Protocol Standards	GSM/GPRS/EDGE: Class A, Multi-slot class 10 operation, coding schemes CS1 - CS4 and MSC1 - MSC9. UMTS/WCDMA: Release 99 and Release 6 CDMA: 1xEVDO Release 0 and Release A, IS-95A, IS-95B, IS-856, IS-2000
	Wireless Parametric Standards	Meets or exceeds TIA/EIA IS-98-D
	Maximum Data Rates	UMTS (HSPA) - 14.4 Mbps (Download), 5.76Mbps (Upload) CDMA (EVDO Release A) - 3.1 Mbps (Download), 1.8Mbps (Upload)
	GPS	Standalone GPS enabled gpsOneXTRATM™
	GPS Bands	L1 - 1575.42 MHz
	Maximum Output Power	GSM/GPRS/EDGE: 32dBm (+/-1) WCDMA: 24dBm (+0.7/-2.3) CDMA: 24dBm (+0.7/-2)
	Maximum Power Consumption	2750mA (peak); 1100mA (average)
	Power Consumption, Idle Not Connected	20 mA
	Power Management	USB selective suspend Integrated notebook wireless button
	Antenna Type	Dual high efficiency 5 band antennae with spatial diversity, mounted in the display enclosure
	Form Factor	PCI-Express MiniCard, USB 2.0 interface
	Weight	11.5 g
	Dimensions (Length x Width x Thickness)	2.01 x 1.18 x 0.18 in (51 x 30 x 5 mm)
	Voltage, Operating	3.3v +/- 10%
	Temperature, Operating (from TIA/EIA/IS-98-D)	-30° to 70° C (-22° to 158° F) (full RF performance) -30° to 75° C (-22° to 167° F) (reduced RF performance)
	Temperature, Non-operating, 96 hours (from MIL-STD 202 Method 108)	-40° to 85° C 40° to 185° F (-40° to 185° F)
	Humidity, Non-operating	95% relative humidity for 48 hours @ 185° F (85° C) (non-condensing)
	Configuration Utilities	HP Connection Manager
	LED Activity	LED Off - Radio Off; Solid LED On - Radio On

Technical Specifications

HP hs2340 HSPA+ Mobile Broadband Module	Technology/Operating Bands	GSM/GPRS/EDGE: 850MHz(Cell), 900MHz(EGSM), 1800MHz(DCS), 1900MHz (PCS) UMTS/WCDMA with receive diversity: 2100MHz (UTRA FDD Band I), 1900MHz (UTRA FDD Band II), 900MHz(UTRA FDD Band VIII), 850 MHz (UTRA FDD Band V)
	Wireless Protocol Standards	GSM/GPRS/EDGE: Class B, Multi-slot class 10 operation, coding schemes CS1 - CS4 and MSC1 - MSC9. UMTS/WCDMA: Release 99 and Release 7 Advanced Receiver Type 3i
	Wireless Parametric Standards	Complies with 3GPP specifications
	Maximum Data Rates	UMTS (HSPA) - 21 Mbps (Download), 5.76Mbps (Upload)
	GPS	Standalone, A-GPS (Internet- and Network assisted)
	GPS Bands	1575.42 MHz (± 1.023 MHz)
	Maximum Output Power	GSM/EDGE GSM850 & GSM900 bands GPRS: +33 dBm ± 2 dBm (class 4) EGPRS: +27 dBm ± 3 dBm (class E2) DCS1800 & PCS1900 bands GPRS: +30 dBm ± 2 dBm (class 1) EGPRS: +26 dBm +4 / -3 dBm (class E2) UMTS UTRA FDD Bands +24 dBm +4 / -3 dBm (class 3)
	Maximum Power Consumption	2000mA (peak); 600mA (average)
	Power Consumption, Sleep Mode	5 mA
	Power Management	USB selective suspend Integrated notebook wireless button
	Antenna Type	Dual high efficiency 5 band antennae with spatial diversity, mounted in the display enclosure
	Form Factor	PCI-Express MiniCard, USB 2.0 interface
	Weight	< 12 g
	Dimensions (Length x Width x Thickness)	51 x 30 x 5 mm (2.01 x 1.18 x 0.18 in)
	Voltage, Operating	3.3v +/- 9%
	Temperature, Operating	-10° to 65° C (14° to 149° F) (full RF performance) -10° to 75° C (14° to 167° F) (reduced RF performance)
	Temperature, Non-operating, 96 hours (from MIL-STD 202 Method 108)	-30° to 85° C -22° to 185° F (-22° to 185° F)
	Humidity, Non-operating	85% relative humidity for 48 hours @ 85° C (185° F) (non-condensing)
	Configuration Utilities	HP Connection Manager

Technical Specifications

LED Activity LED Off - Radio Off;
Solid LED On - Radio On

HP Ic2010 Mobile Broadband Module	Technology/Operating Bands	GSM/GPRS/EDGE: 850MHz(Cell), 900MHz(EGSM), 1800MHz(DCS), 1900MHz (PCS) UMTS/WCDMA with receive diversity: 2100MHz (UTRA FDD Band I), 900MHz(UTRA FDD Band VIII)
	Wireless Protocol Standards	GSM/GPRS/EDGE: Class B, Multi-slot class 10 operation, coding schemes CS1 - CS4 and MSC1 - MSC9. UMTS/WCDMA: Release 99 and Release 6
	Wireless Parametric Standards	Complies with 3GPP specifications
	Maximum Data Rates	UMTS (HSPA) - 7.2 Mbps (Download), 2.0Mbps (Upload)
	GPS	n/a
	GPS Bands	
	Maximum Output Power	GSM/GPRS/EDGE: 32dBm (+/-1) WCDMA: 23dBm (+/-1)
	Maximum Power Consumption	2000mA (peak); 600mA (average)
	Power Consumption, Sleep Mode	5 mA
	Power Management	USB selective suspend Integrated notebook wireless button
	Antenna Type	Dual high efficiency 5 band antennae with spatial diversity, mounted in the display enclosure
	Form Factor	PCI-Express MiniCard, USB 2.0 interface
	Weight	< 10 g
	Dimensions (Length x Width x Thickness)	51 x 30 x 5 mm (2.01 x 1.18 x 0.18 in)
	Voltage, Operating	3.3v +/- 10%
	Temperature, Operating	-10° to 65° C (14° to 149° F) (full RF performance) -10° to 75° C (14° to 167° F) (reduced RF performance)
	Temperature, Non-operating, 96 hours (from MIL-STD 202 Method 108)	-30° to 85° C (-22° to 185° F)
Humidity, Non-operating	85% relative humidity for 48 hours @ 85° C (185° F) (non-condensing)	
Configuration Utilities	HP Connection Manager	
LED Activity	LED Off - Radio Off; Solid LED On - Radio On	

Intel Centrino Advanced-N Wireless LAN Standards 6205	IEEE 802.11a
	IEEE 802.11b
	IEEE 802.11g

Technical Specifications

	IEEE 802.11n*
	* In countries where 802.11n is not allowed, this capability is not enabled.
Interoperability	Wi-Fi certified Cisco Compatible Extensions Program compliant with Microsoft Windows Vista and XP (details at: http://www.hp.com/go/notebooks/WLAN)
Frequency Band	2.4 GHz and 5GHz
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: 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
Modulation	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM, BPSK, QPSK, 16-QAM, 64-QAM
Security¹	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.
Sub-channels	Multinational support with frequency bands and channels compliant to local regulations.
Media Access Protocol	CSMA/CA (Collision Avoidance) with ACK
Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between 2.4GHz band Access Points
Output Power (for CCK and OFDM) ²	17 dBm max
Power Consumption	Transmit: 2.3 Watts (max, with two spatial streams) Receive: 1 Watt (max with two spatial streams) Idle mode ³ : 35 mW (average) Radio off: 20 mW (max)
Power Management	ACPI compliant power management 802.11 compliant power saving mode
Receiver Sensitivity⁴	54 Mbps: -76 dBm, 6 Mbps: -92 dBm
Antenna Connections	2 U.FL type connectors, 50 ohm nominal impedance
Form Factor	PCI-Express Half-MiniCard
Weight	3.4 g (0.0075 lb)
Dimensions	3.1 x 26.8 x 30.0 mm (0.12 x 1.06 x 1.18 in)
Operating Voltage	3.3V +/- 9%

Technical Specifications

Temperature	Operating	0° to 80° C (32° to 176° F)
	Non-operating	-40° to 80° C F (-40° to 176°)
Humidity	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 90% (non-condensing)
Altitude	Operating	0 to 3,048 m (10,000 ft)
	Non-operating	0 to 15,240 m (50,000 ft)
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 Centrino Ultimate-N 6300	Wireless LAN Standards	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n*
		* In countries where 802.11n is not allowed, this capability is not enabled.
	Interoperability	Wi-Fi certified (802.11bgn only) Cisco Compatible Extensions Program compliant (802.11bgn only) with Microsoft Windows Vista and XP (details at: http://www.hp.com/go/notebooks/WLAN)
	Frequency Band	2.4 GHz and 5GHz
	Antenna Structure	3 transmit; 3 receive (3x3)
	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: many possible data rates, ranging from 6 Mbps to 450 Mbps, depending on the combination of Bandwidth, Modulation Coding Scheme, and Guard Interval used, as defined in IEEE 802.11n specification
	Modulation	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM, BPSK, QPSK, 16-QAM, 64-QAM
	Security¹	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.

Technical Specifications

Sub-channels	Multinational support with frequency bands and channels compliant to local regulations.	
Media Access Protocol	CSMA/CA (Collision Avoidance) with ACK	
Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)	
Roaming	IEEE 802.11 compliant roaming between Access Points	
Output Power (for CCK and OFDM) ²	17 dBm max	
Power Consumption	Transmit: 2.4 Watts (max, with three spatial streams) Receive: 1.4 Watts (max with three spatial streams) Idle mode ³ : 35 mW (average) Radio off: 20 mW (max)	
Power Management	ACPI compliant power management 802.11 compliant power saving mode	
Receiver Sensitivity ⁴	54 Mbps: -76 dBm, 6 Mbps: -92 dBm	
Antenna Connections	3 U.FL type connectors, 50 ohm nominal impedance	
Form Factor	PCI-Express Half-MiniCard	
Weight	3.4 g (0.0075 lb)	
Dimensions	3.1 x 26.8 x 30.0 mm (0.12 x 1.06 x 1.18 in)	
Operating Voltage	3.3V +/- 9%	
Temperature	Operating	0° to 80° C (32° to 176° F)
	Non-operating	-40° to 80° C (-40° to 176° F)
Humidity	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 90% (non-condensing)
Altitude	Operating	0 to 3,048 m (10,000 ft)
	Non-operating	0 to 15,240 m (50,000 ft)
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.

**Atheros HB112AGN
802.11a/b/g/n 3x3 WiFi
Adapter**

Wireless LAN Standards	IEEE802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n
Interoperability	Wi-Fi certified
Frequency Band	2.4 GHz and 5GHz

Technical Specifications

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: many possible data rates, ranging from 6 Mbps to 450 Mbps, depending on the combination of Bandwidth, Modulation Coding Scheme, and Guard Interval used, as defined in IEEE 802.11n specification
Modulation	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM, BPSK, QPSK, 16-QAM, 64-QAM
Security¹	Supports 64- and 128-bit WEP, WPA, WPA2, hardware-accelerated AES, 802.1x authentication types EAP-TLS, EAP-TTLS, PEAP-GTC, PEAP-MSCHAPv2, LEAP, EAP-FAST.
Sub-channels	Multinational support with frequency bands and channels compliant to local regulations.
Media Access Protocol	CSMA/CA (Collision Avoidance) with ACK
Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between access points
Output Power (for CCK and OFDM) ²	17 dBm, nominal
Output Power (for OFDM; power varies by data rate) ²	15 dBm, nominal
Power Consumption	Transmit: 2.0 W (max) Receive: 1.5 W (max) Associated to Access Point, Idle: 300 mW nominal Wireless Button Off: 75 mW nominal
Power Management	ACPI compliant power management 802.11 compliant power saving mode
Receiver Sensitivity³	54 Mbps: -75 dBm, 11 Mbps: -88 dBm, 1 Mbps: -93 dBm
Antenna type	High efficiency antenna with spatial diversity, mounted in the display enclosure
Form Factor	PCI-Express Half-MiniCard
Weight	6 g (0.013 lb)
Dimensions	4.75 x 26.8 x 30 mm (0.19 x 1.06 x 1.18 in)
Operating Voltage	3.3v +/- 9%
Temperature	Operating -10° to 65° C (14° to 149° F) Non-operating -40° to 80° C (-40° to 176° F)
Humidity	Operating 10% to 90% (non-condensing) Non-operating 5% to 95% (non-condensing)
Altitude	Operating 0 to 3,048 m (10,000 ft) Non-operating 0 to 15,240 m (50,000 ft)
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 \(CCK modulation\) and a packet error rate of 10% for 802.11a/g \(OFDM modulation\).](#)

Technical Specifications

Broadcom 43224AGN 802.11a/b/g/n WiFi Adapter	Wireless LAN Standards	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n*
	Interoperability	Wi-Fi certified (802.11abg only) Cisco Compatible Extensions Program compliant (802.11abg only) with Microsoft Windows Vista and XP (details at: http://www.hp.com/go/notebooks/WLAN)
	Frequency Band	2.4 GHz and 5 GHz
	Data Rates	802.11b: 1, 2, 5.5, 11 Mbps 802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: 6, 6.5, 9, 12, 13, 13.5, 18, 19.5, 24, 26, 27, 36, 39, 40.5, 48, 52, 54, 58.5, 65, 78, 81, 104, 108, 117, 121.5, 130, 135, 162, 216, 243, 270, 300 Mbps
	Frequency Support	20 MHz: 2.4 GHz and 5 GHz bands 40 MHz: 2.4 GHz and 5 GHz bands
	Modulation	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM, BPSK, QPSK, 16-QAM, 64-QAM
	Security¹	Supports 64- and 128-bit WEP, WPA, WPA2, hardware-accelerated AES, 802.1x authentication types EAP-TLS, EAP-TTLS, PEAP-GTC, PEAP-MSCHAPv2, LEAP, EAP-FAST. 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.
	Sub-channels	Multinational support with frequency bands and channels compliant to local regulations.
	Media Access Protocol	CSMA/CA (Collision Avoidance) with ACK
	Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
	Roaming	IEEE 802.11 compliant roaming between access points
	Output Power (for CCK)²	17 dBm , nominal
	Output Power (for OFDM; power varies by data rate)²	15 dBm , nominal
	Power Consumption	Idle associated: 250 mW Idle unassociated: 150 mW Transmit/Receive 20 MHz channel: 2.0 W (max) Transmit/Receive 40 MHz channel: 2.0 W (max)
	Power Management	ACPI compliant power management 802.11 compliant power saving mode
	Receiver Sensitivity³	270 Mbps: -61dBm, , 54 Mbps: -72 dBm, 11 Mbps: -85 dBm , 1 Mbps: -92 dBm
	Antenna type	High efficiency dual band antenna with spatial diversity, mounted in the display enclosure
	Form Factor	PCI-Express Half-MiniCard
	Weight	6 g (0.013 lb)

Technical Specifications

Dimensions	4.75 x 26.8 x 30 mm (0.19 x 1.06 x 1.18 in)	
Operating Voltage	3.3v +/- 10%	
Temperature	Operating	-10° to 65° C (14° to 149° F)
	Non-operating	-40° to 80° C (-40° to 176° F)
Humidity	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 95% (non-condensing)
Altitude	Operating	0 to 3,048 m (10,000 ft)
	Non-operating	0 to 15,240 m (50,000 ft)
LED Activity	LED Off - Radio OFF; Solid LED On - Radio ON	
	<ol style="list-style-type: none"> 1. Check latest software/driver release for updates on supported security features. 2. Maximum output power may vary by country according to local regulations. 3. 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). 4. 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. 	

Broadcom 4313GN 802.11b/g/n WiFi Adapter

Wireless LAN Standards	IEEE 802.11b IEEE 802.11g IEEE 802.11n
Interoperability	Wi-Fi certified Cisco Compatible Extensions Program compliant with Microsoft Win7, Vista and XP (details at: http://www.hp.com/go/notebooks/WLAN)
Frequency Band	2.4 GHz
Data Rates	802.11b: 1, 2, 5.5, 11 Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: 6.5, 7.2, 13, 14.4, 19.5, 21.7, 26, 28.9, 39, 43.3, 52, 57.8, 58.5, 65, 72.2Mbps
Frequency Support	20 MHz: 2.4 GHz bands
Modulation	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM, BPSK, QPSK, 16-QAM, 64-QAM
Security¹	Supports 64- and 128-bit WEP, WPA, WPA2, hardware-accelerated AES, 802.1x authentication types EAP-TLS, EAP-TTLS, PEAP-GTC, PEAP-MSCHAPv2, LEAP, EAP-FAST. 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.
Sub-channels	Multinational support with frequency bands and channels compliant to local regulations.
Media Access Protocol	CSMA/CA (Collision Avoidance) with ACK
Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between access points

Technical Specifications

Output Power (for CCK) ²	17 dBm , nominal
Output Power (for OFDM; power varies by data rate) ²	15 dBm , nominal
Power Consumption	Idle associated: 250 mW avg (CLKREQ enabled) Idle unassociated: 425 mW avg Transmit/Receive 20 MHz channel: 5.5 W (max)
Power Management	ACPI compliant power management 802.11 compliant power saving mode
Receiver Sensitivity ³	72.2 Mbps: -71 dBm
Antenna type	High efficiency dual band antenna with spatial diversity, usually mounted in the display enclosure
Form Factor	PCI-Express Half-MiniCard
Weight	0.013 lb (6 g)
Dimensions	4.75 x 26.8 x 30 mm (0.19 x 1.06 x 1.18 in)
Operating Voltage	3.3v +/- 10%
Temperature	Operating -10° to 65° C (14° to 149° F) Non-operating -40° to 80° C (-40° to 176° F)
Humidity	Operating 10% to 90% (non-condensing) Non-operating 5% to 95% (non-condensing)
Altitude	Operating 0 to 3,048 m (10,000 ft) Non-operating 0 to 15,240 m (50,000 ft)
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 (CCK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).
4. 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 and Win7.

HP Integrated Module with Bluetooth 2.1+EDR Wireless Technology

Bluetooth Specification	2.1+EDR Compliant
Dimensions	30 x 6.5 x 3.25 mm (1.18 x 0.26 x 0.13 in)
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	-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) 264 mW Peak (Rx) 231 mW Sleep <1 mW
Antenna	Internally integrated within module
Range	Up 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
Temperature	Operating -20° to 70° C (-4° to 158° F) Non-operating -40° to 80° C (-40° to 176° F)
Humidity	Operating 10% to 90% Non-operating 5% to 95%
Altitude	Operating 4,572 m (15,000 ft) Non-operating 12,192 m (40,000 ft)
Bluetooth Profiles Supported	Serial Port Profile (SPP) ¹ Service Discovery Application Profile (SDAP) Dial-Up Networking (DUN) ^{1,2} Generic Object Exchange Profile (GOEP) ^{1,2} Object Push Profile (OPP) ^{1,2} File Transfer Profile (FTP) Synchronization Profile (SYNC) Hard Copy Cable Replacement (HCRP) ^{1,2} Personal Area Networking Profile (PAN) ^{1,2} Human Interface Device Profile (HID) ^{1,2,3} 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

Technical Specifications

Environmental Data	Eco-Label Certifications	<p>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:</p> <ul style="list-style-type: none"> ● US ENERGY STAR® ● IT ECO declaration ● EPEAT - Gold where HP registers commercial notebook products. See http://www.epeat.net for registration status in your country. 		
	System Configuration	<p>The configuration used for the Energy Consumption and Declared Noise Emissions data for the Convertible Mini tower Desktop model is based on a "Typically Configured Notebook"</p>		
	Energy Consumption	115 VAC	230 VAC	100 VAC
	Normal Operation	15.34 W	15.44 W	15.29 W
	Sleep (Energy Star low power mode)	1.56 W	1.63 W	1.55 W
	Off	0.92 W	0.99 W	0.94 W
	Heat Dissipation*	115 VAC	230 VAC	100 VAC
	Normal Operation	52 BTU/hr	53 BTU/hr	52 BTU/hr
	Sleep	5 BTU/hr	6 BTU/hr	5 BTU/hr
	Off	3 BTU/hr	3 BTU/hr	3 BTU/hr
		<p>* Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.</p>		
	Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)			
	System Fan Off	Sound Power (LWAd, bels)	Sound Pressure (LpAm, decibels)	
	Idle	2.9	23	
	Fixed Disk (random writes)	4.1	33	
	System fan is usually off except when charging the battery			
	Batteries	<p>This battery(s) in this product comply with EU Directive 2006/66/EC</p> <p>Batteries used in the product do not contain:</p> <ul style="list-style-type: none"> ● Mercury greater the 5ppm by weight ● Cadmium greater than 10ppm by weight <p>The battery type and chemistry used in the product is: CR2032 (coin cell), Li-ion 6-cell high capacity Lithium-Ion battery (optional 8 cell available)</p>		
	Additional information	<p>This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2002/95/EC.</p> <p>This HP product is designed to comply with the Waste Electrical and Electronic</p>		

Technical Specifications

Equipment (WEEE) Directive - 2002/96/EC.

This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).

This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold level, see www.epeat.net

Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.

This product contains 0% post consumer recycled plastic (by wt.)

This product is greater than 95.2% recycle-able when properly disposed of at end of life.

Packaging Materials

- External:
 - Paper / Cardboard 600 g
- Internal:
 - Polyethylene low density 22 g
 - PET 18 g
- The Paper / Cardboard packaging material is made from 80% recycled content.
- The PET packaging material is made from 80% recycled content.
- The Polyethylene low density packaging material is made from 80% recycled content.

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.

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):

Technical Specifications

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants - may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- 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)

Nickel finishes that release greater than 0.5 µgrams/cm²/week, measured according to EN 1811:1998, are not used on any product surface designed to be frequently handled or touched by users.

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>

Environment website

<http://www.hp.com/environment>

Eco-label certifications

<http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html>

ISO 14001 certificates:

<http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html>

Technical Specifications

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