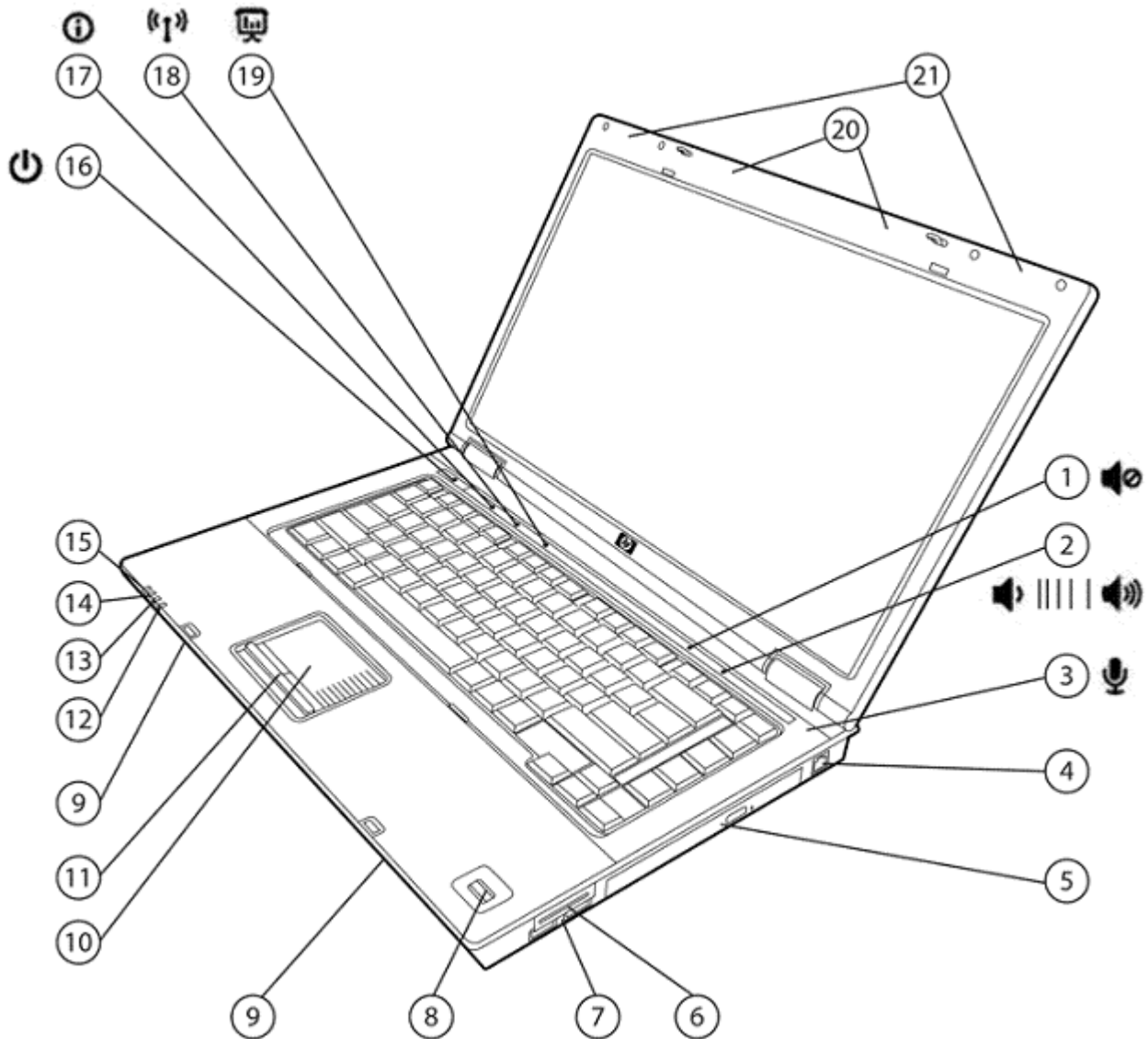


### Overview

**HP recommends Windows Vista® Business**

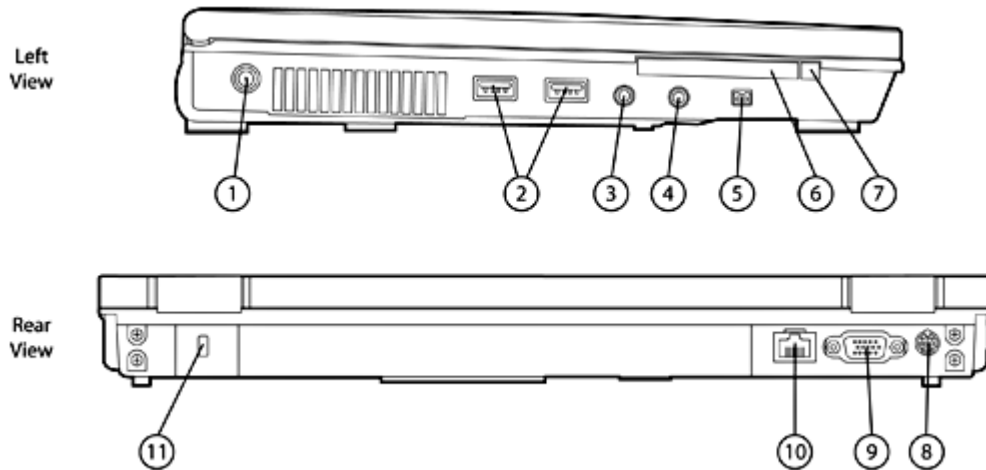


- |   |  |
|---|--|
| 1. Volume mute button with LED indicator          | 12. Hard drive activity / HP 3D DriveGuard LED       |
| 2. Volume scroll zone with up/down LED indicators | 13. Battery charging LED                             |
| 3. Integrated microphone                          | 14. Power/standby LED                                |
| 4. RJ-11/modem port                               | 15. Wireless on/off LED                              |
| 5. Optical drive                                  | 16. Power button with LED                            |
| 6. Media Card Reader                              | 17. HP Info / HP QuickLook button with LED indicator |
| 7. 2 USB 2.0 ports                                | 18. Wireless on/off button with LED indicator        |
| 8. HP Fingerprint Sensor                          | 19. HP Presentation button with LED indicator        |
| 9. Integrated stereo speakers                     | 20. WLAN antennas (with WLAN option)                 |

### Overview

- 10. Touchpad with scroll zone
- 11. Touchpad buttons

- 21. WWAN antennas (with WWAN option)



- 1. Power connector
- 2. 2 USB 2.0 ports
- 3. Stereo headphone/line out
- 4. Stereo microphone in
- 5. 1394a port
- 6. Type I/II PC Card slot
- 7. PC Card eject button
- 8. S-Video TV out
- 9. VGA/external monitor connector
- 10. RJ-45/Ethernet port
- 11. Kensington Lock slot

### At A Glance

- Genuine Windows Vista Business\*, Genuine Windows Vista Home Basic, Genuine Windows XP Professional, or FreeDOS
- Widescreen 15.4-inch diagonal display with wide-viewing angle, BrightView and HP Privacy Filter support
- Flexible wireless connectivity options:
  - Integrated HP ev2200 1xEV-DO, HP ev2210 1xEVDO-A or HP hs2300 HSDPA Broadband Wireless module
  - Integrated 802.11 a/b/g/draft-n, a/b/g, or b/g wireless LAN module
  - Bluetooth®
- Intel® Core™2 Duo processor or Intel Celeron® processor
- Thin, lightweight design starting at 5.7 lb/2.59 kg and 1.4-inch/34.9 mm thin at front
- Security features including Drive Encryption for HP ProtectTools, HP Fingerprint Sensor, TPM 1.2\*\*
- HP QuickLook on Windows Vista models for instant access to email, calendar, and contact information
- Up to 250-GB 5400 rpm or 120-GB 7200 rpm user-removable hard drive with HP 3D DriveGuard protection
- Media Card Reader
- Touch-sensitive controls for HP Info Center, HP QuickLook, wireless on/off, HP Presentation button, external volume up, volume down, and mute
- Integrated optical drive, including optional DVD+/-RW SuperMulti DL LightScribe Drive
- Up to 4 GB of 667-MHz DDR2 SDRAM, dual channel memory support
- Mobile Intel Graphics Media Accelerator X3100, with up to 384-MB shared system memory (select models)
- Broadcom NetLink Gigabit Ethernet Controller
- Touchpad with scroll zone

\* At initial boot, either 32- or 64-bit can be selected. This is a one time selection and the other version will be deleted.

\*\* TPM module disabled where not permitted by law (for example, Russia and China).

### Standard Features

#### Processors

Intel Core 2 Duo Processor T9500 (2.60 GHz, 6 MB L2 cache, 800 MHz FSB)\*  
Intel Core 2 Duo Processor T9300 (2.50 GHz, 6 MB L2 cache, 800 MHz FSB)\*  
Intel Core 2 Duo Processor T8300 (2.40 GHz, 3 MB L2 cache, 800 MHz FSB)\*  
Intel Core 2 Duo Processor T8100 (2.10 GHz, 3 MB L2 cache, 800 MHz FSB)\*  
Intel Core 2 Duo Processor T7800 (2.60 GHz, 4 MB L2 cache, 800 MHz FSB)\*  
Intel Core 2 Duo Processor T7700 (2.40 GHz, 4 MB L2 cache, 800 MHz FSB)\*  
Intel Core 2 Duo Processor T7500 (2.20 GHz, 4 MB L2 cache, 800 MHz FSB)\*  
Intel Core 2 Duo Processor T7300 (2.00 GHz, 4 MB L2 cache, 800 MHz FSB)\*  
Intel Core 2 Duo Processor T7250 (2.00 GHz, 2 MB L2 cache, 800 MHz FSB)\*  
Intel Core 2 Duo Processor T7100 (1.80 GHz, 2 MB L2 cache, 800 MHz FSB)\*  
Intel Core 2 Duo Processor T5470 (1.60 GHz, 2 MB L2 cache, 800 MHz FSB)\* (select countries only)  
Intel Celeron Processor 550 (2.00 GHz, 1 MB L2 cache, 533 MHz FSB)\*  
Intel Celeron Processor 540 (1.86 GHz, 1 MB L2 cache, 533 MHz FSB)\*  
Intel Celeron Processor 530 (1.73 GHz, 1 MB L2 cache, 533 MHz FSB)\*

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

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

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#### Operating System

##### Preinstalled

Genuine Windows Vista Business†\*  
Genuine Windows Vista Home Basic\*  
Genuine Windows XP Professional  
FreeDOS

##### Supported

Genuine Windows Vista Enterprise\*

##### Certified

SuSE Linux Enterprise Desktop 10

† At initial boot, either 32- or 64-bit can be selected. This is a one time selection and the other version will be deleted.

\* Certain Windows Vista product features require advanced or additional hardware. See <http://www.microsoft.com/windowsvista/getready/hardwarereqs.mspx> and <http://www.microsoft.com/windowsvista/getready/capable.mspx> 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>.

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#### Chipset

Mobile Intel GM965

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### Standard Features

#### Graphics

Mobile Intel Graphics Media Accelerator X3100

Total System Memory	Reserved Graphics Memory *	Maximum Graphics Memory **
<b>Windows XP</b>		
256 MB	8 MB	128 MB
512 or 768 MB	8 MB	256 MB
1024 MB or more	8 MB	384 MB
<b>Windows Vista</b>		
512 MB	32 MB	64 MB
768 MB	128 MB	123 MB
1024 MB	128 MB	251 MB
1536 MB or more	128 MB	358 MB

\* System memory exclusive to graphics.  
\*\* Total available graphics memory (HyperMemory), which includes Reserved Graphics Memory and Shared System Memory.

Microsoft DirectX 9 capable

#### Display

##### Internal

15.4-inch diagonal WXGA anti-glare (1280 x 800 resolution)  
15.4-inch diagonal WXGA BrightView (1280 x 800 resolution)  
15.4-inch diagonal WSXGA+ WVA anti-glare (1680 x 1050 resolution)  
HP Privacy Filter support

##### External

Up to 32-bit per pixel color depth  
**VGA** port supports resolutions up to 2048 x 1536 at 75 Hz, and lower resolutions at up to 100 Hz  
**NOTE:** Resolutions are dependent upon monitor capability, and resolution and color depth settings.

#### Memory

##### Standard

512-MB, 1024-MB, 2048-MB, or 4096-MB 667-MHz DDR2 SDRAM; two SODIMM slots supporting dual channel memory

##### Maximum

Upgradeable to 4096-MB maximum (2048-MB SODIMM in slots 1 and 2)

##### 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 of memory requires Windows Vista Business 64-bit 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.

### Standard Features

#### Communications

Integrated Broadcom NetLink Gigabit Ethernet Controller (10/100/1000 NIC)\*  
56K V.92 modem\*\*

\* The term "10/100/1000" or "Gigabit" Ethernet indicates compliance 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.

#### Wireless Devices

Support for a broad range of secure, integrated wireless LAN and wireless WAN options featuring support for the latest industry standards. Wireless LAN is factory configurable or available as an option to be added later. Broadband Wireless (WWAN) requires Windows Vista Business or Windows XP Professional 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.

##### **HP ev2200 1xEV-DO Broadband Wireless Module**

Integrated WWAN module connects to the Verizon Wireless BroadbandAccess and NationalAccess networks (U.S. only)

Supports CDMA 1xEV-DO, 1xRTT connections at 850 and 1900 MHz.

**NOTE:** Separately purchased Verizon Wireless service is required. For details, go to <http://www.hp.com/go/broadbandwireless>.

Two 850/900/1800/1900/2100-MHz antennas integrated in the top of the display panel support current and future WWAN technologies

##### **HP ev2210 1xEVDO-A Broadband Wireless Module**

Integrated WWAN module connects to the Verizon Wireless BroadbandAccess and NationalAccess networks (US only)

Supports CDMA 1xEVDO-A, 1xRTT connections at 800 and 1900 MHz.

**NOTE:** Separately purchased Verizon Wireless service is required. For details, go to <http://www.hp.com/go/broadbandwireless>.

Upgradeable design and two 850/900/1800/1900/2100-MHz antennas integrated in the top of the display panel support current and future WWAN technologies

##### **HP hs2300 HSDPA Broadband Wireless Module**

Integrated WWAN module that provides connection to GSM, GPRS, EDGE, UMTS, and HSDPA mobile networks in many countries. Currently available for the AT&T Broadbandconnect network in the U.S. (supports international roaming).

**NOTE:** Separately purchased mobile network operator service is required.

Two 850/900/1800/1900/2100-MHz antennas integrated in the top of the display panel support current and future WWAN technologies.

##### **All 802.11a/b/g integrated wireless LAN options**

Wi-Fi certified

Cisco Compatible Extensions support (Version 4.0) with Microsoft Windows XP  
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

WiFi certified for WPA2, WMM

Dual antennas integrated in the display enclosure

##### **Intel Wireless WiFi Link 4965AGN\***

Integrated support for 802.11a, b, g, and draft-n  
Up to 300-mbps data rate

### Standard Features

<b>Intel Wireless WiFi Link 4965AG*</b>	Integrated support for 802.11 a, b and g Up to 54-mbps data rate
<b>Intel PRO/Wireless 3945ABG Network Connection*</b>	Integrated support for 802.11 a, b and g Up to 54-mbps data rate
<b>Intel PRO/Wireless 3945BG Network Connection*</b>	Integrated support for 802.11 b and g Up to 54-mbps data rate
<b>Broadcom 4321AGN 802.11a/b/g/draft-n WiFi Adapter</b>	Integrated support for 802.11a, b, g, and draft-n Up to 300-mbps data rate
<b>Broadcom 4311AG 802.11a/b/g WiFi Adapter</b>	Integrated support for 802.11 a, b and g Up to 54-mbps data rate
<b>Broadcom 4311BG 802.11b/g WiFi Adapter</b>	Integrated support for 802.11 b and g Up to 54-mbps data rate
<b>HP Integrated Module with Bluetooth Wireless Technology</b>	Bluetooth Specification v2.0 compliant Works with a wide range of Bluetooth devices

\* Requires Intel Core 2 Duo processor

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### Keyboard

The 101/102-key compatible keyboard features an industry standard, full-pitch key layout with desktop keyboard features, such as the isolated inverted-T cursor control keys, editing keys, both left and right control and alt keys, and 12 function keys. U.S. and International key layouts are available. Other features include an integrated numeric keypad, hotkeys for instant access to power conservation, brightness, and other features, 19-mm x 19-mm key pitch (center-to-center spacing), 2.5-mm stroke, and comfort-dished keycaps.

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### Touch-sensitive controls

Touch-sensitive controls provide easy access to the following features: HP Info Center, HP QuickLook, wireless on/off, HP Presentation button, external volume up, volume down, and mute

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### Pointing device

Touchpad with scroll zone, two pick buttons

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### Standard Features

<b>Expansion card slots</b>	<b>1 Type I/II PC Card slot</b>	Supports 32-bit CardBus and 16-bit PC Cards
	<b>or</b>	
	<b>Optional Integrated Smart Card Reader</b> (replaces PC Card slot)	Compatible with ISO 7816 compliant Smart Cards PC/SC interface support
	<b>Media Card Reader</b>	Supports SD (Secure Digital), Multimedia card, Memory Stick, Memory Stick Pro, Memory Stick Duo*, Picture card
<b>*NOTE:</b> Memory Stick Duo Adapters are required and sold separately. Inserting a Memory Stick Duo Card directly into your notebook could damage the memory card and/or notebook.		

<b>Storage</b>	<b>Hard drives</b>	80/120/160/250-GB 5400 rpm SMART SATA 80/120-GB 7200 rpm SMART SATA
	<b>NOTE:</b> These hard drives are customer removable and will withstand multiple insertion/removal cycles. Up to 10 GB is reserved for the system recovery software.	
	<b>HP 3D DriveGuard</b>	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.
	<b>Fixed optical drives</b>	DVD-ROM Drive DVD/CD-RW Combo Drive DVD+/-RW SuperMulti DL Drive DVD+/-RW SuperMulti DL LightScribe Drive

<b>Interfaces</b>	<b>PC Card slot</b>	One Type I/II PC Card slot or optional Smart Card Reader
	<b>External monitor</b>	One – VGA
	<b>1394a</b>	One
	<b>Stereo microphone in</b>	One
	<b>Stereo headphone/line out</b>	One
	<b>Power connector</b>	One
	<b>RJ-11/modem</b>	One
	<b>RJ-45/Ethernet</b>	One
	<b>S-video TV out</b>	One (Support for NTSC/PAL)
	<b>USB 2.0</b>	Four
	<b>Docking connector</b>	One
	<b>Secondary battery connector</b>	One
	<b>LED status indicators</b>	Fifteen

### Standard Features

<b>Audio</b>	High Definition Audio support w/24-bit DAC Integrated stereo speakers Integrated microphone Touch-sensitive controls for volume up, volume down, and mute Stereo headphone/line out Stereo microphone in
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<b>Software</b>	<b>Preinstalled software with Windows Vista or Windows XP</b>	PDF Complete HP Backup and Recovery Manager HP Help and Support Center HP QuickLook (Windows Vista only) HP OpenView Radia Management Agent HP Universal Print Driver HP ProtectTools Security Manager: BIOS Configuration for HP ProtectTools Credential Manager for HP ProtectTools Device Access Manager for HP ProtectTools* Drive Encryption for HP ProtectTools Embedded Security for HP ProtectTools HP Quick Launch Buttons HP Wireless Assistant Microsoft Office Ready with 60-day Office Professional 2007 Trial Edition (select models) Roxio Creator 9 (for optional DVD+/-RW and DVD/CDRW drives) Synaptics Touchpad Driver Symantec Norton Internet Security with complimentary 60-day live update Intervideo WinDVD – DVD Player
	<b>Additional software available from the web</b>	HP Client Manager Java Card Security for HP ProtectTools

\* Download available from [hp.com](http://hp.com) for Windows Vista; preinstalled with Windows XP.

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<b>HP Backup and Recovery Manager</b>	Each unit is shipped with HP Backup and Recovery Manager. HP Backup and Recovery Manager can provide data and system file protection for HP business PCs to enable fast recovery if the system becomes corrupted or if important information is accidentally deleted. HP Backup and Recovery Manager can perform scheduled or manual backups of the entire drive or individual files and folders. Up to 10 GB of the hard drive is reserved for the system recovery software. HP Backup and Recovery Manager can also create software recovery CDs or DVDs (requires optional hardware).
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<b>SMBIOS Version 2.4</b>	System Management BIOS, previously known as DMI BIOS, is used to store system management information.
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### Standard Features

**HP ProtectTools Security Manager** 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. Modules currently available are:

- BIOS Configuration for HP ProtectTools
- Credential Manager for HP ProtectTools
- Device Access Manager for HP ProtectTools
- Drive Encryption for HP ProtectTools
- Embedded Security for HP ProtectTools
- Java Card Security for HP ProtectTools

### Security

#### Standard Features

HP ProtectTools Security Manager  
HP Fingerprint Sensor  
Configuration Control Hardware  
Memory Change Alert  
Ownership Tag  
Setup Password  
Power-On Password  
TPM 1.2 Embedded Security Chip\*  
TPM Enhanced DriveLock\*  
HP Disk Sanitizer  
HP 3D DriveGuard  
Kensington Lock Slot  
Support for Computrace / LoJack for Laptops (must be purchased separately)

#### Optional Features

**Smart Card Reader** Compatible with ISO 7816 compliant Smart Cards  
(replaces Type I/II PC Card PC/SC interface support slot)

**HP Privacy Filter** Narrows viewing area so that screen data is visible only to persons directly in front of the monitor

**\*NOTE:** TPM module disabled where use is restricted by law; for example, Russia and China.  
For more information on HP security solutions refer to <http://www.hp.com/go/security>.

### Power Supply

External 90-watt Smart AC adapter, 6-foot (1.8-meter) power cord included.  
Total length including external AC adapter is 12 feet (3.66 meter).  
HP Fast Charge\*

\*HP Fast Charge recharges your battery up to 90% within 90 minutes when the system is off. HP Fast Charge does not apply to 12-cell Ultra-Capacity batteries.

### Standard Features

<b>Battery</b>	<b>Primary battery</b>	6-cell (55 WHr) Lithium-Ion battery 6-cell (47 WHr) Lithium-Ion battery
	<b>Optional HP Extended Life Battery</b>	8-cell (52 WHr) high capacity Lithium-Ion battery
	<b>Optional HP Ultra-Capacity Battery</b>	12-cell (95 WHr) high capacity Lithium-Ion battery

### Battery Life

	<b>6-cell (55 WHr) Primary</b>	<b>6-cell (47 WHr) Primary</b>
<b>Primary battery</b>	Up to 5 hours and 15 minutes	Up to 4 hours and 15 minutes
<b>Primary battery and optional HP Extended Life Battery</b>	Up to 10 hours and 45 minutes	Up to 9 hours and 45 minutes
<b>Primary battery and optional HP Ultra-Capacity Battery</b>	Up to 14 hours and 30 minutes	Up to 13 hours and 30 minutes

**NOTE:** The listed battery life measurements were taken on models running Microsoft Windows XP Professional. Battery life will vary depending on the product configuration, product model, applications loaded on the product, power management settings of the product, and the product features used by the customer. As with all batteries, the maximum capacity of this battery will decrease with time and usage.

### System Standby Time

Up to 1 week

### Power Conservation

Supports enhanced Intel SpeedStep technology with Intel Core 2 Duo processors (allows Battery Optimized Mode, Maximum Performance Mode, or Automatic mode)  
Intel Display Power Saving technology  
Hibernation  
Standby  
ACPI compliance

### Docking and Stands

HP Advanced Docking Station  
HP Basic Docking Station  
HP Standard Monitor Stand  
HP Adjustable Notebook Stand  
HP External MultiBay II

HP's shared docking solutions provide simple and convenient port replication and cable management. Features include Gigabit NIC pass through, modem pass through, legacy parallel and serial ports, S-video TV out, USB 2.0 ports, integrated security mechanism\*, integrated MultiBay II and ExpressCard\*\* slots. These docking solutions are compatible across multiple Business Notebook platforms enabling a lower total cost of ownership.

\* HP/Kensington Cable Lock required (purchased separately)

\*\* HP 3-in-1 NAS Docking Station and HP Advanced Docking Station only

### Standard Features

#### **Service and Support**

HP Services offers limited 3- year, 1-year and 90-day warranty options depending on country; 1-year limited warranty on primary battery. On-site service and warranty upgrades are also available. For HP Care Pack services see <http://www.hp.com/go/lookuptool>.

**NOTE:** Certain restrictions and exclusions apply. Consult the HP Customer Support Center for details. <http://h20000.www2.hp.com/bizsupport/TechSupport/ProductRoot.jsp>.

### Options

<b>Memory</b>	HP 512-MB (DDR2 667 MHz) SODIMM	EM993AA
	HP 1-GB (DDR2 667 MHz) SODIMM	EM994AA
	HP 2-GB (DDR2 667 MHz) SODIMM	EM995AA
<b>MultiBay II Storage</b> (9.5-mm) <b>NOTE:</b> Requires HP 3-in-1 NAS Docking Station, HP Advanced Docking Station, or HP External MultiBay II	HP MultiBay II DVD-ROM Drive	PA849A
	HP MultiBay II DVD/CD-RW Combo Drive	PA850A
	HP MultiBay II DVD+/-RW SuperMulti DL Drive	PA851A
	HP 80-GB 5400rpm MultiBay II Hard Drive	PH357A
<b>Other Storage</b>	HP 80-GB 5400rpm Primary SATA Hard Drive	ET354AA
	HP DVD+/-RW SuperMulti DL LightScribe Drive	ET353AA
	HP Notebooks USB Diskette Drive	DC361B
<b>Communications</b>	Intel Wireless WiFi Link 4965AGN option kit* * Requires Intel Core 2 Duo processor	RT081AA#xxx
<b>Expansion Solutions</b>	HP Docking Station with Smart Adapter	EN488AA#xxx
	HP Advanced Docking Station with Smart Adapter	EN489AA#xxx
	HP Standard Monitor Stand	PA507A
	HP Adjustable Notebook Stand	PA508A
	HP External MultiBay II	PA509A#xxx
<b>Power</b>	HP 2-Bay Battery Charging Station (North America only)	DT533A#xxx
	HP 2-Bay Battery Charging Station (rest of world)	EW424AA#xxx
	HP 10-Bay Battery Charging Station (North America only)	DT534A#ABA
	HP Battery Adapter Kit	PK402A
	HP 90W Smart AC Adapter	ED495AA#xxx
	HP 90W Smart Auto Adapter	ED493AA
	HP 65W AC/Auto/Air Combo Smart Adapter	ED993AA#xxx
	HP 6-Cell Li-Ion Primary Battery	PB994A
	HP 8-cell Extended Life Battery	PB993A
HP 12-cell Ultra-Capacity Battery	EJ092AA	

### Options

<b>Carrying Cases</b>	HP Value Nylon Case	RR314AA
	HP Universal Nylon Case	RR315AA
	HP Executive Leather Case	RR316AA
	HP Deluxe Nylon Backpack	RR317AA
	HP Universal Messenger Bag	GD404AA
	HP Deluxe Roller Case	GD405AA
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<b>Security</b>	HP PC Card Smart Card Reader with Java Card	EL347AA
	HP ProtectTools Java Card – 10 units	EL348AA
	HP/Kensington MicroSaver Security Lock	PC766A
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<b>Input/Output Devices</b>	HP PS/2 Keyboard & Mouse Bundle	RC464AA#xxx
	HP USB Keyboard & Mouse Bundle	RC465AA#xxx
	HP USB/PS2 Optical 2-Button Scroll Mouse	DC369A
	HP USB Optical Travel Mouse	RH304AA
	HP Bluetooth PC Card Mouse	RJ316AA

### Memory

Support for up to 4096 MB of 667-MHz DDR2 SDRAM  
Two DIMM slots  
DIMM sizes supported: 512 MB, 1024 MB, and 2048 MB

- Standard Memory**
- 512 MB (512 MB x 1)
  - 1024 MB (1024 MB x 1 or 512 MB x 2)
  - 2048 MB (2048 MB x 1 or 1024 MB x 2)
  - 4096 MB (2048 MB x 2)

**Optional Memory Upgrades** Support for up to 4096 MB of memory is available (with the installation of optional DDR2 SDRAM memory kits). Both memory slots are user accessible. Please refer to the Hardware and Software Guide for installation procedures. Maximized dual-channel performance requires SODIMMs of the same size and speed in both memory slots.

Up to	Slot 1	Slot 2
1024 MB	1024 MB	Empty
1024 MB	512 MB	512 MB
1536 MB	1024 MB	512 MB
2048 MB	1024 MB	1024 MB
4096 MB	2048 MB	2048 MB

**NOTE:** This chart does not represent all possible memory configurations. Due to the non-industry standard nature of some third-party memory modules, we strongly recommend using only HP branded memory modules to ensure compatibility. If you mix memory speeds, the system will perform at the lower memory speed. Full availability of 4 GB of memory requires Windows Vista Business 64-bit 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.

<b>Memory Upgrades</b>	HP 512-MB (DDR2 667 MHz) SODIMM	EM993AA
	HP 1024-MB (DDR2 667 MHz) SODIMM	EM994AA
	HP 2048-MB (DDR2 667 MHz) SODIMM	EM995AA

### Storage

#### Removable Media Drive Support

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	Quantity Supported	Drive Bay
DVD-ROM Drive	One	Fixed optical drive bay
DVD/CD-RW Combo Drive	One	Fixed optical drive bay
DVD+/-RW SuperMulti DL Drive	One	Fixed optical drive bay
DVD+/-RW SuperMulti DL LightScribe Drive	One	Fixed optical drive bay

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#### Hard Drive Support

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	Quantity Supported	Drive Bay
<b>Primary Hard Drives</b>		
250-GB 5400 rpm SMART SATA Hard Drive	One	Dedicated hard drive bay
160-GB 5400 rpm SMART SATA Hard Drive	One	Dedicated hard drive bay
120-GB 5400 rpm SMART SATA Hard Drive	One	Dedicated hard drive bay
80-GB 5400 rpm SMART SATA Hard Drive	One	Dedicated hard drive bay
120-GB 7200 rpm SMART SATA Hard Drive	One	Dedicated hard drive bay
80-GB 7200 rpm SMART SATA Hard Drive	One	Dedicated hard drive bay

### Technical Specifications

<b>System Unit</b>	<b>Dimensions (HxWxD)</b>	1.4 in (at front) x 14.1 in x 10.4 in 34.9 mm (at front) x 357.0 mm x 265.0 mm
	<b>Weight</b>	Starting at 5.7 lb (2.59 kg)
	<b>NOTE:</b> Height varies depending upon where on the notebook the measurement is made. Weight varies by configuration and components. Weight includes 6-cell battery, 80-GB hard drive, and optical drive. Weight varies by configuration and components.	
	<b>Stand-Alone Power Requirements (AC Power)</b>	Nominal Operating Voltage 18.5 V Average Operating Power 12.5 W Max Operating Power < 90 W
	<b>Temperature</b>	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)
	<b>Relative Humidity</b>	Operating 10% to 90%, non-condensing Non-operating 5% to 95%, 101.6° F (38.7° C) maximum wet bulb temperature
	<b>Shock</b>	Operating 125 G, 2 ms, half-sine Non-operating 200 G, 2 ms, half-sine
	<b>Random Vibration</b>	Operating 0.75 grms Non-operating 1.50 grms
	<b>Altitude (unpressurized)</b>	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)
	<b>Industry Standard Certifications</b>	UL Yes CSA Yes FCC Compliance Yes ENERGY STAR® 4.0 Yes ICES Yes GS Yes Australia / NZ A-Tick Compliance Yes CCC Yes Japan VCCI Compliance Yes MIC Yes BSMI Yes CE Marking Compliance Yes BNCI or BELUS Yes CIT Yes GOST Yes Saudi Arabian Compliance (ICCP) Yes SABS Yes UKRSERTCOMPUTER Yes



### Technical Specifications

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

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<b>HP 90W Smart AC Adapter</b>	<b>Dimensions</b>	5.24 x 2.28 x 1.1 in (13.3 x 5.8 x 2.9 cm)	
	<b>Weight</b>	0.86 lb (390 g)	
	<b>Input</b>	Input	100 to 240 VAC
		Input Efficiency	83% min at 115 VAC
		Input frequency range	47 to 63 Hz
		Input AC current	1.5 A at 90 VAC, 0.75 A at 180 VAC PFC Version 2.4 A at 90 VAC, 1.2 A at 180 VAC NON PFC Version
	<b>Output</b>	Output power	90W
		DC output	18.5V
		Hold-up time	5 msec at 115 VAC input
		Output current limit	<11A, Over voltage protection- 29V max automatic shutdown
	<b>Connector</b>	3 pin/grounded, mates with interchangeable cords	
	<b>Environmental Design</b>	Operating temperature	32° to 104° F (0° to 40° C)
		Non-operating (storage) temperature	-4° to 149° F (-20° to 65° C)
		Altitude	0 to 10,000 ft (0 to 3,048 m)
		Humidity	20% to 80%
	Storage Humidity	10% to 90%	
<b>EMI and Safety Certifications</b>	CE Mark – full compliance with LVD and EMC directives; Worldwide safety standards – IEC60950, EN60950, UL60950, Class1, SELV; Agency approvals – C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE; MTBF- over 200,000 hours at 25°C ambient condition.		

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<b>Optional HP Ultra-Capacity Battery</b>	<b>Dimensions (H x W x L)</b>	1.3 x 6.0 x 10.6 in (3.33 x 15.25 x 26.88 cm)	
	<b>Weight</b>	1.77 lb (0.803 kg)	
	<b>Cells/Type</b>	12-cell Lithium-Ion	
	<b>Energy</b>	Watt-hour Capacity 95Wh	
	<b>Temperature</b>	Operating (Charging)	32° to 113° F (0° to 45° C)
		Operating (Discharging)	14° to 140° F (-10° to 60° C)
		Non-operating	-4° to 140° F (-20° to 60° C)
	<b>Battery Re-Charge Time</b>	Smart Adapter	3 to 4 hours
		System ON	4 to 5 hours (depending on system power consumption)
<b>Fuel Gauge</b>	When pressed, LEDs light indicating level of charge remaining on battery		

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### Technical Specifications

<b>Optional HP Extended Life Battery</b>	<b>Dimensions (H x W x L)</b>	1.0 x 3.9 x 8.7 in (2.5 x 10.0 x 22.0 cm)	
	<b>Weight</b>	1.00 lb (0.455 kg)	
	<b>Cells/Type</b>	8-cell Lithium-Ion	
	<b>Energy</b>	Watt-hour Capacity	52Wh
	<b>Temperature</b>	Operating (Charging)	32° to 113° F (0° to 45° C)
		Operating (Discharging)	14° to 140° F (-10° to 60° C)
		Non-operating	-4° to 140° F (-20° to 60° C)
	<b>Battery Re-Charge Time</b>	System in OFF mode or Standby	3 hours
		System ON	3 to 5 hours (depending on system power consumption)
		HP Fast Charge	Charges the battery up to 90% within 90 minutes when system is OFF
<b>Fuel Gauge</b>	When pressed, LEDs light indicating level of charge remaining on battery		

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<b>6-Cell (55Whr) Lithium-Ion battery</b>	<b>Dimensions (H x W x L)</b>	0.8 x 2.1 x 8.0 in (2.0 x 5.3 x 20.3 cm)	
	<b>Weight</b>	0.737 lb (0.335 kg)	
	<b>Cells/Type</b>	6-cell Lithium-Ion	
	<b>Energy</b>	Watt-hour Capacity	55Wh
	<b>Temperature</b>	Operating (Charging)	32° to 113° F (0° to 45° C)
		Operating (Discharging)	14° to 140° F (-10° to 60° C)
		Non-operating	-4° to 140° F (-20° to 60° C)
	<b>Battery Re-Charge Time</b>	System in OFF Mode or Standby	2.5 hours
System ON		3 to 5 hours (depending on system power consumption)	
HP Fast Charge		Charges the battery up to 90% within 90 minutes when system is OFF	

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### Technical Specifications

<b>6-Cell (47Whr) Lithium-Ion battery</b>	<b>Dimensions (H x W x L)</b>	0.8 x 2.1 x 8.0 in (2.0 x 5.3 x 20.3 cm)	
	<b>Weight</b>	0.715 lb (0.325 kg)	
	<b>Cells/Type</b>	6-cell Lithium-Ion	
	<b>Energy</b>	Watt-hour Capacity	47Wh
	<b>Temperature</b>	Operating (Charging)	32° to 113° F (0° to 45° C)
		Operating (Discharging)	14° to 140° F (-10° to 60° C)
		Non-operating	-4° to 140° F (-20° to 60° C)
	<b>Battery Re-Charge Time</b>	System in OFF Mode or Standby	2.5 hours
		System ON	3 to 5 hours (depending on system power consumption)
		HP Fast Charge	Charges the battery up to 90% within 90 minutes when system is OFF

<b>15.4-inch WSXGA+ wide-viewing angle, anti-glare</b>	<b>Dimensions (W x H)</b>	13.0 x 8.1 in (33.1 x 20.7 cm)	
	<b>Diagonal Size</b>	15.4 in (39.1 cm)	
	<b>Surface Treatment</b>	Anti-glare	
	<b>Contrast Ratio</b>	300:1 (typical)	
	<b>Refresh Rate</b>	60 Hz	
	<b>Brightness</b>	200 nit (typical)	
	<b>Pixel Resolution</b>	<b>Pitch</b>	0.197 mm
		<b>Format</b>	1680 x 1050
		<b>Configuration</b>	RGB stripe
	<b>Backlight</b>	CCFL	
<b>PPI</b>	129		
<b>Viewing Angle</b>	±60° Horizontal, ± 50° Vertical (minimum)		

### Technical Specifications

<b>15.4-inch WXGA anti-glare</b>	<b>Active Area (W x H)</b>	13.0 x 8.1 in (33.1 x 20.7 cm)	
	<b>Diagonal Size</b>	15.4 in (39.1 cm)	
	<b>Surface Treatment</b>	Anti-glare	
	<b>Contrast Ratio</b>	300:1 (typical)	
	<b>Refresh Rate</b>	60 Hz	
	<b>Brightness</b>	200 nit (typical)	
	<b>Pixel Resolution</b>	<b>Pitch</b>	0.259 mm
		<b>Format</b>	1280 x 800
		<b>Configuration</b>	RGB stripe
		<b>Backlight</b>	CCFL
	<b>PPI</b>	98	
	<b>Viewing Angle</b>	±30° Horizontal, ±10° Vertical (minimum)	

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<b>15.4-inch WXGA BrightView</b>	<b>Active Area (W x H)</b>	13.0 x 8.1 in (33.1 x 20.7 cm)	
	<b>Diagonal Size</b>	15.4 in (39.1 cm)	
	<b>Surface Treatment</b>	BrightView	
	<b>Contrast Ratio</b>	300:1 (typical)	
	<b>Refresh Rate</b>	60 Hz	
	<b>Brightness</b>	200 nit (typical)	
	<b>Pixel Resolution</b>	<b>Pitch</b>	0.259 mm
		<b>Format</b>	1280 x 800
		<b>Configuration</b>	RGB stripe
		<b>Backlight</b>	CCFL
	<b>PPI</b>	98	
	<b>Viewing Angle</b>	±30° Horizontal, ±10° Vertical (minimum)	

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### Hard Drives

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### Technical Specifications

<b>120-GB 7200 rpm SATA</b>	<b>Drive Weight</b>	0.25 lb (113 g)	
	<b>Capacity</b>	120 GB	
	<b>Height</b>	0.37 in (9.5 mm)	
	<b>Width</b>	2.75 in (70 mm)	
	<b>Interface</b>	ATA-7 / SATA 1.0a	
	<b>Transfer Rate</b>	<b>Synchronous</b> (maximum) 100 MB/s (Drive Capability)	
	<b>Seek Time</b> (typical reads, including settling)	<b>Single Track</b>	1 ms
		<b>Average</b>	10 ms
		<b>Maximum</b>	18 ms
	<b>Rotational Speed</b>	7200 rpm	
	<b>Logical Blocks</b>	234,441,648	
	<b>Operating Temperature</b>	41° to 140° F (5° to 60° C) [case temp]	
<b>Features</b>	ATA Security		

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<b>80-GB 7200 rpm SATA</b>	<b>Drive Weight</b>	0.25 lb (113 g)	
	<b>Capacity</b>	80 GB	
	<b>Height</b>	0.37 in (9.5 mm)	
	<b>Width</b>	2.75 in (70 mm)	
	<b>Interface</b>	ATA-7 / SATA 1.0a	
	<b>Transfer Rate</b>	<b>Synchronous</b> (maximum) 100 MB/s (Drive Capability)	
	<b>Seek Time</b> (typical reads, including settling)	<b>Single Track</b>	1 ms
		<b>Average</b>	10 ms
		<b>Maximum</b>	18 ms
	<b>Rotational Speed</b>	7200 rpm	
	<b>Logical Blocks</b>	156,301,488	
	<b>Operating Temperature</b>	41° to 140° F (5° to 60° C) [case temp]	
<b>Features</b>	ATA Security		

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### Technical Specifications

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<b>250-GB 5400 rpm SATA</b>	<b>Drive Weight</b>	0.22 lb (101 g)	
	<b>Capacity</b>	250 GB	
	<b>Height</b>	0.37 in (9.5 mm)	
	<b>Width</b>	2.75 in (70 mm)	
	<b>Interface</b>	ATA-7 / SATA 1.0a	
	<b>Transfer Rate</b>	<b>Synchronous</b> (maximum) 100 MB/s (Drive Capability)	
	<b>Seek Time</b> (typical reads, including settling)	<b>Single Track</b>	3 ms
		<b>Average</b>	13 ms
		<b>Maximum</b>	24 ms
	<b>Rotational Speed</b>	5400 rpm	
	<b>Logical Blocks</b>	488,397,168	
	<b>Operating Temperature</b>	41° to 140° F (5° to 60° C) [case temp]	
	<b>Features</b>	ATA Security	

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<b>160-GB 5400 rpm SATA</b>	<b>Drive Weight</b>	0.22 lb (101 g)	
	<b>Capacity</b>	160 GB	
	<b>Height</b>	0.37 in (9.5 mm)	
	<b>Width</b>	2.75 in (70 mm)	
	<b>Interface</b>	ATA-7 / SATA 1.0a	
	<b>Transfer Rate</b>	<b>Synchronous</b> (maximum) 100 MB/s (Drive Capability)	
	<b>Seek Time</b> (typical reads, including settling)	<b>Single Track</b>	3 ms
		<b>Average</b>	13ms
		<b>Maximum</b>	24 ms
	<b>Rotational Speed</b>	5400 rpm	
	<b>Logical Blocks</b>	312,581,808	
	<b>Operating Temperature</b>	41° to 140° F (5° to 60° C) [case temp]	
	<b>Features</b>	ATA Security	

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### Technical Specifications

<b>120-GB 5400 rpm SATA</b>	<b>Drive Weight</b>	0.22 lb (101 g)	
	<b>Capacity</b>	120 GB	
	<b>Height</b>	0.37 in (9.5 mm)	
	<b>Width</b>	2.75 in (70 mm)	
	<b>Interface</b>	ATA-7 / SATA 1.0a	
	<b>Transfer Rate</b>	<b>Synchronous</b> (maximum) 100 MB/s (Drive Capability)	
	<b>Seek Time</b> (typical reads, including settling)	<b>Single Track</b>	3 ms
		<b>Average</b>	13 ms
		<b>Maximum</b>	24 ms
	<b>Rotational Speed</b>	5400 rpm	
	<b>Logical Blocks</b>	234,441,648	
	<b>Operating Temperature</b>	41° to 140° F (5° to 60° C) [case temp]	
	<b>Features</b>	ATA Security	

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<b>80-GB 5400 rpm SATA</b>	<b>Drive Weight</b>	0.22 lb (101 g)	
	<b>Capacity</b>	80 GB	
	<b>Height</b>	0.37 in (9.5 mm)	
	<b>Width</b>	2.75 in (70 mm)	
	<b>Interface</b>	ATA-7 / SATA 1.0a	
	<b>Transfer Rate</b>	<b>Synchronous</b> (maximum) 100 MB/s (Drive Capability)	
	<b>Seek Time</b> (typical reads, including settling)	<b>Single Track</b>	3 ms
		<b>Average</b>	13 ms
		<b>Maximum</b>	24 ms
	<b>Rotational Speed</b>	5400 rpm	
	<b>Logical Blocks</b>	156,301,488	
	<b>Operating Temperature</b>	41° to 140° F (5° to 60° C) [case temp]	
	<b>Features</b>	ATA Security	

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### Removable Storage Drives

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### Technical Specifications

<b>DVD-ROM Drive</b>	<b>Access Times</b>	Random	<116 ms CD <125 ms DVD
	<b>Max Data Transfer Rate</b>	24X CD-ROM	3,600 KB/s
		8X-DVD	10,800 KB/s
	<b>Transfer Mode</b>	Multiword DMA Mode 2	
	<b>Interface</b>	EIDE	
	<b>Supported Media (read)</b>	CD-DA, CD+(E)G, CD-MIDI, 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	
	<b>Supported Media (write)</b>	None	
	<b>Max Media Capacity (read)</b>	4.7 GB	
	<b>Transport</b>	Tray Loading	

<b>DVD/CD-RW Combo Drive</b>	<b>Access Times</b>	Random	<110 ms CD <130 ms DVD
	<b>Max Data Transfer Rate</b>	24X CD-ROM	3,600 KB/s
		8X DVD	10,800 KB/s
		24X CD-R	3,600 KB/s
		24X CD-RW	3,600 KB/s
	<b>Transfer Mode</b>	Multiword DMA Mode 2	
	<b>Interface</b>	EIDE	
	<b>Supported Media (read)</b>	CD-DA, CD+(E)G, CD-MIDI, 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	
	<b>Supported Media (write)</b>	CD-R, CD-RW	
	<b>Max Media Capacity (read)</b>	8.5 GB	
	<b>Max Media Capacity (write)</b>	700 MB	
<b>Transport</b>	Tray loading		



### Technical Specifications

<b>DVD+/-RW SuperMulti DL Drive</b>	<b>Access Times</b>	Random	<175 ms CD <230 ms DVD
	<b>Max Data Transfer Rate</b>	24X CD-ROM	3,600 KB/s
		8X DVD	10,800 KB/s
		24X CD-R	3,600 KB/s
		16X CD-RW	2,400 KB/s
		8X DVD+R	10,800 KB/s
		4X DVD+RW	5,400 KB/s
		8X DVD-R	10,800 KB/s
		4X DVD-RW	5,400 KB/s
		2.4X DVD+R(9)	2,700 KB/s
		5X DVD-RAM	6,750 KB/s
	<b>Transfer Mode</b>	Multiword DMA Mode	
	<b>Interface</b>	EIDE	
	<b>Supported Media (read)</b>	CD-DA, CD+(E)G, CD-MIDI, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW, DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW, DVD-RAM	
<b>Supported Media (write)</b>	CD-R, CD-RW, DVD+R, DVD+RW, DVD-R, DVD-RW, DVD-RAM		
<b>Max Media Capacity (read)</b>	8.5 GB		
<b>Max Media Capacity (write)</b>	8.5 GB		
<b>Transport</b>	Tray Loading		

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<b>DVD+/-RW SuperMulti DL LightScribe Drive</b>	<b>Access Times</b>	Random	<175 ms CD <230 ms DVD
	<b>Max Data Transfer Rate</b>	24X CD-ROM	3,600 KB/s
		8X DVD	10,800 KB/s
		24X CD-R	3,600 KB/s
		16X CD-RW	2,400 KB/s
		8X DVD+R	10,800 KB/s
		4X DVD+RW	5,400 KB/s
		8X DVD-R	10,800 KB/s
		4X DVD-RW	5,400 KB/s
		2.4X DVD+R(9)	2,700 KB/s
		5X DVD-RAM	6,750 KB/s
	<b>Transfer Mode</b>	Multiword DMA Mode	
	<b>Interface</b>	EIDE	

### Technical Specifications

<b>Supported Media</b> (read)	CD-DA, CD+(E)G, CD-MIDI, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW, DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW, DVD-RAM
<b>Supported Media</b> (write)	CD-R, CD-RW, DVD+R, DVD+RW, DVD-R, DVD-RW, DVD-RAM, LightScribe
<b>Max Media Capacity</b> (read)	8.5 GB
<b>Max Media Capacity</b> (write)	8.5 GB
<b>Transport</b>	Tray Loading

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

### Audio

<b>Hardware</b>	<b>Implementation</b>	ADI1981HD High Definition CODEC
	<b>Touch-Sensitive Volume Controls</b>	Volume up, volume down, and mute
	<b>Full Duplex</b>	Yes
	<b>Sound Blaster Pro compatible</b>	Yes
	<b>Microphone In</b>	Stereo
	<b>Headphone/Line Out</b>	Stereo
	<b>Integrated Microphone</b>	Yes

### Technical Specifications

<b>Audio Output Quality</b>	<b>Frequency Response</b>	20 Hz – 20 kHz
	<b>Signal to Noise Ratio</b>	>85 dB
	<b>Total Harmonic Distortion</b>	0.01%
	<b>Noise Floor</b>	-110 dB
	<b>Play/Record Sampling Rate(s)</b>	8 kHz – 48kHz
	<b>DAC</b>	16, 20 or 24-bit
	<b>ADC</b>	16 or 20-bit

<b>Integrated Stereo Speakers</b>	<b>Power Rating</b>	2 Watts
	<b>Impedance</b>	4 Ohms

### Communications

<b>Integrated Broadcom NetLink Gigabit Ethernet Controller (10/100/1000 NIC)</b>	<b>Ethernet Features</b>	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 802.3z and 802.3ab; IEEE 802.3 clauses 34-42) 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 802.3x Flow Control (IEEE 802.3 clauses 31-32; configurable)	
	<b>Power Management</b>	ACPI compliant -- multiple power modes Situation-sensitive features reduce power consumption	
	<b>Performance Features</b>	TCP/IP/UDP Checksum Offload (configurable)	
	<b>Manageability</b>	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	
	<b>Interface</b>	PCI Express x1	
	<b>NIC Device Driver Name</b>	Broadcom NetLink Gigabit Ethernet	
	<b>Drivers Available</b>	Microsoft Windows Vista Microsoft Windows XP	

### Technical Specifications

<b>V.92 56K Data/Fax Modem Form Factor</b>	MDC 1.5 Daughtercard
<b>Power Management Support</b>	APM Revision 1.2, ACPI
<b>Approvals/Certifications</b>	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
<b>Data Mode Capabilities</b>	V.92 data V.8bis V.80 V44, V.42bis, MNP5 (Compression) V.42 (LAPM, MNP2-4) (Error Correction) <b>Optional symbol rates:</b> 2800, 3429 Asymmetric Symbol rates <b>Synchronous primary channel data signaling rates:</b> 3600, 31200 Automatic rate re-negotiation V.34 V.32bis V.32 V.23 V.22bis V.22 V.21 Bell 212A Bell 103J
<b>Fax Mode Capabilities</b>	TIA/EIA-578-B (Class 1) T.30, T.4 (Group 3) V.17 V.29 V.27ter V.21 Channel 2
<b>Command Set</b>	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

<b>HP ev2200 1xEV-DO Broadband Wireless Module</b>	<b>Band and Power Class</b>	0 (North American Cellular) – Class III; 1 (North American PCS) – Class II
	<b>Wireless Protocol Standards</b>	CDMA 1x Release 0/A; IS-95A, IS-95B, IS-2000
	<b>Wireless Parametric Standards</b>	Meets or exceeds TIA/EIA IS-98-D
	<b>Interoperability</b>	CDG 22 (TIA/EIA/IS-95-A) CDG 53(TIA/EIA/IS-95-B) C.S0031 (TIA/EIA/IS-2000) CDG 64 (TIA/EIA/IS-2000) C.S0032 (TIA/EIA/IS-866)
	<b>Frequency Band</b>	Dual Band: 850 MHz (Cellular) and 1900 MHz (PCS)
	<b>Data Rates (Packet Mode)</b>	IS-856 rates up to 2.4 Mbps IS-2000 data rates up to 307.2 kbps
	<b>Maximum Output Power</b>	24dBm (+/-1)
	<b>Power Consumption (maximum)</b>	500mA
	<b>Power Consumption, Sleep Mode</b>	1.7mA – 3.5mA
	<b>Power Management</b>	USB selective suspend CDMA slotted mode sleep and dormant modes
	<b>Antenna Type</b>	High efficiency dual band antennae with spatial diversity, mounted in the display enclosure
	<b>Form Factor</b>	PCI-Express MiniCard
	<b>Weight</b>	0.35 oz (10 g)
	<b>Dimensions (Length x Width x Thickness)</b>	2.01 x 1.18 x 0.18 in (51 x 30 x 4.5 mm)
	<b>Voltage, Operating</b>	3.3v +/- 10%
	<b>Temperature, Operating (from TIA/EIA/IS-98-D)</b>	-22° to 140° F (-30° to 60° C) (full RF performance) -22° to 167° F (-30° to 75° C) (reduced RF performance)
	<b>Temperature, Non-operating, 96 hours (from MIL-STD 202 Method 108)</b>	-40° to 185° F (-40° to 85° C)
	<b>Humidity, Non-operating</b>	85% relative humidity for 48 hours @ 185° F (85° C) (non-condensing)
	<b>Configuration Utilities</b>	Verizon Wireless VZAccess Manager
	<b>LED Activity</b>	LED Off – Radio Off; Solid LED On – Radio On

### Technical Specifications

<b>HP ev2210 1xEVDO-A Broadband Wireless Module</b>	<b>Band and Power Class</b>	0 (North American Cellular) – Class III; 1 (North American PCS) – Class II
	<b>Wireless Protocol Standards</b>	CDMA 1x Release A; IS-95A, IS-95B, IS-2000
	<b>Wireless Parametric Standards</b>	Meets or exceeds TIA/EIA IS-98-D
	<b>Interoperability</b>	CDG 22 (TIA/EIA/IS-95-A) CDG 53(TIA/EIA/IS-95-B) C.S0031 (TIA/EIA/IS-2000) CDG 64 (TIA/EIA/IS-2000) C.S0032 (TIA/EIA/IS-866)
	<b>Frequency Band</b>	Dual Band: 800 MHz (Cellular) and 1900 MHz (PCS)
	<b>Data Rates (Packet Mode)</b>	IS-856 rates up to 3.1 Mbps IS-2000 data rates up to 1.8 Mbps
	<b>Maximum Output Power</b>	24dBm (+/-1)
	<b>Power Consumption (maximum)</b>	500mA
	<b>Power Consumption, Sleep Mode</b>	1.7mA – 3.5mA
	<b>Power Management</b>	USB selective suspend CDMA slotted mode sleep and dormant modes
	<b>Antenna Type</b>	High efficiency dual band antennae with spatial diversity, mounted in the display enclosure
	<b>Form Factor</b>	PCI-Express MiniCard
	<b>Weight</b>	0.35 oz (10 g)
	<b>Dimensions (Length x Width x Thickness)</b>	2.01 x 1.18 x 0.18 in (51 x 30 x 4.5 mm)
	<b>Voltage, Operating</b>	3.3v +/- 10%
	<b>Temperature, Operating (from TIA/EIA/IS-98-D)</b>	-22° to 140° F (-30° to 60° C) (full RF performance) -22° to 167° F (-30° to 75° C) (reduced RF performance)
	<b>Temperature, Non-operating, 96 hours (from MIL-STD 202 Method 108)</b>	-40° to 185° F (-40° to 85° C)
	<b>Humidity, Non-operating</b>	85% relative humidity for 48 hours @ 185° F (85° C) (non-condensing)
	<b>Configuration Utilities</b>	Verizon Wireless VZAccess Manager
	<b>LED Activity</b>	LED Off – Radio Off; Solid LED On – Radio On
<b>HP hs2300 HSDPA Broadband Wireless Module</b>	<b>Frequency Bands and Power Class</b>	850/1900/2100MHz WCDMA Power class 3 (+24dBm) 850MHz GSM/GPRS/EDGE 900MHz GSM/GPRS/EDGE, 1800MHz GSM/GPRS/EDGE 1900MHz GSM/GPRS/EDGE

### Technical Specifications

	EDGE E2 power GPRS/EDGE Multislot Class 12 GPRS PCS/DCS power class 1 GSM power class 4
<b>Wireless Protocol Standards</b>	GPRS/EDGE: 3GPP R99 GERAN P1 WCDMA Release 5 (R5) High-Speed Downlink Packet Access (HSDPA) 3.6Mbps GSM Phase 2+
<b>Wireless Parametric Standards</b>	Complies with 3GPP specifications
<b>Additional Standards Compliance</b>	FCC parts 15/22/24, CE, Microsoft WHQL, R&TTE directive 1999/5/EC (health, safety, EMC, spectrum), GCF-CC (Module), European Union Directive 2002/95/EC (restrictions of the use of certain Hazardous Substances (RoHS) in electronic equipment), Infrastructure Interoperability Testing (IOT)
<b>Data Rates</b> (Packet Mode)	Designed maximum data rate: EDGE 118 kbps UL / 236 kbps DL UMTS 384 kbps UL / 384 kbps DL HSDPA 384 kbps UL / 3.6 Mbps DL
<b>Chipset and Module</b>	Qualcomm MSM6280 chipset; Sierra Wireless MC8775 module
<b>Maximum Output Power</b>	32 dBm (+/-2) GSM/EDGE GMSK mode
<b>Power Consumption</b> (maximum)	800mA
<b>Power Consumption, Sleep Mode</b>	4 – 8mA
<b>Power Management</b>	USB Selective Suspend sleep and standby mode
<b>Antenna Type</b>	High efficiency 5- band antennae, mounted in the display enclosure
<b>Form Factor</b>	PCI-Express MiniCard
<b>Weight</b>	0.35 oz (10 g)
<b>Dimensions</b> (Length x Width x Thickness)	2.01 x 1.18 x 0.18 in (51 x 30 x 4.5 mm)
<b>Voltage, Operating</b>	3.3v +/- 10%
<b>Temperature, Operating</b>	-22° to 140° F (-30° to 60° C) (full RF performance) -22° to 167° F (-30° to 75° C) (reduced RF performance)
<b>Temperature, Non-operating, 96 hours</b> (from MIL-STD 202 Method 108)	-40° to 185° F (-40° to 85° C)
<b>Humidity, Non-operating</b>	85% relative humidity for 48 hours @ 185° F (85° C) (non-condensing)
<b>LED Activity</b>	LED Off – Radio Off; Solid LED On – Radio On
<b>Configuration Utilities</b>	Varies per country and mobile network operator

Intel PRO/Wireless  
3945ABG Network

**Wireless LAN Standards** IEEE 802.11a  
IEEE 802.11b



### Technical Specifications

#### Connection

<b>Interoperability</b>	IEEE 802.11g Wi-Fi certified Cisco Compatible Extensions Program compliant with Microsoft Windows 2000 and XP (details at <a href="http://www.hp.com/go/notebooks/WLAN">http://www.hp.com/go/notebooks/WLAN</a> )	
<b>Frequency Band</b>	2.4 GHz	
<b>Data Rates</b>	802.11b: 1, 2, 5.5, 11 Mbps 802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps	
<b>Modulation</b>	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM	
<b>Security<sup>1</sup></b>	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, EAP-SIM.  Support for Cisco Security Features (proven compatibility with Cisco Aironet infrastructure products through the Cisco Compatible Extensions Program Version 4).	
<b>Sub-channels</b>	Multinational support with frequency bands and channels compliant to local regulations.	
<b>Media Access Protocol</b>	CSMA/CA (Collision Avoidance) with ACK	
<b>Network Architecture Models</b>	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)	
<b>Roaming</b>	IEEE 802.11 compliant roaming between access points	
<b>Output Power (for CCK)<sup>2</sup></b>	15 dBm	
<b>Output Power (for OFDM; power varies by data rate)<sup>2</sup></b>	15 dBm	
<b>Power Consumption</b>	Transmit: 1.8 Watts (max) Receive: 1.4 Watts (max) Idle mode <sup>3</sup> : 150 mW (nominal) Sleep mode: 30 mW (max)	
<b>Power Management</b>	ACPI compliant power management 802.11 compliant power saving mode	
<b>Receiver Sensitivity<sup>4</sup></b>	54 Mbps: -72 dBm, 11 Mbps: -88 dBm, 1 Mbps: -97 dBm	
<b>Antenna Connections</b>	2 U.FL type connectors, 50 ohm nominal impedance	
<b>Range</b>	802.11 a – Typical (@6 Mbps)	600 feet – Outdoor Open Area 150 feet – Indoor, Office environment
	802.11 b – Typical (@1 Mbps)	1200 feet – Outdoor Open Area 300 feet – Indoor, Office environment
	802.11 g – Typical (@1 Mbps)	1200 feet – Outdoor Open Area 300 feet – Indoor, Office environment
<b>Form Factor</b>	PCI-Express MiniCard	
<b>Weight</b>	0.013 lb (6 g)	
<b>Dimensions</b>	0.19 x 1.2 x 2.0 in (4.75 x 29.85 x 50.8 mm)	
<b>Operating Voltage</b>	3.3V +/- 9%, 1.5V +/- 5%	
<b>Temperature</b>	Operating	32° to 176° F (0° to 80° C)
	Non-operating	-40° to 176° F (-40° to 80° C)



### Technical Specifications

<b>Humidity</b>	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 95% (non-condensing)
<b>Altitude</b>	Operating	0 to 10,000 ft (3,048 m)
	Non-operating	0 to 50,000 ft (15,240 m)
<b>Configuration Utility<sup>5</sup></b>	Microsoft Windows 2000 or XP Choice of Configuration Utility:	
	<ul style="list-style-type: none"> <li>• Microsoft Windows XP Wireless Network Connection Manager</li> <li>• Intel PROSet for Microsoft Windows 2000 or XP (required for Cisco Compatible Extensions support)</li> </ul>	
	Microsoft Windows Vista	
<b>LED Activity</b>	<ul style="list-style-type: none"> <li>• Microsoft Windows Vista Wireless Network Connection Manager</li> </ul>	
	LED Off – Radio OFF; Solid LED On – Radio ON	
<ol style="list-style-type: none"> <li>1. Check latest software/driver release for updates on supported security features.</li> <li>2. Maximum output power may vary by country according to local regulations.</li> <li>3. In Power Save Polling mode.</li> <li>4. 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).</li> <li>5. WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows 2000 or XP. WLAN may also be compatible with certain third-party software suppliers.</li> </ol>		

### Intel PRO/Wireless 3945BG Network Connection

<b>Wireless LAN Standards</b>	IEEE 802.11b IEEE 802.11g
<b>Interoperability</b>	Wi-Fi certified Cisco Compatible Extensions Program compliant with Microsoft Windows 2000 and XP (details at <a href="http://www.hp.com/go/notebooks/WLAN">http://www.hp.com/go/notebooks/WLAN</a> )
<b>Frequency Band</b>	2.4 GHz
<b>Data Rates</b>	802.11b: 1, 2, 5.5, 11 Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
<b>Modulation</b>	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM
<b>Security<sup>1</sup></b>	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, EAP-SIM.  Support for Cisco Security Features (proven compatibility with Cisco Aironet infrastructure products through the Cisco Compatible Extensions Program Version 4).
<b>Sub-channels</b>	Multinational support with frequency bands and channels compliant to local regulations.
<b>Media Access Protocol</b>	CSMA/CA (Collision Avoidance) with ACK
<b>Network Architecture Models</b>	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
<b>Roaming</b>	IEEE 802.11 compliant roaming between access points

### Technical Specifications

<b>Output Power</b> (for CKK) <sup>2</sup>	15 dBm
<b>Output Power</b> (for OFDM; power varies by data rate) <sup>2</sup>	15 dBm
<b>Power Consumption</b>	Transmit: 1.8 Watts (max) Receive: 1.4 Watts (max) Idle mode <sup>3</sup> : 150 mW (nominal) Sleep mode: 30 mW (max)
<b>Power Management</b>	ACPI compliant power management 802.11 compliant power saving mode
<b>Receiver Sensitivity</b> <sup>4</sup>	54 Mbps: -72 dBm, 11 Mbps: -88 dBm, 1 Mbps: -97 dBm
<b>Antenna Connections</b>	2 U.FL type connectors, 50 ohm nominal impedance
<b>Range</b>	802.11 b – Typical (@1 Mbps) 1200 feet – Outdoor Open Area 300 feet – Indoor, Office environment 802.11 g – Typical (@1 Mbps) 1200 feet – Outdoor Open Area 300 feet – Indoor, Office environment
<b>Form Factor</b>	PCI-Express MiniCard
<b>Weight</b>	0.013 lb (6 g)
<b>Dimensions</b>	0.19 x 1.2 x 2.0 in (4.75 x 29.85 x 50.8 mm)
<b>Operating Voltage</b>	3.3V +/- 9%, 1.5V +/- 5%
<b>Temperature</b>	Operating 32° to 176° F (0° to 80° C) Non-operating -40° to 176° F (-40° to 80° C)
<b>Humidity</b>	Operating 10% to 90% (non-condensing) Non-operating 5% to 95% (non-condensing)
<b>Altitude</b>	Operating 0 to 10,000 ft (3,048 m) Non-operating 0 to 50,000 ft (15,240 m)
<b>Configuration Utility</b> <sup>5</sup>	Microsoft Windows 2000 or XP Choice of Configuration Utility: <ul style="list-style-type: none"><li>● Microsoft Windows XP Wireless Network Connection Manager</li><li>● Intel PROSet for Microsoft Windows 2000 or XP (required for Cisco Compatible Extensions support)</li></ul> Microsoft Windows Vista <ul style="list-style-type: none"><li>● Microsoft Windows Vista Wireless Network Connection Manager</li></ul>
<b>LED Activity</b>	LED Off – Radio OFF; Solid LED On – Radio ON

1. Check latest software/driver release for updates on supported security features.
2. Maximum output power may vary by country according to local regulations.
3. In Power Save Polling mode.
4. 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).
5. WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows 2000 or XP. WLAN may also be compatible with certain third-party software suppliers.

Intel Wireless WiFi Link Wireless LAN Standards IEEE 802.11a



### Technical Specifications

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	IEEE 802.11b IEEE 802.11g IEEE 802.11n (draft 1.02)
<b>Interoperability</b>	Wi-Fi certified (802.11abg only) Cisco Compatible Extensions Program compliant (802.11abg only) with Microsoft Windows 2000 and XP (details at <a href="http://www.hp.com/go/notebooks/WLAN">http://www.hp.com/go/notebooks/WLAN</a> ) Tested with wireless access points from several major manufacturers (details at <a href="http://www.hp.com/go/notebooks/WLAN/draft-n">http://www.hp.com/go/notebooks/WLAN/draft-n</a> )
<b>Frequency Band</b>	2.4 GHz and 5 GHz
<b>Data Rates</b>	802.11b: 1, 2, 5.5, 11 Mbps 802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n (draft): 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 (draft) specification
<b>Modulation</b>	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM, BPSK, QPSK, 16-QAM, 64-QAM
<b>Security<sup>1</sup></b>	Supports 64- and 128-bit WEP, WPA, WPA2, hardware-accelerated AES (support for key sizes of 128, 192, and 256 bits), 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 2000 and XP only.
<b>Sub-channels</b>	Multinational support with frequency bands and channels compliant to local regulations.
<b>Media Access Protocol</b>	CSMA/CA (Collision Avoidance) with ACK
<b>Network Architecture Models</b>	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
<b>Roaming</b>	IEEE 802.11 compliant roaming between access points
<b>Output Power (for CCK)<sup>2</sup></b>	15 dBm
<b>Output Power (for OFDM; power varies by data rate)<sup>2</sup></b>	15 dBm
<b>Power Consumption</b>	Transmit: 2.3 Watts (average, with two spatial streams) Receive: 1.9 Watts (average with three receive chains) Idle mode <sup>3</sup> : 30 mW (average) Radio off: 20 mW (max)
<b>Power Management</b>	ACPI compliant power management 802.11 compliant power saving mode
<b>Receiver Sensitivity<sup>4</sup></b>	300 Mbps: -68 dBm, 54 Mbps: -74 dBm, 6 Mbps: -90 dBm
<b>Antenna Connections</b>	3 U.FL type connectors, 50 ohm nominal impedance
<b>Range</b>	802.11 a – Typical                      600 feet – Outdoor Open Area (@6 Mbps)                                      150 feet – Indoor, Office environment  802.11 b – Typical                      1200 feet – Outdoor Open Area (@1 Mbps)                                      300 feet – Indoor, Office environment

### Technical Specifications

	802.11 g – Typical (@1 Mbps)	1200 feet – Outdoor Open Area 300 feet – Indoor, Office environment
<b>Form Factor</b>	PCI-Express MiniCard	
<b>Weight</b>	0.013 lb (6 g)	
<b>Dimensions</b>	0.19 x 1.2 x 2.0 in (4.75 x 29.85 x 50.8 mm)	
<b>Operating Voltage</b>	3.3V +/- 9%, 1.5V +/- 5%	
<b>Temperature</b>	Operating	32° to 176° F (0° to 80° C)
	Non-operating	-40° to 176° F (-40° to 80° C)
<b>Humidity</b>	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 90% (non-condensing)
<b>Altitude</b>	Operating	0 to 10,000 ft (3,048 m)
	Non-operating	0 to 50,000 ft (15,240 m)
<b>Configuration Utility<sup>5</sup></b>	Microsoft Windows 2000 or XP Choice of Configuration Utility: <ul style="list-style-type: none"><li>• Microsoft Windows XP Wireless Network Connection Manager</li><li>• Intel PROSet for Microsoft Windows 2000 or XP (required for Cisco Compatible Extensions support)</li></ul>	
	Microsoft Windows Vista <ul style="list-style-type: none"><li>• Microsoft Windows Vista Wireless Network Connection Manager</li></ul>	
<b>LED Activity</b>	LED Off – Radio OFF; Solid LED On – Radio ON <ol style="list-style-type: none"><li>1. Check latest software/driver release for updates on supported security features.</li><li>2. Maximum output power may vary by country according to local regulations.</li><li>3. In Power Save Polling mode and on battery power.</li><li>4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).</li><li>5. WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows 2000 or XP. WLAN may also be compatible with certain third-party software suppliers.</li></ol>	

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<b>Intel Wireless WiFi Link 4965AG</b>	<b>Wireless LAN Standards</b>	IEEE 802.11a IEEE 802.11b IEEE 802.11g
	<b>Interoperability</b>	Wi-Fi certified Cisco Compatible Extensions Program compliant with Microsoft Windows 2000 and XP (details at <a href="http://www.hp.com/go/notebooks/WLAN">http://www.hp.com/go/notebooks/WLAN</a> )
	<b>Frequency Band</b>	2.4 GHz and 5 GHz
	<b>Data Rates</b>	802.11b: 1, 2, 5.5, 11 Mbps 802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
	<b>Modulation</b>	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM
	<b>Security<sup>1</sup></b>	Supports 64- and 128-bit WEP, WPA, WPA2, hardware-accelerated AES (support for key sizes of 128, 192, and 256 bits), 802.1x authentication types EAP-TLS, EAP-TTLS, PEAP-GTC, PEAP-MSCHAPv2, LEAP, EAP-FAST.

### Technical Specifications

	Support for Cisco Security Features (proven compatibility with Cisco Aironet infrastructure products through the Cisco Compatible Extensions Program Version 4) with Microsoft Windows 2000 and XP only.	
<b>Sub-channels</b>	Multinational support with frequency bands and channels compliant to local regulations.	
<b>Media Access Protocol</b>	CSMA/CA (Collision Avoidance) with ACK	
<b>Network Architecture Models</b>	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)	
<b>Roaming</b>	IEEE 802.11 compliant roaming between access points	
<b>Output Power (for CKK)<sup>2</sup></b>	15 dBm	
<b>Output Power (for OFDM; power varies by data rate)<sup>2</sup></b>	15 dBm	
<b>Power Consumption</b>	Transmit: 1.6 Watts (average) Receive: 1.1 Watts (average) Idle mode <sup>3</sup> : 30 mW (average) Radio off: 20 mW (max)	
<b>Power Management</b>	ACPI compliant power management 802.11 compliant power saving mode	
<b>Receiver Sensitivity<sup>4</sup></b>	54 Mbps: -74 dBm, 6 Mbps: -90 dBm	
<b>Antenna Connections</b>	2 U.FL type connectors, 50 ohm nominal impedance	
<b>Range</b>	802.11 a – Typical (@6 Mbps)	600 feet – Outdoor Open Area 150 feet – Indoor, Office environment
	802.11 b – Typical (@1 Mbps)	1200 feet – Outdoor Open Area 300 feet – Indoor, Office environment
	802.11 g – Typical (@1 Mbps)	1200 feet – Outdoor Open Area 300 feet – Indoor, Office environment
<b>Form Factor</b>	PCI-Express MiniCard	
<b>Weight</b>	0.013 lb (6 g)	
<b>Dimensions</b>	0.19 x 1.2 x 2.0 in (4.75 x 29.85 x 50.8 mm)	
<b>Operating Voltage</b>	3.3V +/- 9%, 1.5V +/- 5%	
<b>Temperature</b>	Operating	32° to 176° F (0° to 80° C)
	Non-operating	-40° to 176° F (-40° to 80° C)
<b>Humidity</b>	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 90% (non-condensing)
<b>Altitude</b>	Operating	0 to 10,000 ft (3,048 m)
	Non-operating	0 to 50,000 ft (15,240 m)

### Technical Specifications

<b>Configuration Utility<sup>5</sup></b>	Microsoft Windows 2000 or XP Choice of Configuration Utility: <ul style="list-style-type: none"> <li>● Microsoft Windows XP Wireless Network Connection Manager</li> <li>● Intel PROSet for Microsoft Windows 2000 or XP (required for Cisco Compatible Extensions support)</li> </ul>
	Microsoft Windows Vista <ul style="list-style-type: none"> <li>● Microsoft Windows Vista Wireless Network Connection Manager</li> </ul>
<b>LED Activity</b>	LED Off – Radio OFF; Solid LED On – Radio ON <ol style="list-style-type: none"> <li>1. Check latest software/driver release for updates on supported security features.</li> <li>2. Maximum output power may vary by country according to local regulations.</li> <li>3. In Power Save Polling mode and on battery power.</li> <li>4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).</li> <li>5. WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows 2000 or XP. WLAN may also be compatible with certain third-party software supplicants.</li> </ol>

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<b>Broadcom 4311AG 802.11a/b/g WiFi Adapter</b>	<b>Wireless LAN Standards</b>	IEEE 802.11a IEEE 802.11b IEEE 802.11g
	<b>Interoperability</b>	Wi-Fi certified Cisco Compatible Extensions Program compliant with Microsoft Windows 2000 and XP (details at <a href="http://www.hp.com/go/notebooks/WLAN">http://www.hp.com/go/notebooks/WLAN</a> )
	<b>Frequency Band</b>	2.4 GHz and 5 GHz
	<b>Data Rates</b>	802.11b: 1, 2, 5.5, 11 Mbps 802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
	<b>Modulation</b>	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM
	<b>Security<sup>1</sup></b>	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).
	<b>Sub-channels</b>	Multinational support with frequency bands and channels compliant to local regulations.
	<b>Media Access Protocol</b>	CSMA/CA (Collision Avoidance) with ACK
	<b>Network Architecture Models</b>	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
	<b>Roaming</b>	IEEE 802.11 compliant roaming between access points
	<b>Output Power (for CKK)<sup>2</sup></b>	17.5 dBm
	<b>Output Power (for OFDM; power varies by data rate)<sup>2</sup></b>	15 dBm

### Technical Specifications

<b>Power Consumption</b>	Transmit: 2.0 W (max) Receive: 1.5 W (max) Idle mode <sup>3</sup> : 390 mW (nominal) Sleep mode: 20 mW (max)	
<b>Power Management</b>	ACPI compliant power management 802.11 compliant power saving mode	
<b>Receiver Sensitivity<sup>4</sup></b>	54 Mbps: -72 dBm, 11 Mbps: -88 dBm , 1 Mbps: -97 dBm	
<b>Antenna type</b>	High efficiency dual band antenna with spatial diversity, mounted in the display enclosure	
<b>Range</b>	802.11 a – Typical (@6 Mbps)	600 feet – Outdoor Open Area 150 feet – Indoor, Office environment
	802.11 b – Typical (@1 Mbps)	1200 feet – Outdoor Open Area 300 feet – Indoor, Office environment
	802.11 g – Typical (@1 Mbps)	1200 feet – Outdoor Open Area 300 feet – Indoor, Office environment
<b>Form Factor</b>	PCI-Express MiniCard	
<b>Weight</b>	0.026 lb (12 g)	
<b>Dimensions</b>	0.19 x 1.2 x 2.0 in (4.75 x 29.85 x 50.8 mm)	
<b>Operating Voltage</b>	3.3v +/- 10%	
<b>Temperature</b>	Operating	32° to 176° F (0° to 80° C)
	Non-operating	-40° to 176° F (-40° to 80° C)
<b>Humidity</b>	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 95% (non-condensing)
<b>Altitude</b>	Operating	0 to 10,000 ft (3,048 m)
	Non-operating	0 to 50,000 ft (15,240 m)
<b>Configuration Utility<sup>5</sup></b>	Microsoft Windows 2000 or XP Choice of Configuration Utility: <ul style="list-style-type: none"><li>● Microsoft Windows XP Wireless Network Connection Manager</li><li>● Broadcom Wireless Configuration Utility (required for Cisco Compatible Extensions support)</li></ul> Microsoft Windows Vista <ul style="list-style-type: none"><li>● Microsoft Windows Vista Wireless Network Connection Manager</li></ul>	
<b>LED Activity</b>	LED Off – Radio OFF; Solid LED On – Radio ON	
	<ol style="list-style-type: none"><li>1. Check latest software/driver release for updates on supported security features.</li><li>2. Maximum output power may vary by country according to local regulations.</li><li>3. In Power Save Polling mode.</li><li>4. 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).</li><li>5. WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows 2000 or XP. WLAN may also be compatible with certain third-party software suppliers.</li></ol>	

**Broadcom 4311BG  
802.11b/g WiFi Adapter**

**Wireless LAN Standards** IEEE 802.11b  
IEEE 802.11g



### Technical Specifications

<b>Interoperability</b>	Wi-Fi certified Cisco Compatible Extensions Program compliant with Microsoft Windows 2000 and XP (details at <a href="http://www.hp.com/go/notebooks/WLAN">http://www.hp.com/go/notebooks/WLAN</a> )	
<b>Frequency Band</b>	2.4 GHz	
<b>Data Rates</b>	802.11b: 1, 2, 5.5, 11 Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps	
<b>Modulation</b>	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM	
<b>Security<sup>1</sup></b>	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).	
<b>Sub-channels</b>	Multinational support with frequency bands and channels compliant to local regulations.	
<b>Media Access Protocol</b>	CSMA/CA (Collision Avoidance) with ACK	
<b>Network Architecture Models</b>	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)	
<b>Roaming</b>	IEEE 802.11 compliant roaming between access points	
<b>Output Power (for CCK)<sup>2</sup></b>	17.5 dBm	
<b>Output Power (for OFDM; power varies by data rate)<sup>2</sup></b>	15 dBm	
<b>Power Consumption</b>	Transmit: 2.0 W (max) Receive: 1.5 W (max) Idle mode <sup>3</sup> : 390 mW (nominal) Sleep mode: 20 mW (max)	
<b>Power Management</b>	ACPI compliant power management 802.11 compliant power saving mode	
<b>Receiver Sensitivity<sup>4</sup></b>	54 Mbps: -72 dBm, 11 Mbps: -88 dBm , 1 Mbps: -97 dBm	
<b>Antenna type</b>	High efficiency dual band antenna with spatial diversity, mounted in the display enclosure	
<b>Range</b>	802.11 b – Typical (@1 Mbps)	1200 feet – Outdoor Open Area 300 feet – Indoor, Office environment
	802.11 g – Typical (@1 Mbps)	1200 feet – Outdoor Open Area 300 feet – Indoor, Office environment
<b>Form Factor</b>	PCI-Express MiniCard	
<b>Weight</b>	0.026 lb (12 g)	
<b>Dimensions</b>	0.19 x 1.2 x 2.0 in (4.75 x 29.85 x 50.8 mm)	
<b>Operating Voltage</b>	3.3v +/- 10%	
<b>Temperature</b>	Operating	32° to 176° F (0° to 80° C)
	Non-operating	-40° to 176° F (-40° to 80° C)
<b>Humidity</b>	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 95% (non-condensing)



### Technical Specifications

<b>Altitude</b>	Operating	0 to 10,000 ft (3,048 m)
	Non-operating	0 to 50,000 ft (15,240 m)
<b>Configuration Utility<sup>5</sup></b>	Microsoft Windows 2000 or XP Choice of Configuration Utility:	
	<ul style="list-style-type: none"> <li>• Microsoft Windows XP Wireless Network Connection Manager</li> <li>• Broadcom Wireless Configuration Utility (required for Cisco Compatible Extensions support)</li> </ul>	
	Microsoft Windows Vista	
	<ul style="list-style-type: none"> <li>• Microsoft Windows Vista Wireless Network Connection Manager</li> </ul>	
<b>LED Activity</b>	LED Off – Radio OFF; Solid LED On – Radio ON	
	<ol style="list-style-type: none"> <li>1. Check latest software/driver release for updates on supported security features.</li> <li>2. Maximum output power may vary by country according to local regulations.</li> <li>3. In Power Save Polling mode.</li> <li>4. 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).</li> <li>5. WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows 2000 or XP. WLAN may also be compatible with certain third-party software supplicants.</li> </ol>	

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<b>Broadcom 4321AGN 802.11a/b/g/draft-n WiFi Adapter</b>	<b>Wireless LAN Standards</b>	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n (draft)
	<b>Interoperability</b>	Wi-Fi certified (802.11abg only) Cisco Compatible Extensions Program compliant (802.11abg only) with Microsoft Windows 2000 and XP (details at <a href="http://www.hp.com/go/notebooks/WLAN">http://www.hp.com/go/notebooks/WLAN</a> ) Tested with wireless access points from several major manufacturers (details at <a href="http://www.hp.com/go/notebooks/WLAN/draft-n">http://www.hp.com/go/notebooks/WLAN/draft-n</a> )
	<b>Frequency Band</b>	2.4 GHz and 5 GHz
	<b>Data Rates</b>	802.11b: 1, 2, 5.5, 11 Mbps 802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n (draft): 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 Mbps
	<b>Frequency Support</b>	20 MHz: 2.4 GHz and 5 GHz bands 40 MHz: 5 GHz band only
	<b>Modulation</b>	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM, BPSK, QPSK, 16-QAM, 64-QAM
	<b>Security<sup>1</sup></b>	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 2000 and XP only.

### Technical Specifications

<b>Sub-channels</b>	Multinational support with frequency bands and channels compliant to local regulations.	
<b>Media Access Protocol</b>	CSMA/CA (Collision Avoidance) with ACK	
<b>Network Architecture Models</b>	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)	
<b>Roaming</b>	IEEE 802.11 compliant roaming between access points	
<b>Output Power (for CKK)<sup>2</sup></b>	17 dBm	
<b>Output Power (for OFDM; power varies by data rate)<sup>2</sup></b>	15 dBm	
<b>Power Consumption</b>	Idle associated: 300 mW Idle unassociated: 150 mW Transmit/Receive 20 MHz channel: 2.6 W (max) Transmit/Receive 40 MHz channel: 3.3 W (max)	
<b>Power Management</b>	ACPI compliant power management 802.11 compliant power saving mode	
<b>Receiver Sensitivity<sup>3</sup></b>	270 Mbps: -66dBm, 162 Mbps: -72 dBm, 54 Mbps: -72 dBm, 11 Mbps: -85 dBm , 1 Mbps: -94 dBm	
<b>Antenna type</b>	High efficiency dual band antenna with spatial diversity, mounted in the display enclosure	
<b>Range</b>	802.11 a – Typical (@6 Mbps)	600 feet – Outdoor Open Area 150 feet – Indoor, Office environment
	802.11 b – Typical (@1 Mbps)	1200 feet – Outdoor Open Area 300 feet – Indoor, Office environment
	802.11 g – Typical (@1 Mbps)	1200 feet – Outdoor Open Area 300 feet – Indoor, Office environment
<b>Form Factor</b>	PCI-Express MiniCard	
<b>Weight</b>	0.026 lb (12 g)	
<b>Dimensions</b>	0.19 x 1.2 x 2.0 in (4.75 x 29.85 x 50.8 mm)	
<b>Operating Voltage</b>	3.3v +/- 10%	
<b>Temperature</b>	Operating	14° to 149° F (–10° to 65° C)
	Non-operating	–40° to 176° F (–40° to 80° C)
<b>Humidity</b>	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 95% (non-condensing)
<b>Altitude</b>	Operating	0 to 10,000 ft (3,048 m)
	Non-operating	0 to 50,000 ft (15,240 m)

### Technical Specifications

<b>Configuration Utility<sup>4</sup></b>	<p>Microsoft Windows 2000 or XP Choice of Configuration Utility:</p> <ul style="list-style-type: none"> <li>• Microsoft Windows XP Wireless Network Connection Manager</li> <li>• Broadcom Wireless Configuration Utility (required for Cisco Compatible Extensions support)</li> </ul> <p>Microsoft Windows Vista</p> <ul style="list-style-type: none"> <li>• Microsoft Windows Vista Wireless Network Connection Manager</li> </ul>
<b>LED Activity</b>	<p>LED Off – Radio OFF; Solid LED On – Radio ON</p> <ol style="list-style-type: none"> <li>1. Check latest software/driver release for updates on supported security features.</li> <li>2. Maximum output power may vary by country according to local regulations.</li> <li>3. 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).</li> <li>4. WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows 2000 or XP. WLAN may also be compatible with certain third-party software supplicants.</li> </ol>

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<b>HP Integrated Module with Bluetooth Wireless Technology</b>	<b>Bluetooth Specification</b>	2.0 Compliant
	<b>Dimensions</b>	1.02 x 0.55 x 0.22 in (26 x 14 x 5.7 mm)
	<b>Frequency Band</b>	2402 to 2480 MHz
	<b>Number of Available Channels</b>	79 (1 MHz) available channels
	<b>Data Rates and Throughput</b>	3 Mbps data rate; throughput up to 2.17 Mbps Synchronous Connection Oriented links up to 3, 64 kbps, voice channels Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric or 1306.9 kbps symmetric
	<b>Transmit Power</b>	-6 dBm to 4 dBm (Bluetooth Class II)
	<b>Receiver Sensitivity</b>	Better than -80 dBm at 0.1 % raw bit error rate
	<b>Power Consumption</b>	Peak (Tx) 264 mW Peak (Rx) 231 mW Sleep <1 mW
	<b>Antenna</b>	Internally integrated within module
	<b>Range</b>	Up 33 ft (10 m)
	<b>Electrical Interface</b>	USB 2.0 compliant Microsoft Windows Plug and Play compliant
	<b>OS Support</b>	Genuine Windows Vista Genuine Windows XP Genuine Windows 2000
	<b>Bluetooth Software Supported</b>	Broadcom Bluetooth for Windows Microsoft Windows XP Bluetooth Software
	<b>Link Topology</b>	Point to Point, Multipoint Pico Nets up to 7 slaves
<b>Security</b>	Full support of Bluetooth Security Provisions	

### Technical Specifications

<b>Power Management</b>	Microsoft Windows ACPI, and USB Bus Support Self configurable to optimize power conservation in all operating modes, including Standby, Hold, Park, and Sniff
<b>Certifications</b>	All necessary regulatory approvals for supported countries, including: FCC (47 CFR) Part 15C, Section 15.247 & 15.249 ETS 300 328, ETS 300 826 Low Voltage Directive IEC950 UL, CSA, and CE Mark
<b>Temperature</b>	Operating -4° to 158° F (-20° to 70° C) Non-operating -40° to 176° F (-40° to 80° C)
<b>Humidity</b>	Operating 10% to 90% Non-operating 5% to 95%
<b>Altitude</b>	Operating 15,000 ft (4,572 m) Non-operating 40,000 ft (12,192 m)
<b>Bluetooth Profiles Supported</b>	(with Bluetooth for Windows 4.0 software) Serial Port Profile (SPP)* Dial-Up Networking (DUN)* Generic Object Exchange Profile (GOEP) Object Push Profile (OPP)* File Transfer Profile (FTP) Synchronization Profile (SYNC) Hard Copy Cable Replacement (HCRP)* Personal Area Networking Profile (PAN)* Human Interface Device Profile (HID)* FAX Profile (FAX) Basic Imaging Profile (BIP) Headset Profile (HSP) Hands Free Profile (HFP) Advanced Audio Distribution Profile (A2DP)

\* indicates the profile is also supported by Microsoft Windows XP SP2

### Technical Specifications

#### Environmental Data

#### Eco-Label Certifications

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:

- ENERGY STAR 4.0
- US Federal Energy Management Program (FEMP)
- Taiwan Green Mark
- China Energy Conservation Program (CECP)
- IT ECO declaration
- Korean Eco Label

#### System Configuration

The configuration used for the Energy Consumption and Declared Noise Emissions data is based on a "Typically Configured Notebook"

#### Energy Consumption

	115 VAC	230 VAC	100 VAC
Normal Operation	13.92 W	13.95 W	13.65 W
Sleep (Energy Star low power mode)	0.9 W	1.11 W	0.87 W
Off	1.19 W	1.4 W	1.18 W

#### Heat Dissipation\*

	115 VAC	230 VAC	100 VAC
Normal Operation	47.495 BTU/hr	47.597 BTU/hr	46.573 BTU/hr
Sleep	3.07 BTU/hr	3.787 BTU/hr	2.968 BTU/hr
Off	4.06 BTU/hr	4.776 BTU/hr	4.026 BTU/hr

\* Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

This product is in compliance with US executive order 13221, WOL (wake on LAN) disabled.

#### Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)

Idle  
Operating mode (HDD)

#### Sound Power (LWAd, bels)

3.1  
3.1

#### Sound Pressure (LpAm, decibels)

21.4  
22.2

#### Batteries

This product complies with ISO standards:

- EU Directive 91/ 157/ EEC
- EU Directive 93/ 86/ EEC
- EU Directive 98/ 101/ EEC

Batteries used in the product do not contain:

- Mercury greater the 5ppm by weight
- Cadmium greater than 10ppm by weight
- Lead greater than 4000 ppm by weight.

The battery type and chemistry used in the product is:

CR2032 (coin cell), Lithium  
6 cell rechargeable Lithium-Ion battery; optional 8 cell Lithium-Ion battery available

#### Additional

This product is in compliance with the EU Restrictions of Hazardous

### Technical Specifications

#### information:

Substances (RoHS) Directive – 2002/95/EC.

This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.

Keyboard complies with ISO standard: ISO 9995, EN 29241-4, and ISO/IEC 15412

Input devices of this product comply with ISO 9241, part 9.

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

This product contains 0% recycled materials (by wt.)

This product is greater than 95% recyclable when properly disposed of at end of life.

#### Packaging Materials

- Corrugated / Paper – 2.41 lb (1094 g)
- EPE Foam – 0.112 lb (51 g)
- LDPE Bag – 0.011 lb (5 g)
- The corrugated paper packaging materials contains at least 40% 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](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

### Technical Specifications

- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- Nickel – finishes must not be used on the external surface designed to be frequently handled or carried by the user.
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Biphenyl Ethers (PBBEs)
- Polybrominated Biphenyl Oxides (PBBOs)
- 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)

#### **End-of-life Management and Recycling**

HP offers our customers several other options for handling their aging computers while also minimizing the impact on the environment—including product trade-in and leasing services—in addition to recycling services.

Please go to: <http://www.hp.com/recycle> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

#### **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>

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