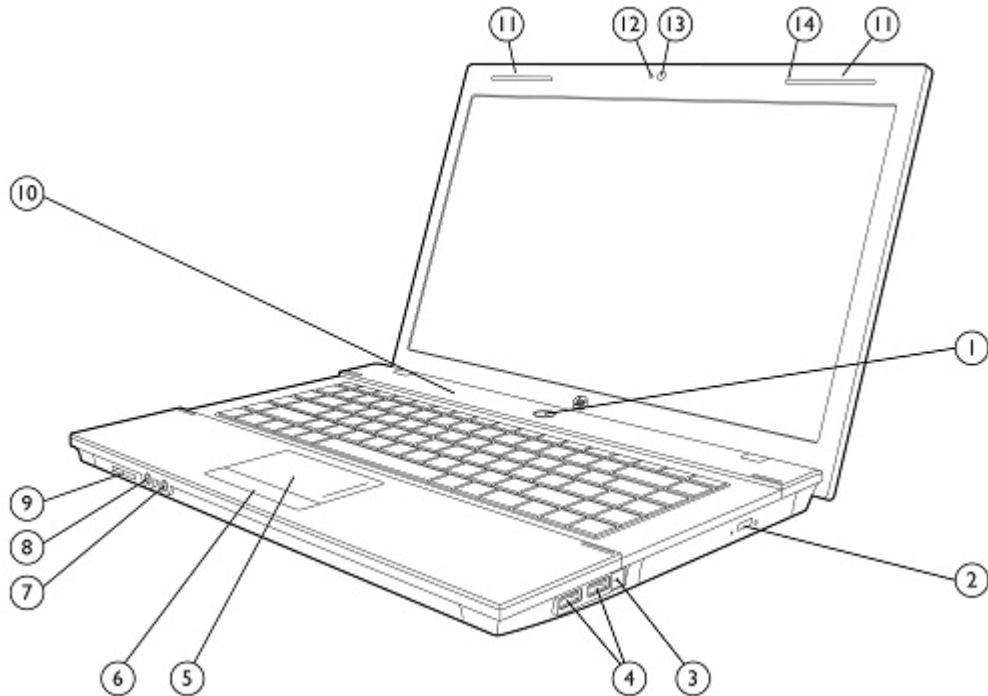
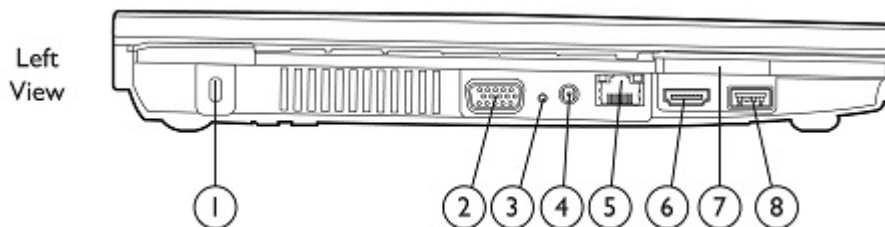


Overview



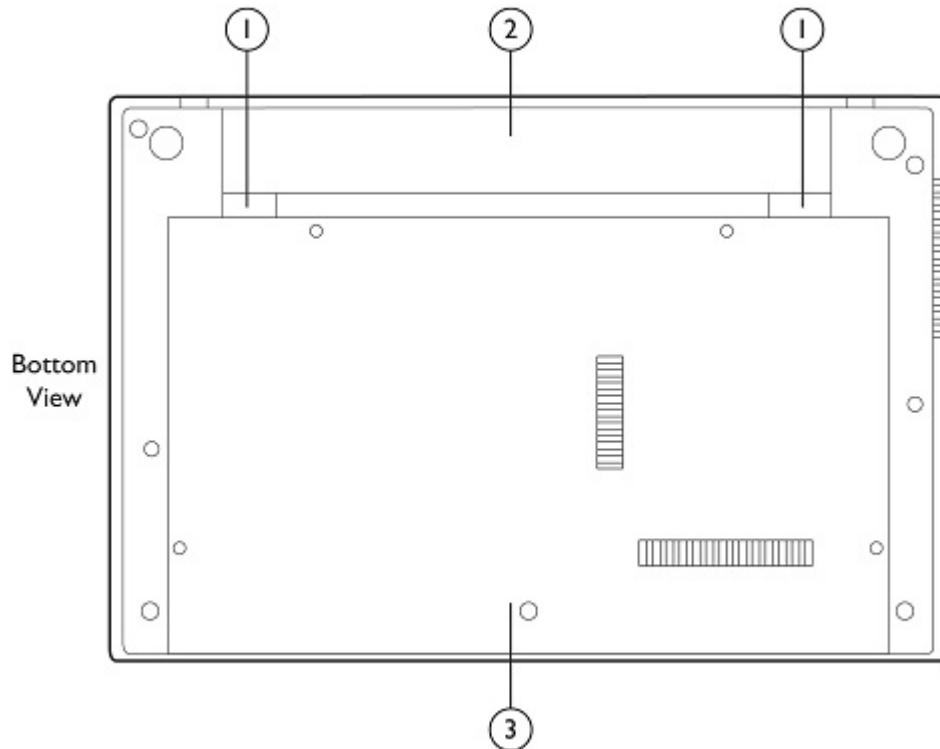
- | | |
|------------------------------------|---|
| 1. Power button with LED indicator | 8. Stereo headphone/line out |
| 2. Optical drive* | 9. Secure Digital (SD) slot |
| 3. Optional RJ-11/modem port | 10. Speaker |
| 4. Two USB 2.0 ports | 11. Dual-band wireless LAN antennas |
| 5. Touchpad with scroll zone | 12. Webcam LED (works with optional webcam) |
| 6. Touchpad button | 13. Optional 2 MP webcam |
| 7. Stereo microphone in | 14. Integrated microphone |

* Select models only



- | | |
|-----------------------------------|------------------------|
| 1. Kensington lock slot | 5. RJ-45/Ethernet port |
| 2. VGA/external monitor connector | 6. HDMI port |
| 3. Battery charging LED indicator | 7. ExpressCard/34 slot |
| 4. Power connector | 8. USB 2.0 port |

Overview



1. Battery release latches
2. Battery bay
3. Memory/WLAN/Hard drive compartment

At A Glance

- Genuine Windows 7 versions, Genuine Windows Vista versions, SUSE Linux, Red Flag Linux (PRC only), or FreeDOS*
- Durable, stylish design with microfiber pattern in stone color
- Full-sized spill-resistant keyboard
- New keyboard function keys on HP 620 for play, rewind, and fast-forward of video and audio files
- HDMI port for connecting to high-resolution displays
- Optional integrated 2 MP webcam, integrated microphone
- Integrated 802.11 b/g/n or b/g wireless LAN module**
- Bluetooth® 3.0 + High Speed (HS)**
- Choice of 9-cell or 6-cell battery to customize weight and run-time to your needs
- Widescreen 15.6-inch or 14.0-inch diagonal LED-backlit HD display with 16:9 aspect ratio, BrightView optional
- Intel® Core™2 Duo processor, Intel Pentium® processor, or Intel Celeron® processor

* Operating system options vary by country.

** Select models only

Standard Features (availability may vary by country)

Processors

Intel Core 2 Duo Processor P7370 (2.0 GHz, 3 MB L2 cache, 1066 MHz FSB)* †
 Intel Core 2 Duo Processor T6670 (2.2 GHz, 2 MB L2 cache, 800 MHz FSB)* †
 Intel Core 2 Duo Processor T6570 (2.1 GHz, 2 MB L2 cache, 800 MHz FSB)* †
 Intel Pentium Processor T4500 (2.3 GHz, 1 MB L2 cache, 800 MHz FSB)* ††
 Intel Pentium Processor T4400 (2.2 GHz, 1 MB L2 cache, 800 MHz FSB)* ††
 Intel Pentium Processor T4300 (2.1 GHz, 1 MB L2 cache, 800 MHz FSB)* ††
 Intel Pentium Processor T4200 (2.0 GHz, 1 MB L2 cache, 800 MHz FSB)* ††
 Intel Celeron Processor 900 (2.20 GHz, 1 MB L2 cache, 800 MHz FSB)* ††
 Intel Celeron Processor T3300 (2.00 GHz, 1 MB L2 cache, 800 MHz FSB)* ††
 Intel Celeron Processor T3000 (1.80 GHz, 1 MB L2 cache, 800 MHz FSB)* ††
 Intel Celeron Processor T1600 (1.66 GHz, 1 MB L2 cache, 667 MHz FSB)* ††

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

† Requires Mobile Intel GM45 or PM 45 Express Chipset.

†† Requires Mobile Intel GL40 or PM45 Express Chipset.

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

Operating System

Preinstalled

Genuine Windows 7 Professional 64*
 Genuine Windows 7 Professional 32*
 Genuine Windows 7 Home Premium 64*
 Genuine Windows 7 Home Premium 32*
 Genuine Windows 7 Home Basic 32*
 Genuine Windows 7 Starter 32*
 Genuine Windows Vista Home Basic 32**
 SUSE Linux Enterprise Desktop 11
 Red Flag Linux (PRC only)
 FreeDOS

Supported

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

Certified

SUSE Linux Enterprise Desktop 11

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

Standard Features (availability may vary by country)

Chipset

Models with integrated graphics:
Mobile Intel GL40 Express Chipset with ICH9M
or Mobile Intel GM45 Express Chipset with ICH9M
Models with discrete graphics:
Mobile Intel PM45 Express Chipset with ICH9M

Graphics

Models with Mobile Intel GL40 Express Chipset and Mobile Intel GM45 Express Chipset:
Mobile Intel Graphics Media Accelerator 4500MHD

Models with Mobile Intel PM45 Express Chipset:
ATI Mobility Radeon HD 4350 discrete graphics with 512 MB dedicated video memory and HyperMemory support

Microsoft DirectX 10.1 (discrete), 10 (integrated) capable

Display

Internal

HP 420:
14.0-inch diagonal LED-backlit HD 16:9 widescreen antiglare
(1366 x 768)
14.0-inch diagonal LED-backlit HD 16:9 widescreen BrightView
(1366 x 768)

HP 620:
15.6-inch diagonal LED-backlit HD 16:9 widescreen anti-glare
(1366 x 768 resolution)
15.6-inch diagonal LED-backlit HD 16:9 widescreen BrightView
(1366 x 768 resolution)

External

Up to 32-bit per pixel color depth
VGA port supports resolutions up to 1600 x 1200 at 75 Hz, and lower resolutions at up to 100 Hz
HDMI 1.3 port supports direct connection to high-definition displays with up to 1920 x 1080 resolution and 7-channel audio with one convenient cable (not included).
NOTE: Resolutions are dependent upon monitor capability, and resolution and color depth settings.

Standard Features (availability may vary by country)

Memory	Standard	DDR3 SDRAM (1066 MHz/1333 MHz)* Two SODIMM slots supporting dual-channel memory 1024 MB and 2048 MB SODIMMs Standard memory up to 4096 MB
	Maximum	Upgradeable to 8192 MB with optional 4096 MB SODIMMs in slots 1 and 2
	Dual-channel	Maximized dual-channel performance requires SODIMMs of the same size and speed in both memory slots.

* Maximum memory speed supported by the system is 1066 MHz.

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 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.

Communications	Realtek Ethernet Integrated Controller (10/100 NIC) Optional 56K V.92 modem*
	* 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 options featuring support for the latest industry standards. Integrated Bluetooth is also available (factory configurable only) and can be combined with any of the supported wireless LAN options.	
	All 802.11 integrated wireless LAN options	Wi-Fi certified* 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
	RALINK RASHI CARD	WIFI + BT3.0 HIGH SPEED (HS)
	Broadcom 4312G 802.11b/g WiFi Adapter	Integrated support for 802.11 b and g Cisco Compatible Extensions support Up to 54 mbps data rate
	Realtek RTL8191SE 802.11b/g/n 1x1 WiFi Adapter	Integrated support for 802.11 b, g, and n Cisco Compatible Extensions support Up to 150 mbps data rate
	Ralink RT3090BC4 802.11b/g/n WiFi and Bluetooth 3.0 HS Combo Adapter	Integrated support for 802.11 b, g, and n Up to 150 mbps data rate Bluetooth 3.0 + High Speed (HS) Works with a wide range of Bluetooth devices
	HP Integrated Module with Bluetooth Wireless Technology	Bluetooth Specification v2.1 compliant Works with a wide range of Bluetooth devices

Standard Features (availability may vary by country)

* In countries where 802.11n is not allowed, this capability is not enabled.

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. International key layouts are available. Other features include 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, comfort-dished keycaps, and bright key legends for improved visibility in low light conditions.

New keyboard hotkeys for play, rewind, and fast-forward of video and audio files.

Pointing device

Touchpad with scroll zone, 1-piece pick button with left and right click functions

Expansion card slots

ExpressCard/34 slot

Supports ExpressCard/34 (34 mm x 75 mm x 5 mm)

Secure Digital slot

Supports SD (Secure Digital), and MultiMediaCard

Storage

Hard drives

160/250/320/500 GB 7200 rpm SMART SATA II
160/250/320/500 GB 5400 rpm SMART SATA II

NOTE: Up to 15 GB is reserved for the system recovery software.

DriveGuard

The hard drive is mounted directly to the notebook frame, reducing the transmission of shock to the hard drive.

Fixed optical drives

DVD ROM Drive
DVD+/-RW SuperMulti DL LightScribe Drive

Interfaces

ExpressCard/34 slot

Supports ExpressCard/34

VGA

One

HDMI

One

Stereo microphone in

One

Stereo headphone/line out

One

Power connector

One

RJ-11/modem (optional)

One

RJ-45/Ethernet

One

USB 2.0

Three

LED status indicators

Six

Standard Features (availability may vary by country)

Audio/Visual

HD audio (HP Premier Sound)

Integrated microphone

Integrated mono speaker

Stereo headphone/line out

Stereo microphone in

Optional 2 MP webcam

- Supports videoconferencing and still image capture
- Improved quality for video streaming and still image capture (1600x1200 resolution)
- Up to 30 frames/sec
- Fixed focus lens
- 16-bit true color (camera sensor up to UXGA resolution)

Software

Preinstalled Software with Windows Operating System

HP Recovery Manager (available with Windows 7 or Vista only)

HP Support Assistant (available with Windows 7 or Vista only)

Antivirus software (may vary by country)*

Microsoft Office 2010 preloaded (purchase of a Product

Key required to activate a full Office 2010 suite)**

HP Webcam Software (select models)

HP Wireless Assistant

Corel Office productivity suite 60-day trial

Roxio Creator Business (select models)

InterVideo WinDVD Player (select models)

* Internet access required. May be Norton or McAfee antivirus software. First 60 days included.

Subscription required for live updates afterwards.

** 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>.

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 15 GB of the hard drive is reserved for the system recovery software.

Security

Standard Features

HP Spare Key

HP Disk Sanitizer

Setup Password

DriveLock

Kensington Lock Slot

Support for Computrace / LoJack for Laptops (must be purchased separately)

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

Standard Features (availability may vary by country)

Power Supply

Models with integrated graphics: External 65-watt AC adapter
Models with discrete graphics: External 90-watt AC adapter
6-foot (1.8-meter) power cord included
Total length including External AC adapter is 12 feet (3.66 meter).
Fast Charge*

* Fast Charge recharges your battery up to 90% within 90 minutes when the system is off. HP Fast Charge does not apply to the HP 9-cell battery.

Battery

HP 6-cell (47 WHr) Li-Ion battery
HP 9-cell (93 WHr) Li-Ion battery

Battery Life

	Integrated graphics	Discrete graphics
Compaq 420		
Primary 9-cell (93 WHr) battery	Up to 10 hrs 30 min	Up to 8 hrs 30 min
Primary 6-cell (47 WHr) battery	Up to 5 hrs 30 min	Up to 4 hrs 15 min
Compaq 620		
Primary 9-cell (93 WHr) battery	Up to 10 hrs	Up to 8 hrs 30 min
Primary 6-cell (47 WHr) battery	Up to 5 hrs 15 min	Up to 5 hrs

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 <http://www.bapco.com/products/mobilemark2007> for additional details.

System Standby Time

Up to 1 week (for 6-cell battery)

Power Conservation

Hibernation
Standby
ACPI compliance

Service and Support

HP Services offers limited 1-year warranty options depending on country; 1-year limited warranty on primary battery. 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>

Options (availability may vary by country)

Memory	HP 1 GB (DDR3 1333 MHz) SODIMM	AT911AA
	HP 2 GB (DDR3 1333 MHz) SODIMM	AT912AA
	HP 4 GB (DDR3 1333 MHz) SODIMM	AT913AA
	* Memory speed is processor dependent.	
Other Storage	HP 250 GB USB Pocket Media Hard Drive	FE477AA
	HP External USB CD/DVD R/RW Drive	FS943AA
Expansion	HP Essential USB 2.0 Port Replicator	AQ731AA#xxx
	HP USB 2.0 Docking Station	FQ834AA#xxx
	HP Basic Adjustable Stand	AL549AA
Modem	HP External USB Modem	GS023AA
Power	65W Smart AC Adapter	ED494AA#xxx
	90W Smart AC Adapter	ED495AA#xxx
	90W Smart Combo Adapter	AJ652AA#xxx
	Primary 6-cell Battery pack	TBD
Carrying Cases	HP Basic Carrying Case	AJ078AA
	HP Basic Backpack	AM863AA
	HP Basic Messenger	AP355AA
	HP Basic Messenger (Bulk 240 pieces)	BC055AA
	HP Value Nylon Case	RR314AA
	HP Universal Nylon Case	RR315AA
	HP Executive Leather Case	RR316AA
	HP Deluxe Nylon Backpack	RR317AA
	HP Deluxe Roller Case	GD405AA
	HP Professional Series Slip Case	AT890AA
Security	HP Compaq Notebook Combo Lock	AY475AA
	HP Privacy Filter For 13.3 in	AU649AA
	HP Privacy Filter For 14.0 in	AU100AA
	HP Privacy Filter For 15.6 in	AU103AA

Options (availability may vary by country)

Input/Output Devices	HP Bluetooth Stereo Headphones	AR084AA
	HP Mobile Audio Speakers	FS944AA
	HP PS/2 Keyboard & Optical Mouse Bundle	RC464AA#xxx
	HP USB Keyboard & Mouse Bundle	RC465AA#xxx
	HP Wireless Optical Mouse	AR085AA
	HP USB-P/S2 Optical Mouse	DC369A
	HP Mobile Productivity Bundle	AQ729AA
	HP Special Edition Optical Mouse	AU094AA#xxx
	HP USB Optical Travel mouse	RH304AA
	HP Promo USB Graphics Adapter	NL571AT
	HP Digital Premium Stereo Headset	KJ270AA
	HP Premium Autofocus Webcam	KQ245AA
	HP Migration Cable for Windows 7	AY493AA
	HP Notebook Multi-Purpose Cleaning Kit	BL528AA#ABA
	HP Notebook Projection Companion	AX325AA
	HP Mobile Productivity Bundle	AQ729AA

Technical Specifications

System Unit	Dimensions (HxWxD)	HP 420: 1.06 (at front) x 13.23 x 8.98 in 27 (at front) x 336 x 228 mm
		HP 620: 1.09 (at front) x 14.64 x 9.83 in 27.5 (at front) x 371.8 x 249.6 mm
Weight		HP 420: Starting at 4.7 lb (2.13 kg) without optical drive Starting at 5.0 lb (2.26 kg) with optical drive
		HP 620: Starting at 5.2 lb (2.36 kg) without optical drive Starting at 5.5 lb (2.49 kg) with optical drive
NOTE: Height varies depending upon where on the notebook the measurement is made. Weight varies by configuration and components. Weight includes 6-cell battery, hard drive, 1 GB memory. Weight varies by configuration and components.		
Stand-Alone Power Requirements (AC Power)	Nominal Operating Voltage	18.5 V
	Average Operating Power	Models with integrated graphics: 18 W Models with discrete graphics: 21 W
Temperature	Max Operating Power	< 65 W or < 90 W
	Operating	32° to 95° F (0° to 35° C) (not writing optical) 41° to 95° F (5° to 35° C) (writing optical)
Relative Humidity	Non-operating	–4° to 140° F (–20° to 60° C)
	Operating	10% to 90%, non-condensing
Shock	Non-operating	5% to 95%, 101.6° F (38.7° C) maximum wet bulb temperature
	Operating	125 G, 2 ms, half-sine
Random Vibration	Non-operating	200 G, 2 ms, half-sine
	Operating	0.75 grms
Altitude (unpressurized)	Non-operating	1.50 grms
	Operating	–50 to 10,000 ft (–15.24 to 3,048 m)
Industry Standard Certifications	Non-operating	–50 to 40,000 ft (–15.24 to 12,192 m)
	UL	Yes
	CSA	Yes
	FCC Compliance	Yes
	ENERGY STAR®	Select models*
	EPEAT	Registered TBD in United States**
	ICES	Yes
	Australia / NZ A-Tick Compliance	Yes
	CCC	Yes
	Japan VCCI Compliance	Yes

Technical Specifications

KCC	Yes
BSMI	Yes
CE Marking Compliance	Yes
BNCI or BELUS	Yes
CIT	Yes
GOST	Yes
Saudi Arabian Compliance (ICCP)	Yes
SABS	Yes
UKRSERTCOMPUTER	Yes

* Configurations of the HP 420 and HP 620 that are ENERGY STAR qualified are identified as HP 420 ENERGY STAR and HP 620 ENERGY STAR on HP websites and on www.energystar.gov.

** EPEAT registration varies by country. See www.epeat.net for registration status by country. EPEAT status listed above applies to U.S.

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

HP 90W AC Adapter	Dimensions	5.00 x 1.97 x 1.1 in (12.7 x 5.0 x 2.9 cm)	
	Weight	0.82 lb (370 g)	
	Input	100 to 240 VAC	
		Input Efficiency	83% min at 115 VAC
		Input frequency range	47 to 63 Hz
	Output	Input AC current	1.5 A at 90 VAC, 0.75 A at 180 VAC PFC Version
		Output power	90W
		DC output	19.0V
		Hold-up time	5 msec at 115 VAC input
		Output current limit	<11A, Over voltage protection- 29V max automatic shutdown
	Connector	3 pin/grounded, mates with interchangeable cords	
	Environmental Design	Operating temperature	32° to 104° F (0° to 40° C)
		Non-operating (storage) temperature	-4° to 149° F (-20° to 65° C)
		Altitude	0 to 10,000 ft (0 to 3,048 m)
		Humidity	20% to 80%
		Storage Humidity	10% to 90%
	EMI and Safety Certifications	CE Mark – full compliance with LVD and EMC directives; Worldwide safety standards – 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.	

Technical Specifications

HP 65W AC Adapter	Dimensions	4.17 x 1.85 x 1.1 in (10.6 x 4.7 x 2.8 cm)	
	Weight	0.62 lb (280 g)	
	Input	100 to 240 VAC	
		Input Efficiency	83% min at 115 VAC
		Input frequency range	47 to 63 Hz
	Output	Input AC current 1.7 A at 90 VAC, 0.85 A at 180 VAC	
		Output power	65W
		DC output	18.5V
		Hold-up time	5 msec at 115 VAC input
		Output current limit <11A, Over voltage protection- 29V max automatic shutdown	
	Connector	3 pin/grounded, mates with interchangeable cords	
	Environmental Design	Operating temperature	32° to 104° F (0° to 40° C)
		Non-operating (storage) temperature	-4° to 149° F (-20° to 65° C)
		Altitude	0 to 10,000 ft (0 to 3,048 m)
		Humidity	20% to 80%
		Storage Humidity	10% to 90%
	EMI and Safety Certifications	CE Mark – full compliance with LVD and EMC directives; Worldwide safety standards – 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.	

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.

Displays

15.6-inch LED HD (1366 x 768) anti-glare	Dimensions (W x H)	13.54 x 7.59 in (34.4 x 19.4 cm)
	Diagonal Size	15.6 in (39.6cm)
	Surface Treatment	Anti-glare
	Contrast Ratio	400:1 (min)
	Refresh Rate	60 Hz
	Brightness	210 nit (typical)
	Pixel Resolution	Pitch 0.252 mm
		Format 1366 x 768
		Configuration RGB Stripe
	Backlight	LED
PPI	101 ppi	
Viewing Angle	±30° Horizontal, ±10° Vertical (minimum) 30/30/20/10 (Left/Right/Down/Up) (minimum) or 45/45/35/25 (Left/Right/Down/Up) (typical)	

15.6-inch LED HD (1366 x 768) BrightView	Dimensions (W x H)	13.54 x 7.59 in (34.4 x 19.4 cm)	
	Diagonal Size	15.6 in (39.6cm)	
	Surface Treatment	BrightView (glossy)	
	Contrast Ratio	500:1 (typical)	
	Refresh Rate	60 Hz	
	Brightness	200 nit (typical)	
	Pixel Resolution	Pitch	0.252 mm
		Format	1366 x 768
		Configuration	RGB Stripe
	Backlight	LED	
PPI	101 ppi		
Viewing Angle	±30° Horizontal, ±10° Vertical (minimum) 30/30/20/10 (Left/Right/Down/Up) (minimum) or 45/45/35/25 (Left/Right/Down/Up) (typical)		

Technical Specifications

14.0-inch LED HD (1366 x 768) anti-glare	Active Area (W x H)	12.74 x 7.56 in (32.4 x 19.2 cm)	
	Diagonal Size	14.0 in (35.6cm)	
	Surface Treatment	Anti-glare	
	Contrast Ratio	400:1 (typical)	
	Refresh Rate	60 Hz	
	Brightness	200 nit (typical)	
	Pixel Resolution	Pitch	0.227 mm
		Format	1366 x 768
		Configuration	RGB Stripe
	Backlight	LED	
	PPI	112 ppi	
	Viewing Angle	±30° Horizontal, ±10° Vertical (minimum) 30/30/20/10 (Left/Right/Down/Up) (minimum) or 45/45/35/25 (Left/Right/Down/Up) (typical)	

14.0-inch LED HD (1366 x 768) BrightView	Active Area (W x H)	12.16 x 6.85 in (30.9 x 17.4 cm)	
	Diagonal Size	14.0 in (35.6cm)	
	Surface Treatment	BrightView (glossy)	
	Contrast Ratio	500:1 (typical)	
	Refresh Rate	60 Hz	
	Brightness	200 nit (typical)	
	Pixel Resolution	Pitch	0.227 mm
		Format	1366 x 768
		Configuration	RGB Stripe
	Backlight	LED	
	PPI	112 ppi	
	Viewing Angle	±30° Horizontal, ±10° Vertical (minimum) 30/30/20/10 (Left/Right/Down/Up) (minimum) or 45/45/35/25 (Left/Right/Down/Up) (typical)	

Internal Storage

Technical Specifications

500 GB 7200 rpm SATA Hard Drive	Drive Weight	0.25 lbs (115g)
	Capacity	500 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) 150 MB/s (Drive Capability)
	Seek Time (typical reads, including settling)	Single Track 1.5ms
		Average 11ms
		Maximum 22ms
	Rotational Speed	7200 rpm
	Logical Blocks	976,773,168
	Operating Temperature	32° to 140° F (0° to 60° C) [case temp]
	Features	ATA Security

320 GB 7200 rpm SATA Hard Drive	Drive Weight	0.25 lbs (115g)
	Capacity	250 GB
	Height	0.37 in (9.5 mm) or on some models 0.28 in (7 mm)
	Width	2.75 in (70 mm)
	Interface	ATA-8, SATA 2.6, 3.0 Gb/s, NCQ
	Transfer Rate	Synchronous (maximum) 150 MB/s (Drive Capability)
	Seek Time (typical reads, including settling)	Single Track 1.5ms
		Average 11ms
		Maximum 22ms
	Rotational Speed	7200 rpm
	Logical Blocks	625,142,448
	Operating Temperature	32° to 140° F (0° to 60° C) [case temp]
	Features	ATA Security

Technical Specifications

250 GB 7200 rpm SATA Hard Drive	Drive Weight	0.25 lbs (115g)
	Capacity	250 GB
	Height	0.37 in (9.5 mm) or on some models 0.28 in (7 mm)
	Width	2.75 in (70 mm)
	Interface	ATA-8, SATA 2.6, 3.0 Gb/s, NCQ
	Transfer Rate	Synchronous (maximum) 150 MB/s (Drive Capability)
	Seek Time (typical reads, including settling)	Single Track 1.5ms
		Average 11ms
		Maximum 22ms
	Rotational Speed	7200 rpm
	Logical Blocks	488,397,168
	Operating Temperature	32° to 140° F (0° to 60° C) [case temp]
	Features	ATA Security

160 GB 7200 rpm SATA Hard Drive	Drive Weight	0.25 lb (115 g)
	Capacity	160 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) 150 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	312,581,808
	Operating Temperature	32° to 140° F (0° to 60° C) [case temp]
	Features	ATA Security

Technical Specifications

500 GB 5400 rpm SATA Hard Drive	Drive Weight	0.22 lb (101 g)
	Capacity	500 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) 150 MB/s (Drive Capability)
	Seek Time (typical reads, including settling)	Single Track 3 ms
		Average 13 ms
		Maximum 24 ms
	Rotational Speed	5400 rpm
	Logical Blocks	976,773,168
	Operating Temperature	32° to 140° F (0° to 60° C) [case temp]
	Features	ATA Security

320 GB 5400 rpm SATA Hard Drive	Drive Weight	0.22 lb (101 g)
	Capacity	320 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) 150 MB/s (Drive Capability)
	Seek Time (typical reads, including settling)	Single Track 3 ms
		Average 13 ms
		Maximum 24 ms
	Rotational Speed	5400 rpm
	Logical Blocks	625,142,448
	Operating Temperature	32° to 140° F (0° to 60° C) [case temp]
	Features	ATA Security

Technical Specifications

250 GB 5400 rpm SATA Hard Drive	Drive Weight	0.22 lb (101 g)
	Capacity	250 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) 150 MB/s (Drive Capability)
	Seek Time (typical reads, including settling)	Single Track 3 ms
		Average 13ms
		Maximum 24 ms
	Rotational Speed	5400 rpm
	Logical Blocks	488,397,168
	Operating Temperature	32° to 140° F (0° to 60° C) [case temp]
	Features	ATA Security

160 GB 5400 rpm SATA Hard Drive	Drive Weight	0.22 lb (101 g)
	Capacity	160 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) 150 MB/s (Drive Capability)
	Seek Time (typical reads, including settling)	Single Track 3 ms
		Average 13ms
		Maximum 24 ms
	Rotational Speed	5400 rpm
	Logical Blocks	312,581,808
	Operating Temperature	32° to 140° F (0° to 60° C) [case temp]
	Features	ATA Security

Optical Drives

Technical Specifications

DVD-ROM Drive	Access Times	Random	< 140 ms CD (typical) < 160 ms DVD (typical)
	Max Data Transfer Rate	24X CD-ROM	Up to 3,600 KB/s
		8X-DVD	Up to 10,800 KB/s
	Transfer Mode	UDMA Mode 5	
	Interface	Gen 1 SATA	
	Supported Media (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	
	Supported Media (write)	None	
	Max Media Capacity (read)	8.5GB	
	Transport	Tray Loading	

DVD+/-RW SuperMulti DL LightScribe Drive	Access Times	Random	< 150ms CD (typical) < 160 ms DVD (typical)
	Max Data Transfer Rate	24X CD-ROM	Up to 3,600 KB/s
		8X DVD	Up to 10,800 KB/s
		24X CD-R	Up to 3,600 KB/s
		16X CD-RW	Up to 2,400 KB/s
		8X DVD+R	Up to 10,800 KB/s
		8X DVD+RW	Up to 10,800 KB/s
		8X DVD-R	Up to 10,800 KB/s
		6X DVD-RW	Up to 8100KB/s
		4X - DVD+R Dual Layer	Up to 5,400 KB/s
		4X - DVD-R Dual Layer	Up to 5,400 KB/s
		5X DVD-RAM	Up to 6,750 KB/s
	Transfer Mode	UDMA Mode 5	
	Interface	Gen 1 SATA	
	Supported Media (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	
	Supported Media (write)	CD-R, CD-RW, DVD+R, DVD+RW, DVD-R, DVD-RW, DVD-RAM, LightScribe	
	Max Media Capacity (read)	8.5 GB	
	Max Media Capacity (write)	8.5 GB	
	Transport	Tray Loading	

Technical Specifications

Security

HP Fingerprint Sensor (optional)	Mobile Voltage Operation	3.0V-3.6V Single Supply
	Operating Temperature	32° - 158°F (0° - 70°C)
	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

Audio

Hardware	Implementation	IDT 92HD88 High Definition audio
	Volume Controls	Up, down, and mute function keys
	Full Duplex	Yes
	Microphone In	Stereo
	Headphone/Line Out	Stereo
	Integrated Microphone	Yes

Audio Output Quality	Frequency Response	10 Hz ~ 30 KHz
	Signal to Noise Ratio	>95 db
	Total Harmonic Distortion	>83 dBr
	Noise Floor	-110 dB
	Play/Record Sampling Rate(s)	Up to 192 KHz
	DAC	24 bits
	ADC	24 bits

Internal Mono Speaker	Power Rating	2 W
	Impedance	8 ohms

Communications

Ralink RT3090BC4 802.11b/g/n WiFi and	Wireless LAN Standards	IEEE 802.11b IEEE 802.11g
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Technical Specifications

Bluetooth 3.0 HS Combo Adapter	Interoperability	IEEE 802.11n 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
Data Rates		802.11b: 1, 2, 5.5, 11 Mbps
		802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
		802.11n: 15, 30, 45, 60, 90, 120, 135, 150 Mbps
Modulation		Direct Sequence Spread Spectrum
		DBPSK, DQPSK, CCK, OFDM
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 7, Windows Vista and XP.
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: 2.0 W (max)
		Receive: 2.0 W (max)
Power Management		ACPI compliant power management
		802.11 compliant power saving mode
Receiver Sensitivity³		54 Mbps: -71 dBm, 11 Mbps: -81 dBm , 1 Mbps: -90 dBm
Antenna type		High efficiency dual band antenna with spatial diversity, mounted in the display enclosure
Form Factor		PCI-Express Half-MiniCard
Weight		0.013 lb (6 g)
Dimensions		0.22 x 1.06 x 1.18 in (4.1 x 26.8 x 30 mm)
Operating Voltage		3.3v +/- 10%
Temperature	Operating	14° to 149° F (-10° to 65° C)
	Non-operating	-40° to 176° F (-40° to 80° C)
Humidity	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 95% (non-condensing)
Altitude	Operating	0 to 10,000 ft (3,048 m)
	Non-operating	0 to 50,000 ft (15,240 m)

Technical Specifications

Configuration Utility⁴	Microsoft Windows XP Choice of Configuration Utility: • Microsoft Windows XP Wireless Network Connection Manager • Microsoft Windows Vista & Windows 7 Wireless Network Connection Manager
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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/n (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.
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Bluetooth 3.0 + HS Wireless Technology

Bluetooth Specification	BT 3.0 + HS
Dimensions	0.22 x 1.06 x 1.18 in (4.1 x 26.8 x 30 mm)
Frequency Band	2402 to 2480 MHz
Number of Available Channels	79 (1 MHz) available channels
Data Rates and Throughput	BT 2.1 + EDR 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 BT 3.0 + HS Throughput up to 25 Mbps
Transmit Power	-6 dBm to 4 dBm (Bluetooth Class II)
Receiver Sensitivity	Better than -80 dBm at 0.1 % raw bit error rate
Power Consumption	Peak (Tx) 350 mW Peak (Rx) 250 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	Motorola Bluetooth Profiles and Stack
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

Technical Specifications

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	-4° to 158° F (-20° to 70° C)
	Non-operating	-40° to 176° F (-40° to 80° C)
Humidity	Operating	10% to 90%
	Non-operating	5% to 95%
Altitude	Operating	15,000 ft (4,572 m)
	Non-operating	40,000 ft (12,192 m)
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

Integrated Realtek RTL8153EH 10/100 NIC	Ethernet Features	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) 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)
	Power Management	ACPI compliant - multiple power modes Situation-sensitive features reduce power consumption Advanced link down power saving for reducing link down power consumption
	Performance Features	TCP/IP/UDP Checksum Offload (configurable) Large send offload and Giant send offload Receiving Side Scaling
	Manageability	Wake-on-LAN from standby and hibernation (Magic Packet and Microsoft Wake-Up Frame); Wake-on-LAN from off (Magic Packet only) PXE 2.1 Remote Boot Statistics Gathering (SNMP MIB II, Ethernet-like MIB, Ethernet MIB (802.3x, clause 30)) Comprehensive diagnostic and configuration software suite Virtual Cable Doctor for Ethernet cable status
	Interface NIC Device Driver Name	PCI Express 1.1 x1 to fully support ASPM L0s/L1 and CLKREQ Realtek PCIe FE Ethernet Family Controller

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 V.44, 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

Technical Specifications

	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

Broadcom 4312G 802.11b/g WiFi Adapter

Wireless LAN Standards	IEEE 802.11b IEEE 802.11g
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
Data Rates	802.11b: 1, 2, 5.5, 11 Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
Modulation	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM
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

Technical Specifications

Power Consumption	Idle associated: 250 mW Idle unassociated: 150 mW Transmit: 2.0 W (max) Receive: 2.0 W (max)	
Power Management	ACPI compliant power management 802.11 compliant power saving mode	
Receiver Sensitivity³	54 Mbps: -71 dBm, 11 Mbps: -85 dBm , 1 Mbps: -95 dBm	
Antenna type	High efficiency dual band antenna with spatial diversity, mounted in the display enclosure	
Form Factor	PCI-Express Half-MiniCard	
Weight	0.013 lb (6 g)	
Dimensions	0.19 x 1.06 x 1.18 in (4.75 x 26.8 x 30 mm)	
Operating Voltage	3.3v +/- 10%	
Temperature	Operating	14° to 149° F (-10° to 65° C)
	Non-operating	-40° to 176° F (-40° to 80° C)
Humidity	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 95% (non-condensing)
Altitude	Operating	0 to 10,000 ft (3,048 m)
	Non-operating	0 to 50,000 ft (15,240 m)
LED Activity	LED Off - Radio OFF; Solid LED On - Radio ON	
1. Check latest software/driver release for updates on supported security features. 2. Maximum output power may vary by country according to local regulations. 3. 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.		

Realtek RTL8191SE 802.11b/g/n 1x1 WiFi Adapter

Wireless LAN Standards	IEEE 802.11b IEEE 802.11g IEEE 802.11n
Interoperability	Wi-Fi certified
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: many possible data rates, ranging from 6 Mbps to 150 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
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.

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 CKK) ²	17 dBm, nominal	
Output Power (for OFDM; power varies by data rate) ²	15 dBm, nominal	
Power Consumption	Transmit: 1.5 W (max) Receive: 1.0 W (max) Associated to Access Point, Idle: 152 mW nominal Wireless Button Off: 33 mW nominal	
Power Management	ACPI compliant power management 802.11 compliant power saving mode	
Receiver Sensitivity ³	54 Mbps: -73 dBm, 11 Mbps: -82 dBm , 1 Mbps: -93 dBm, MCS7_HT20: -69dBm , MCS7_HT40: -67dBm	
Antenna type	High efficiency antenna with spatial diversity, mounted in the display enclosure	
Form Factor	PCI-Express Half-MiniCard	
Weight	0.007 lb (3 g)	
Dimensions	0.14 x 1.06 x 1.18 in (3.5 x 26.8 x 30 mm)	
Operating Voltage	3.3v +/- 9%	
Temperature	Operating	14° to 149° F (-10° to 65° C)
	Non-operating	-40° to 176° F (-40° to 80° C)
Humidity	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 95% (non-condensing)
Altitude	Operating	0 to 10,000 ft (3,048 m)
	Non-operating	0 to 50,000 ft (15,240 m)
LED Activity	LED Off - Radio OFF; Solid LED On - Radio ON	

1. Check latest software/driver release for updates on supported security features.
2. Maximum output power may vary by country according to local regulations.
3. 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/n (OFDM modulation).

Ralink RT3090BC4 802.11b/g/n WiFi and Bluetooth 3.0 HS Combo Adapter

Wireless LAN Standards	IEEE 802.11b IEEE 802.11g IEEE 802.11n
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

Technical Specifications

Data Rates	802.11b: 1, 2, 5.5, 11 Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: 15, 30, 45, 60, 90, 120, 135, 150 Mbps	
Modulation	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM	
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 7, Windows Vista and XP.	
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: 2.0 W (max) Receive: 2.0 W (max)	
Power Management	ACPI compliant power management 802.11 compliant power saving mode	
Receiver Sensitivity³	54 Mbps: -71 dBm, 11 Mbps: -81 dBm , 1 Mbps: -90 dBm	
Antenna type	High efficiency dual band antenna with spatial diversity, mounted in the display enclosure	
Form Factor	PCI-Express Half-MiniCard	
Weight	0.013 lb (6 g)	
Dimensions	0.22 x 1.06 x 1.18 in (4.1 x 26.8 x 30 mm)	
Operating Voltage	3.3v +/- 10%	
Temperature	Operating	14° to 149° F (-10° to 65° C)
	Non-operating	-40° to 176° F (-40° to 80° C)
Humidity	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 95% (non-condensing)
Altitude	Operating	0 to 10,000 ft (3,048 m)
	Non-operating	0 to 50,000 ft (15,240 m)

Technical Specifications

Configuration Utility⁴	Microsoft Windows XP Choice of Configuration Utility: • Microsoft Windows XP Wireless Network Connection Manager • Microsoft Windows Vista & Windows 7 Wireless Network Connection Manager
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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/n (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.
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Bluetooth 3.0 + HS Wireless Technology

Bluetooth Specification	BT 3.0 + HS
Dimensions	0.22 x 1.06 x 1.18 in (4.1 x 26.8 x 30 mm)
Frequency Band	2402 to 2480 MHz
Number of Available Channels	79 (1 MHz) available channels
Data Rates and Throughput	BT 2.1 + EDR 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 BT 3.0 + HS Throughput up to 25 Mbps
Transmit Power	-6 dBm to 4 dBm (Bluetooth Class II)
Receiver Sensitivity	Better than -80 dBm at 0.1 % raw bit error rate
Power Consumption	Peak (Tx) 350 mW Peak (Rx) 250 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	Motorola Bluetooth Profiles and Stack
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

Technical Specifications

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	-4° to 158° F (-20° to 70° C)
	Non-operating	-40° to 176° F (-40° to 80° C)
Humidity	Operating	10% to 90%
	Non-operating	5% to 95%
Altitude	Operating	15,000 ft (4,572 m)
	Non-operating	40,000 ft (12,192 m)
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

HP Integrated Module with Bluetooth 2.1+EDR Wireless Technology

Bluetooth Specification	2.1+EDR Compliant
Dimensions	1.18 x 0.26 x 0.13 in (30 x 6.5 x 3.25 mm)
Frequency Band	2402 to 2480 MHz
Number of Available Channels	79 (1 MHz) available channels
Data Rates and Throughput	3 Mbps data rate; throughput up to 2.17 Mbps Synchronous Connection Oriented links up to 3, 64 kbps, voice channels Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric or 1306.9 kbps symmetric
Transmit Power	-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 -4° to 158° F (-20° to 70° C) Non-operating -40° to 176° F (-40° to 80° C)
Humidity	Operating 10% to 90% Non-operating 5% to 95%
Altitude	Operating 15,000 ft (4,572 m) Non-operating 40,000 ft (12,192 m)
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)

Technical Specifications

1. indicates the profile is supported by Microsoft Windows XP SP2
2. indicates the profile is part of Windows Vista

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:

- US Energy Star
- IT ECO declaration
- EPEAT - Gold where HP registers commercial desktop products. See <http://www.epeat.net> for registration status in your country.

HP 420 Notebook PC and HP 620 Notebook PC

Energy Consumption	115 VAC	230 VAC	100 VAC
Normal Operation	11.87 W	11.95 W	11.68 W
Sleep (Energy Star low power mode)	0.702 W	0.792 W	0.674 W
Off	0.522 W	0.594 W	0.492 W
Heat Dissipation*	115 VAC	230 VAC	100 VAC
Normal Operation	41 BTU/hr	41 BTU/hr	40 BTU/hr
Sleep	2 BTU/hr	3 BTU/hr	2 BTU/hr
Off	2 BTU/hr	2 BTU/hr	2 BTU/hr

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

HP 420 Notebook PC

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

System Fan Off	Sound Power (LWAd, bels)	Sound Pressure (LpAm, decibels)
Idle	3.4	27
Fixed Disk (random writes)	3.9	32

System fan is usually off except when charging the battery

HP 620 Notebook PC

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

System Fan Off	Sound Power (LWAd, bels)	Sound Pressure (LpAm, decibels)
Idle	3.2	25.1
Fixed Disk (random writes)	3.4	31.6

System fan is usually off except when charging the battery

Technical Specifications

HP 420 Notebook PC

Batteries

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

Batteries used in the product do not contain:

- Mercury greater than 5ppm by weight
- Cadmium greater than 10ppm by weight

The battery type and chemistry used in the product is:

- CR2032 (coin cell), Li ion
- 6-cell high capacity Li ion battery (optional 8 cell available)

Additional information:

This product is in compliance with the Restrictions of Hazardous 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.

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% recycle-able when properly disposed of at end of life.

Packaging Materials

- External:
 - Corrugated carton 360 g
 - Cardboard & misc 365 g
- Internal:
 - Polyethylene low density Foam 15 g
 - EPE - Expanded Polyethylene 90 g
- The Corrugated carton packaging material is made from 70~80% recycled content.
- The Cardboard & misc packaging material is made from 70~80% recycled content.
- The Polyethylene low density Foam packaging material is made from 0% recycled content.
- The EPE - Expanded Polyethylene packaging material is made from 70~80% recycled content.

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

Technical Specifications

- 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.

HP 620 Notebook PC

Batteries

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

Batteries used in the product do not contain:

- Mercury greater the 5ppm by weight
- Cadmium greater than 10ppm by weight

The battery type and chemistry used in the product is:

- CR2032 (coin cell), Li ion
- 6-cell high capacity Li ion battery (optional 8 cell available)

Additional information:

This product is in compliance with the Restrictions of Hazardous 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.

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% recycle-able when properly disposed of at end of life.

Packaging Materials

- External:
 - Corrugated carton 635 g
 - Corrugated 140 g

Technical Specifications

- Internal:
 - Polyethylene low density 15 g
 - EPS (Expanded Polystyrene) 50 g
- The Corrugated carton packaging material is made from 80% recycled content.
- The Corrugated packaging material is made from 80% recycled content.
- The Polyethylene low density packaging material is made from 100% recycled content.
- The EPS (Expanded Polystyrene) packaging material is made from 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.

HP 420 Notebook PC and HP 620 Notebook PC

Material Usage

This product does not contain any of the following substances in excess of regulatory limits (for reference of these limits please refer to the HP General Specification of the Environment

(http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html):

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants – may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Biphenyl Ethers (PBBEs)
- Polybrominated Biphenyl Oxides (PBBOs)

Technical Specifications

- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) – except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.
- Radioactive Substances
- Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)
- Nickel finishes that release greater than 0.5 micro-grams/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>

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