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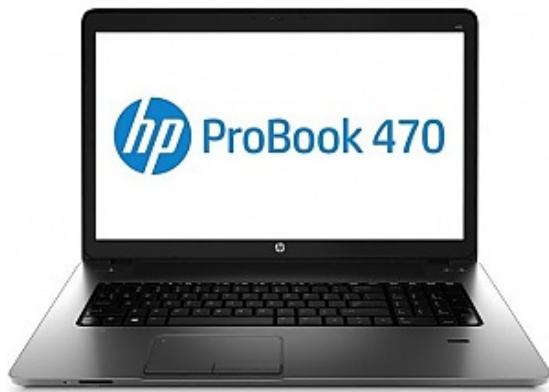
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HP ProBook 470 G1 Notebook PC Specifications

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Product image






HP ProBook 470 G1 Notebook PC


Product features

Feature	Description
Processors	4 th generation Intel Core Processors
Chipset	Mobile Intel HM87 Express
Graphics	<p>Integrated graphics</p> <ul style="list-style-type: none"> • Intel HD Graphics 4600 (4th Generation Intel Quad-Core i7 and Dual-Core i5 and i3) • Intel HD Graphics (Celeron and Pentium configurations) • AMD Radeon™ HD** 8750M, with 1 or 2 GB dedicated DDR3 video memory
Display	<ul style="list-style-type: none"> • Internal: 17.3" diagonal LED-backlit HD+ anti-glare (1600 x 900) • External: Up to 32-bit per pixel color depth • VGA: Port supports resolutions up to 1920 x 1080 external resolution @60 Hz • HDMI: Supports direct connection to high-definition displays with up to 1920 x 1200@60Hz resolution and 7-channel audio with one convenient connector (not included)

Feature	Description
Storage and drives	<p>Hard drives</p> <ul style="list-style-type: none"> • 320/500/750GB/1 TB 5400 rpm SMART SATA II HDD • 500GB 7200 rpm SMART SATA II HDD • 500GB 5400 rpm SMART SATA II Hybrid HDD/SSHD <p>Solid State Drives</p> <ul style="list-style-type: none"> • 128GB 2.5" Solid State Drive
Optical drives	<p>Fixed 9.5 mm SATA optical drive</p> <ul style="list-style-type: none"> • Blu-ray ROM DVD+/-RW SuperMulti DL Drive • DVD+/-RW SuperMulti DL Drive • DVD-ROM Drive • No optical drive option
Memory	<p>Standard</p> <ul style="list-style-type: none"> • DDR3L 1.35V SDRAM (1600 MHz) • Two SODIMM slots supporting dual-channel memory 2GB, 4GB, and 8GB SODIMMs <p>Maximum</p> <ul style="list-style-type: none"> • Upgradeable to 16384 MB with optional 8192 MB SODIMMs in slots 1 and 2 <p>Dual-channel</p> <ul style="list-style-type: none"> • Maximized dual-channel performance requires SODIMMs of the same size and speed in both memory slots.
Networking/Communications	<p>Broadband wireless (WWAN)²</p> <ul style="list-style-type: none"> • HP hs3110 HSPA+ Mobile Broadband Module • HP lt4112 LTE/HSPA+ Gobi 4G Module <p>Wireless LAN (WLAN)²</p> <ul style="list-style-type: none"> • Realtek 802.11 b/g/n (1x1) • Mediatek 802.11 b/g/n (1x1) with Bluetooth v4.0 combo • Intel Dual Band Wireless-AC 3160 802.11 a/b/g/n/ac (1 x 1) WiFi with Bluetooth 4.0 combo • Intel Dual Band Wireless-N 7260AN 802.11 a/b/g/n (2 x 2) WiFi with Bluetooth 4.0 combo 

Feature	Description
	Communications <ul style="list-style-type: none"> Realtek 10/100/1000 ethernet controller
Communications	Realtek 10/100/1000* Ethernet Controller
Webcam	Optional 720p HD webcam ³

System specifications

Specification	Description		
Stand-Alone power	Nominal operating: 19 V		
Requirements (ac Power)	Voltage		
	Average Operating Power	Windows 7 (64-bit)	Windows 8 (64-bit)
	ProBook 470 Discrete graphics	9.55 W	9.88 W
Temperature	Operating <ul style="list-style-type: none"> 0° to 35° C (32° to 95° F) (not writing optical) 5° to 35° C (41° to 95° F) (writing optical) Non-operating <ul style="list-style-type: none"> -20° to 60° C (-4° to 140° F) 		
Relative humidity	Operating: 10% to 90%, non-condensing		

Specification	Description
	<p>Non-operating: 5% to 95%, 38.7° C (101.6° F) maximum wet bulb temperature</p>
Shock	<p>Operating: 40 G, 2 ms, half-sine</p> <p>Non-operating: 200 G, 2 ms, half-sine</p>
Random Vibration	<p>Operating: 0.75 grms</p> <p>Non-operating: 1.50 grms</p>
Altitude (unpressurized)	<p>Operating:</p> <p>-15.24 to 3,048 m (-50 to 10,000 ft)</p> <p>Non-operating:</p> <p>-15.24 to 12,192 m (-50 to 40,000 ft)</p>
Planned industry standard certifications	<ul style="list-style-type: none"> • UL: Yes • CSA: Yes • FCC Compliance: Yes • ENERGY STAR: Select models • EPEAT: Registered Gold in United States • ICES: Yes • Australia/NZ A-Tick Compliance: Yes • CCC: Yes • Japan VCCI Compliance: Yes • KC: Yes • BSMI: Yes • CE Marking Compliance: Yes • BNCI or BELUS: Yes • CIT: Yes • GOST: Yes • Saudi Arabian Compliance (ICCP): Yes • SABS: Yes • UKRSERTCOMPUTER: Yes




Display specifications

Specification	Description
17.3-inch LED HD+ antiglare:	
Active Area (W x H)	38.2 x 21.5 cm (15.0 x 8.5 in)
Weight	570g max
Diagonal size	43.9 cm (17.3 in)
Contrast ratio	300:1 (min)
Surface Treatment	Anti-glare
Refresh rate	60 Hz
Brightness	200 nit (typical)
Pixel resolution	<ul style="list-style-type: none"> • Pitch: 0.23868 x 0.23868 mm • Format: 1600 x 900 • Configuration: RGB Stripe
Backlight	LED



Specification	Description
PPI	106
Viewing angle	<ul style="list-style-type: none"> • $\pm 30^\circ$ Horizontal, $\pm 10^\circ$ vertical (minimum) • 30/30/20/10 (Left/Right/Down/Up) (minimum) • 45/45/35/25 (Left/Right/Down/Up) (typical)

HDD specifications

Specification	Description
500 GB 7200 rpm SATA Hard Drive:	
Drive Weight	115g (0.25 lbs)
Capacity	500 GB
Height	9.5 mm (0.37 in)
Width	70 mm (2.75 in)
Interface	ATA-8, SATA 2.6, 3.0 Gb/s, NCQ
Transfer Rate	Synchronous (maximum): 300 MB/s (drive capability) 
Seek Time	<ul style="list-style-type: none"> • Single Track: 1.5 ms

Specification	Description
	<ul style="list-style-type: none"> • Maximum: 22 ms
Rotational Speed	7200 rpm
Logical Blocks	976,773,168
Operating Temperature	0° to 60° C (32° to 140° F)
Features	ATA Security
320 GB 5400 rpm SATA Hard Drive:	
Drive weight	115g (0.25 lbs)
Capacity	320GB
Height	9.5 mm (0.37 in)
Width	70 mm (2.75 in)
Interface	ATA-8, SATA 2.6, 3.0 Gb/s, NCQ
Transfer rate	Synchronous (maximum) 300MB/s (Drive Capability)



Specification	Description
Seek time (typical reads, including settling)	<ul style="list-style-type: none">• Single Track: 1.5 ms• Average: 11 ms• Maximum: 22 ms
Rotational speed	7200 rpm
Logical blocks	625,142,448
Operating temperature	0° to 60° C (32° to 140° F) [case temp]
Features	ATA security
500GB 5400 rpm SATA Hard Drive:	
Drive weight	101 g (0.22 lb)
Capacity	500GB
Height	9.5 mm (0.37 in)
Width	70 mm (2.75 in)
Interface	ATA-8, SATA 2.6, 3.0 Gb/s, NCQ



Specification	Description
Transfer rate	Synchronous (maximum) 300MB/s (Drive Capability)
Seek time (typical reads, including settling)	<ul style="list-style-type: none"> • Single Track: 3 ms • Average: 13 ms • Maximum: 24 ms
Rotational speed	5400 rpm
Logical blocks	976,773,168
Operating temperature	0° to 60° C (32° to 140° F)
Features	ATA security
750 GB* 5400 rpm SATA Hard Drive:	
Drive weight	101 g (0.22 lb)
Capacity	750GB
Height	5 mm (0.37 in)
Width	70 mm (2.75 in)



Specification	Description
Interface	ATA-8, SATA 2.6, 3.0 Gb/s, NCQ
Transfer Rate	Synchronous (maximum) 300 MB/s (Drive Capability)
Seek Time	<ul style="list-style-type: none"> • Single Track 3: 3ms • Average: 13 ms • Maximum: 24 ms
Rotational Speed	5400 rpm
Logical Blocks	1,465,149,168
Operating Temperature	0° to 60° C (32° to 140° F)
Features	ATA Security
1 TB* 5400 rpm SATA Hard Drive:	
Drive weight	0.254 g (0.22 lb)
Capacity	1 TB
Height	9.5 mm (0.37 in)



Specification	Description
Width	70 mm (2.75 in)
Interface	ATA-8, SATA 2.6, 3.0 Gb/s, NCQ
Transfer Rate	Synchronous (maximum) 300 MB/s (Drive Capability)
Seek Time	<ul style="list-style-type: none"> • Single Track 3: 3ms • Average: 13 ms • Maximum: 24 ms
Rotational Speed	5400 rpm
Logical Blocks	1,953,525,168
Operating Temperature	0° to 60° C (32° to 140° F)
Features	ATA Security
500 GB* 5400 rpm SMART SATA II Hybrid HDD/SSHD:	
Drive weight	95 g (0.22 lb)
Capacity	500GB




Specification	Description
Height	7 mm (0.276 in)
Width	70.1 mm (2.76 in)
Interface	ATA-8, SATA 2.6, 3.0 Gb/s, NCQ
Transfer Rate	Synchronous (maximum) 600 MB/s (Drive Capability)
Seek Time	<ul style="list-style-type: none"> • Single Track 3: 2ms • Average: 12 ms • Maximum: NIL ms
Rotational Speed	7200 rpm
Logical Blocks	976,773,168
Operating Temperature	0° to 60° C (32° to 140° F)
Features	ATA Security
SATA 6 Gb/s 128 GB*, 2.5- inch Solid State Drive	
Drive weight	73 Grams




Specification	Description
Capacity	128GB
Height	7 mm (0.276 in)
Width	70 mm (2.76 in)
Interface	SATA 3 (6 Gb/s)
Performance	<ul style="list-style-type: none"> • Maximum Sequential Read:415 MB/s • Maximum Sequential Write:175 MB/s • Maximum: NIL ms
Logical Blocks	250,069,680
Operating Temperature	0° to 70° C (32° to 158° F)
Features	ATA Security; ATA-8; SATA 3.0; DIPM; TRIM

Security

Specification	Description
HP Fingerprint Sensor (optional)	

Specification	Description
Mobile voltage operation	3.0V -3.6V single supply
Weight	TBD
Operating temperature	0° - 70°C (32° - 158°F)
Current consumption at 3.3 V	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 192 x 16 pixels • 9.7 mm x 0.81 mm • 500 ppi High-Resolution images

Ports/slots

Feature	Description
Ports/Slots	<p>Ports</p> <ul style="list-style-type: none"> • USB 3.0 – Two • USB 2.0 (power port) – One • HDMI 1.4a – One • Stereo microphone input – One • Headphone/line out – One 

Feature	Description
	<ul style="list-style-type: none"> • RJ-45 (Ethernet) – One • Power connector – One • VGA – One
Digital media slots	<ul style="list-style-type: none"> • Multi Media Reader slot supporting SD • SDHC • SDXC • Memory stick • MSXC

Networking/Communications

Specification	Description
	Integrated Realtek RTL8151FH-CG 10/100/1000 NIC:
Ethernet Features	<ul style="list-style-type: none"> • 10 Mbit/s operation (10BASE-T; IEEE 802.3i; IEEE 802.3 clauses 13-14) • 100 Mbit/s operation (100BASE-TX; IEEE 802.3u; IEEE 802.3 clauses 21-30) • 1000 Mbit/s operation (1000BASE-T; IEEE 802.3ab; IEEE 8023 clauses 40) • Auto-Negotiation (Automatic Speed Selection) • Full Duplex Operation at all Speeds, Half Duplex operation at 10 and 100 Mbit/s • IEEE 802.1p QoS (Quality of Service) Support • IEEE 802.1q VLAN support • IEEE 802.3x Flow Control (IEEE 802.3 clauses 31-32; configurable) • IEEE 802.3az EEE (Energy Efficient Ethernet) • Jumbo Frame 9K • Auto MDI/MDIX Crossover cable detection
Weight	TBD





Specification	Description
Power Management	<ul style="list-style-type: none"> • ACPI compliant - multiple power modes • Situation-sensitive features reduce power consumption • Advanced link down power saving for reducing link down power consumption
Manageability	<ul style="list-style-type: none"> • Wake-on-LAN from standby and hibernation (Magic Packet and Microsoft Wake-Up Frame); Wake-on-LAN from off (Magic Packet only) • PXE 2.1 Remote Boot • Statistics Gathering (SNMP MIB II, Ethernet-like MIB, Ethernet MIB (802.3x, clause 30)) • Comprehensive diagnostic and configuration software suite • Virtual Cable Doctor for Ethernet cable status
Interface	PCI Express 1.1 x1 to fully support ASPM L0s/L1 and CLKREQ
NIC Device Driver Name	Realtek PCIe GBE Ethernet Family Controller
HP 3110 HSPA+ Mobile Broadband Module:	
Technology/Operating Bands	<ul style="list-style-type: none"> • CDMA/1xRTT/EvDO: 800MHz (Cell), 1900MHz (PCS) • GSM/GPRS/EDGE: 850MHz (Cell), 900MHz (EGSM), 1800MHz (DCS), 1900MHz (PCS) • UMTS/WCDMA with receive diversity: 2100MHz (UTRA FDD Band I), 1900MHz • (UTRA FDD Band II), 900MHz (UTRA FDD Band VIII), 850 MHz (UTRA FDD Band V) • LTE: 700 MHz (Verizon, Band XIII)
Mobile Operator	Verizon (US only)



Specification	Description
Wireless Protocol Standards	<ul style="list-style-type: none"> • GSM/GPRS/EDGE: Class B, Multi-slot class 10 operation, coding schemes CS1 - CS4 and MSC1 - MSC9. • CDMA: 1xEVDO Release 0 and Release A, IS-95A, IS-95B, IS-856, IS-2000 UMTS/WCDMA: Release 99 and Release 7 • LTE: Power Class III as per 3GPP TS 36.101
Wireless Parametric Standards	Complies with 3GPP specifications Release 8 for LTE
Maximum Data Rates	<ul style="list-style-type: none"> • EvDO (Revision A) - 3.1 Mbps (Download), 1.8 Mbps (Upload) WCDMA (DC-HSPA+) - 42Mbps (Download) • LTE (Category 3) - 100 Mbps (Download), 50Mbps (Upload)
GPS	Standalone, Assisted, XTRA
GPS Bands	1575.42 MHz (± 1.023 MHz)
Maximum Output Power	<ul style="list-style-type: none"> • GSM/GPRS/EDGE: 32dBm (+/-1) • WCDMA: 24dBm (+0.7/-2.3) • LTE: +23 dBm (+2.7 dBm/-1.7 dBm) • 1xRTT/EvDO: +24 dBm (+0.5 dBm/-1.5 dBm)
Maximum Power Consumption	2700mA (peak)
Power Consumption, Sleep Mode	10 mA
Power Management	<ul style="list-style-type: none"> • USB selective suspend




Specification	Description
	Wireless notebook wireless button
Antenna Type	Dual high efficiency 6 band antennae with spatial diversity, mounted in the display enclosure
Form Factor	PCI-Express MiniCard, USB 2.0 interface
Weight	Less than 10 g
Dimensions (Length x Width x Thickness)	51 x 30 x 4.5 mm (2.01 x 1.18 x 0.18 in)
Voltage, Operating	3.3v +/- 9%
Temperature, Operating	-20° to 65° C (-4° to 149° F)
Temperature, Nonoperating, 96 hours (from MIL-STD 202 Method 108)	-40° to 85° C (-40° to 185° F)
Humidity, Non-operating	85% relative humidity for 48 hours @ 85° C (185° F) (non-condensing)
LED Activity	<ul style="list-style-type: none"> • LED Off - Radio Off; • Solid LED On - Radio On
HP lt4112 LTE/HSPA+ Gobi 4G Module 	

Specification	Description
Technology/Operating Bands	<ul style="list-style-type: none"> • LTE FDD all bands with diversity: 2100 MHz (Band I), 1900 MHz (Band II), 1800 MHz (Band III), 850 MHz (Band V), 2600 MHz (Band VII), 900 MHz (Band VIII), 800 MHz (Band XX, DD800) • WCDMA/HSDPA/HSUPA/HSPA+ all bands with diversity: 2100 MHz (Band I), 1900 MHz (Band II), 800 MHz (Band V), 900 MHz (Band VIII) GSM/GPRS/EDGE: 1900 MHz (Band II), 1800 MHz (Band III), 850 MHz (Band V), 900 MHz (Band VIII)
Wireless Protocol Standards	3GPP Release 8 LTE Specification
Wireless Parametric Standards	Complies with 3GPP specifications Release 8 for LTE
Maximum Data Rates	<ul style="list-style-type: none"> • LTE (Category 3): 100 Mbps (Download), 50Mbps (Upload) • DC-HSPA+: 42 Mbps (Download), 5.76 Mbps (Upload) • HSPA+: 21.6 Mbps (Download), 5.76 Mbps (Upload) • EDGE: 236.8 kbps (Download), 236.8 kbps (Upload) • GPRS: 85.6 kbps(Download), 85.6 kbps (Upload)
GPS	Standalone
GPS Bands	1575.42 MHz (\pm 1.023 MHz), GLONASS 1596-1607MHz
Maximum Output Power	<ul style="list-style-type: none"> • LTE: +23 dBm (+/- 2 dBm) • WCDMA: +23.5 dBm (+/- 1 dBm) • GPRS Band II, III: +29.5 dBm (+/- 1 dBm) • GPRS Band V, VIII: +32.5 dBm (+/- 1 dBm) • EGPRS Band II, III: +26.5 dBM (+/-1.5 dBm) • EGPRS Band V, VIII: +27.5 dBM (+/-1.5 dBm) 


Specification	Description
Maximum Power Consumption	LTE: 1,200 mA (peak); Less than 900 mA (average)
Power Consumption, Sleep Mode	3 mA
Power Management	USB selective suspend, Integrated notebook wireless button
Antenna Type	Dual high efficiency multi-band antennae with spatial diversity
Form Factor	M.2, USB 2.0 interface
Weight 6 g Dimensions (Length x Width x Thickness)	42 mm × 30 mm × 2.3 mm
Voltage, Operating	3.3 V +1.1V/-0.165V (3.135 V to 4.4 V)
Temperature, operating (from TIA/EIA/IS-98-D)	-10° to 55° C (14° to 131° F)
Temperature, nonoperating, 96 hours (from MIL-STD 202 Method 108)	-40° to 85° C (-40° to 185° F)
Humidity, Non-operating	95% relative humidity for 48 hours @ 185° F (85° C) (non-condensing)
LED Activity	LED Off - Radio Off; Solid LED On - Radio On



Specification	Description
Realtek 802.11 b/g/n (1x1):	
Wireless LAN Standards	<ul style="list-style-type: none"> • IEEE 802.11b • IEEE 802.11g • IEEE 802.11n
Interoperability	Wi-Fi certified
Frequency Band	2.402 - 2.482 GHz
Modulation	<ul style="list-style-type: none"> • Direct Sequence Spread Spectrum • BPSK, QPSK, CCK, 16-QAM, 64-QAM
Data Rates	<ul style="list-style-type: none"> • 802.11b: 1, 2, 5.5, 11 Mbps • 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11n: card will support rates for NSS=1 for RX and TX for 20 MHz channels. Short and long guard interval will be supported.
Security	<ul style="list-style-type: none"> • IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only AES-CCMP: 128 bit in hardware 802.1x authentication types WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. • WPA2 certification • IEEE 802.11i • Cisco Certified Extensions, all versions through V5 • WAPI
Network Architecture	Ad-hoc (Peer to Peer) 
Models	Infrastructure (Access Point Required)

Specification	Description
Roaming	IEEE 802.11 compliant roaming between access points
Output Power	13.5 dBm, nominal
Power Consumption	<ul style="list-style-type: none"> • Transmit: 2.0 W (max) • Receive: 1.6 W (max) • Associated to Access Point, Idle: 250 mW nominal • Wireless Button Off: 100 mW nominal • Radio disabled: 75 mW nominal
Power Management	<ul style="list-style-type: none"> • ACPI compliant power management • 802.11 compliant power saving mode
Receiver Sensitivity	<ul style="list-style-type: none"> • 802.11b: -95 dBm (1 Mbps), -93 dBm (2 Mbps), -91 dBm (5.5 Mbps), -88 dBm (11 Mbps) • 802.11g: -90 dBm (6 Mbps), -89 dBm (9 Mbps), -87 dBm (12 Mbps), -85 dBm (18 Mbps), -82 dBm (24 Mbps), -79 dBm (36 Mbps), -76 dBm (48 Mbps), -74 dBm (54 Mbps) • 802.11n: -70 dBm (72.2 Mbps)
Antenna type	High efficiency antenna with spatial diversity, mounted in the display enclosure
Form Factor	PCI-Express Half-MiniCard
Weight	6 g (0.013 lb)
Dimensions	4.75 x 26.8 x 30 mm (0.19 x 1.06 x 1.18 in)



Specification	Description
Operating Voltage	3.3v +/- 9%
LED Activity	LED Off - Radio OFF; Solid LED On - Radio ON
Mediatek 802.11 b/g/n (1 x 1) with Bluetooth® v4.0 combo:	
Wireless LAN Standards	<ul style="list-style-type: none"> • IEEE 802.11b • IEEE 802.11g • IEEE 802.11n
Interoperability	Wi-Fi certified
Frequency Band	2.402 - 2.482 GHz
Data Rates	<ul style="list-style-type: none"> • 802.11b: 1, 2, 5.5, 11 Mbps • 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11n: card will support rates for NSS=1 for RX and TX for 20 MHz channels. Short and long guard interval shall be supported.
Security	<ul style="list-style-type: none"> • Support for WPA and WPA2 • Support for CCX version up to and including CCXv5 • Support for the following EAP types: EAP-TLS, EAP-PEAPv0, EAP-PEAPv1, EAP-PEAPv2, EAP-FAST, EAP-SIM • Support for using both machine and user credentials in a single profile. The same profile must be able to be used both before user login and after user login • Support the use of Windows Domain credentials • IP provider shall have support for an auto-logout to Windows using a PLC and LEAP via the IP provider UI 

Specification	Description
	<ul style="list-style-type: none"> • Must have Windows Single Sign On support so that customers can use the WLAN as their primary domain network. With regard to SSO, network association and authentication must occur and be successful before Windows domain authentication is attempted • Support for use of the UI client in a user account with limited local security privileges • Client service / profile manager must support the WiFi Alliance's WiFi Protected Setup specification. • Any credentials saved in a profile must be done securely such that they cannot be re-used by any other user or machine.
Network Architecture Models	<p>Ad-hoc (Peer to Peer)</p> <p>Infrastructure (Access Point Required)</p>
Roaming	<p>IEEE 802.11 compliant roaming between access points</p>
Output Power	<p>2.4G:+13.5dBm, minimum</p>
Power Consumption	<ul style="list-style-type: none"> • Transmit: 2.0 W (max) • Receive: 1.6 W (max) • Associated to Access Point, Idle: 250 mW nominal (WLAN Associated) Wireless Button Off: 100 mW nominal (WLAN unassociated) Radio disabled: 75 mW nominal.
Power Management	<ul style="list-style-type: none"> • ACPI and PCI Express compliant power management • 802.11 compliant power saving mode
Receiver Sensitivity	<ul style="list-style-type: none"> • 802.11b:-95 dBm (1 Mbps), -93 dBm (2 Mbps), -91 dBm (5.5 Mbps), -88 dBm (11 Mbps) • 802.11g:-90 dBm (6 Mbps), -89 dBm (9 Mbps), -87 dBm (12 Mbps), -85 dBm (18 Mbps), -82 dBm (24 Mbps), -79 dBm (36 Mbps), -76 dBm (48 Mbps), -74 dBm (54 Mbps) • 802.11n:-70dBm (72.2 Mbps)

Specification	Description
Antenna type	Two embedded single band 2.4 antennas
Form Factor	PCI-Express Half-MiniCard
Dimensions	4.75 x 26.8 x 30 mm (0.19 x 1.06 x 1.18 in)
Operating Voltage	3.3v +/- 9%
LED Activity	LED Off - Radio OFF; Solid LED On - Radio ON
Bluetooth Specification	V4.0 High Speed, V2.1+EDR, backwards compatible with V1.1, 1.2 and 2.0
Number of Available Channels	79 (1 MHz) available channels
Data Rates and Throughput	<ul style="list-style-type: none"> • 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
Receiver Sensitivity	Better than -80 dBm at 0.1 % raw bit error rate
Power Consumption	Peak (Tx) 330 mW ,Peak (Rx) 230 mW
Range	10 m (Up 33 ft)



Specification	Description
Bluetooth Software Supported	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Microsoft Windows ACPI, and USB Bus Support • Self configurable to optimize power conservation in all operating modes, including Standby, Hold, Park, and Sniff
Certifications	<p>All necessary regulatory approvals for supported countries, including:</p> <ul style="list-style-type: none"> • FCC (47 CFR) Part 15C, Section 15.247 & 15.249 • ETS 300 328, ETS 300 826 • Low Voltage Directive IEC950 • UL, CSA, and CE Mark
Bluetooth Profiles Supported	<ul style="list-style-type: none"> • Generic Access Profile (GAP) • Service Discovery Application Profile (SDAP) • Serial Port Profile (SPP) • Dial_Up Networking Profile (DUN) • Generic Object Exchange Profile (GOEP) • Object Push Profile (OPP) • File Transfer Profile (FTP) • Synchronization Profile (SYNC) • Hard Copy Cable Replacement (HCRP) • Personal Area Networking Profile (PAN) • Human Interface Device Profile (HID) • Generic Audio/Video Distribution Profile (GAVDP) • Advanced Audio/Video Distribution Profile (A2DP) • FAX Profile (FAX) • Basic Imaging Profile (BIP)



Specification	Description
	<ul style="list-style-type: none"> • Headset Profile (HSP) • Hands Free Profile (HFP) • Basic Printing Profile (BPP) • VDP (Video Distribution Profile) • AVRCP (Audio Video Remote Control Profile)
<p>Intel Dual Band Wireless- AC 3160 802.11 ac (1x1) WiFi and Bluetooth 4.0 Combo Adaptor:</p>	
<p>Dimensions (H x W x D)</p>	<ul style="list-style-type: none"> • Standard: 26.80 mm x 30.00 mm x 2.4 mm Max • (Top Side) / 1.35 mm max (Bottom Side) • Low profile: 22 mm x 30.00 mm x 1.5 mm Max • (Top Side) / 0.6 mm Max (Bottom Side) • NGFF: 22 mm x 30 mm, single sided
<p>Weight</p>	<p>TBD</p>
<p>Diversity</p>	<p>No diversity support</p>
<p>Radio ON/OFF Control</p>	<p>Supported in both hardware and software</p>
<p>Connector interface</p>	<ul style="list-style-type: none"> • Half Mini Card form factor, based on PCIe electrical interface • Next Generation Form Factor, A-SD electrical interface definition support
<p>LED Output</p>	<p>On/Off</p>
<p>Operating Temperature</p>	<p>0° to +80° C</p>



Specification	Description
Humidity Non-Operating	50% to 90% RH non-condensing (at temperatures of 25°C to 35°C)
Operating Systems	Microsoft Windows 7, Microsoft Windows 8, Linux
Wi-Fi Alliance	Wi-Fi CERTIFIED for 802.11ac, Wi-Fi CERTIFIED a/b/g, Wi-Fi CERTIFIED n, WMM, WPA, WPA2, and WPS, WPS 2.0, Protected Management Frames, Wi-Fi Direct for peer to peer device connections
Security	
Authentication	WPA and WPA2, 802.1X (EAP-TLS, TTLS, PEAP, LEAP, EAP-FAST), EAP-SIM, EAP-AKA
Authentication Protocols	PAP, CHAP, TLS, GTC, MS-CHAP, MS-CHAPv2
Encryption	64-bit and 128-bit WEP, AES-CCMP, TKIP
Wi-Fi Direct Encryption	WPA2, AES-CCMP
Product Safety	UL, C-UL, CB (IEC 60950-1)
Management Frame Protection	802.11w (WFA- Protected Management Frames)
Compliance	PCI, CISP



Optical Drives

Specification	Description
DVD+/-RW SuperMulti DL Drive:	
Access Times	Random: <ul style="list-style-type: none"> • Less than 140ms CD (typical) • 160 ms DVD (typical)
Max Data Transfer Rate	<ul style="list-style-type: none"> • 24X CD-ROM • 8X DVD • 24X CD-R • 24X CD-RW • 8X DVD+R • 8X DVD+RW • 8X DVD-R • 6X DVD-RW • 6X - DVD+R Dual Layer • 6X - DVD-R Dual Layer • 5X DVD-RAM
Transfer Mode	UDMA Mode 5
Interface	Gen 1 SATA
Supported Media (read)	CD-DA, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW, DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW, DVD-RAM
Supported Media (write)	CD-R, CD-RW, DVD+R, DVD+RW, DVD-R, DVD-RW, DVD-RAM, DVD+R DL, DVD-R DL



Max Media Capacity (read)	8.5GB
Max Media Capacity (write)	8.5 GB
Transport	Tray Loading
Blu-ray ROM DVD+/-RW SuperMulti DL Drive:	
Access Times	<p>Random</p> <ul style="list-style-type: none"> • Less than 190 ms CD-ROM (typical) • Less than 180ms DVD-ROM (typical) • Less than 230 ms BD-ROM (typical)
Max Data Transfer Rate	<ul style="list-style-type: none"> • 24X CD-ROM • 8X DVD-ROM • 24X CD-R • 16X CD-RW • 8X DVD+R • 8X DVD+RW • 8X DVD-R • 6X DVD-RW • 4X - DVD+R Dual Layer • 4X - DVD-R Dual Layer • 5X DVD-RAM • 6X BD-ROM
Transfer Mode	UDMA Mode 5
Interface	Gen 1 SATA



Supported Media (read)	CD-DA, , CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW, DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW. DVD-RAM, BD-ROM, BD-R, BD-RE
Supported Media (write)	CD-R, CD-RW, DVD+R, DVD+R DL, DVD+RW, DVD-R, DVD-R DL, DVD-RW, DVD-RAM
Max Media Capacity (read)	50.0 GB
Max Media Capacity (write)	8.5 GB
Transport	Transport

Audio/Multimedia - DTS sound

Specification	Description
Hardware	
Implementation	IDT 92HD91
Function key volume	Volume up, volume down, and mute
Full duplex	Yes




Specification	Description
Microphone in	Stereo
Headphone/line out	Stereo
Integrated microphone	Yes, dual digital microphone array when equipped with optional webcam
Audio output quality	
Frequency response	20 Hz - 20 kHz
Signal to noise ratio	Less than 85 dB
Total harmonic distortion	0.01%
Noise floor	- 110 dB
Play/Record sampling rate(s)	8 kHz - 48 kHz
DAC	16, 20 or 24-bit
ADC	16 or 20-bit
Internal stereo speakers	




Specification	Description
Power rating	2 W
Impedance	4 ohms

Power

HP 90W Smart AC Adapter (discrete configurations):	
Dimensions	12.7 x 5.0 x 2.9 cm (5.00 x 1.97 x 1.1 in)
Weight	370 g (0.82 lb)
Input	<p>100 to 240 V ac</p> <p>Input Efficiency: 87% min at 115 V ac</p> <p>Input frequency range: 47 to 63 Hz</p> <p>Input ac current:</p> <ul style="list-style-type: none"> • 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
Output	<p>Output power: 90W</p> <p>DC output: 19.5V</p> <p>Hold-up time: 5 msec at 115 V ac input</p> <p>Output current limit: less than 11 A, Over voltage protection- 29V max ac automatic shutdown</p> 

Connector	3 pin/grounded, mates with interchangeable cords
Environmental design	<p>Operating temperature: 0° to 40° C (32° to 104° F)</p> <p>Non-operating (storage) temperature: -20° to 65° C (-4° to 149° F)</p> <p>Altitude: 0 to 3,048 m (0 to 10,000 ft)</p> <p>Humidity: 20% to 80%</p> <p>Storage Humidity: 10% to 90%</p>
EMI and safety certifications	<p>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; Reliability - failure rate of less than 0.1% annually within the first three years of operation.</p>
<p>HP 65W Smart AC Adapter (Configurations with integrated graphics):</p>	
Dimensions(H x W x L)	10.6 x 4.7 x 2.8 cm (4.17 x 1.85 x 1.1 in)
Weight (max)	280 g (0.62 lb)
Input	<p>100 to 240 V ac</p> <p>Input Efficiency: 87% min at 115 V ac</p> <p>Input frequency range: 47 to 63 Hz</p> <p>Input AC current: 1.7 A at 90 V ac, 0.85 A at 180 V ac</p>
Output	<p>Output power: 65W</p> <p>DC output: 18.5V</p>



	<p>Hold-up time: 5 msec at 115 VAC input</p> <p>Output current limit: Less than 11A, Over voltage protection- 29V max automatic shutdown</p>
Connector	3 pin/grounded, mates with interchangeable cords
Environmental Design	<p>Operating temperature: 0° to 40° C (32° to 104° F)</p> <p>Non-operating (storage) temperature: Less than 4° to 149° F (-20° to 65° C)</p> <p>Humidity: 20% to 80%</p> <p>Storage Humidity: 10% to 90%</p>
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.
4-Cell (41 WHr) Lithium-Ion battery	
Cells/Type	4-cell Lithium-Ion
Energy temperature	<p>Watt-hour capacity: 41 WHr</p> <p>Operating (Charging): 0° to 45° C (32° to 113° F)</p> <p>Operating (Discharging): (-10° to 60° C)</p> <p>Non-operating: (-20° to 60° C) -4° to 140° F</p>
Battery re-Charge time	<p>System in OFF or Standby Mode: 2.5 hours</p> <p>System ON: 3 to 5 hours (depending on system power consumption)</p> <p>HP Fast Charge Technology: Charges the battery up to 90% within 90 minutes when system is OFF</p> 


9-Cell (93 WHr) Lithium- Ion battery:	
Dimensions (H x W x L)	4.0 x 4.7 x 26.9 cm (1.57 x 1.85 x 10.59 in)
Weight (max)	0.488 kg (1.07 lb)
Cells/Type	9-cell Lithium-Ion
Energy	<p>Watt-hour Capacity: 93 WHr</p> <p>Amp-hour capacity: 8.4Ah</p> <p>Watt-hour capacity: 11.1V</p>
Temperature	<p>Operating (Charging) 0° to 45° C (32° to 113° F)</p> <p>Operating (Discharging): -10° to 60° C (14° to 140° F)</p>
Battery Re-Charge Time	System in OFF or Standby Mode: 3 to 4 hours

Physical specifications

Feature	Description
Weights and dimensions	<p>Weight</p> <ul style="list-style-type: none"> Starting at 3.0 kg (6.61 lb) with optical drive (weight will vary by configuration) Starting at 2.87 kg (6.33 lb) without optical drive (weight will vary by configuration) <p>Dimensions (w x d x h)</p>

Feature	Description
	<ul style="list-style-type: none"> • 16.29 x 11 x 1.00 (front) -1.24 in (at rear) • 41.3 8 x 27.95 x 2.53 (front) - 3.15 cm (at rear)
Ports/Slots	<p>Ports</p> <ul style="list-style-type: none"> • USB 3.0 – Two • USB 2.0 (power port) – One • HDMI 1.4a – One • Stereo microphone input – One • Headphone/line out – One • RJ-45 (Ethernet) – One • Power connector – One • VGA – One
Digital media slots	<ul style="list-style-type: none"> • Multi Media Reader slot supporting SD • SDHC • SDXC • Memory stick • MSXC

Software/OS


Feature	Description
Operating system	<p>Preinstalled.</p> <ul style="list-style-type: none"> • Windows 8 Pro 64 • Windows 7 Professional (available through downgrade rights from Windows 8 Pro) • Windows 8 64 • Windows 7 Professional 64 • Windows 7 Home Premium 64 • Windows 7 Home Basic 64 • SUSE Linux Enterprise Desktop 11 • FreeDOS 

Feature	Description
Preinstalled software with windows operating system	<ul style="list-style-type: none"> • HP Wireless Hotspot • HP Mobile Connect (EMEA Only) (Win 8 Only) • HP ePrint (HP Exclusive) • HP Hotkey support • HP 3D Driveguard (Windows required) • PDF Complete Corporate Edition • Skype ready • HP Recovery Manager • HP Support Assistant • Buy Office • Intel Wireless Display
Security	<p>Standard</p> <ul style="list-style-type: none"> • HP Client Security (Windows only) • HP Trust Circles Standard (Available in Fall 2013) • Microsoft Security Essentials(Windows 7)/Microsoft Defender (Windows 8) • HP Drive Encryption • HP BIOS Protection • Security lock slot

Environmental specifications

Specification	Description
Energy consumption	<ul style="list-style-type: none"> • 115 V ac • 230 V ac • 100 V ac
Normal operation	<ul style="list-style-type: none"> • 7.968 W • 8.028 W • 7.272 W



Sleep (Energy Star low power mode)	<ul style="list-style-type: none"> • 0.900 W • 0.948 W • 0.876 W
Off	<ul style="list-style-type: none"> • 0.468 W • 0.480 W • 0.456 W
Heat Dissipation ¹	<ul style="list-style-type: none"> • 115 V ac • 230 V ac • 100 V ac
Normal operation	<ul style="list-style-type: none"> • 27 BTU/hr • 27 BTU/hr • 25 BTU/hr
Sleep	<ul style="list-style-type: none"> • 3 BTU/hrr • 3 BTU/hr • 3 BTU/hr
Off	<ul style="list-style-type: none"> • 2 BTU/hrr • 2 BTU/hr • 2 BTU/hr
<p>NOTE: Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.</p> 	

Warranty information

Terms of warranty apply to the individual model purchased. To see if your HP product is still in warranty, go to the [HP Product Warranty Check page](#).

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