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HP ProBook 455 G3 Notebook PC - Specification

[Features](#)[Preinstalled software and security](#)[Power](#)[Weight and dimensions](#)[Ports/slots](#)[Networking/communications](#)[Link to product overview page](#)

Features

Specifications	Description
Operating system (preinstalled)	<p>Windows 10 Pro 64</p> <p>Windows 10 Home 64</p> <p>Windows 8.1 Pro 64</p> <p>Windows 8.1 64</p> <p>Windows 7 Professional 64 (available through downgrade rights from Windows 10 Pro)</p> <p>NOTE: This system is preinstalled with Windows 7 Professional software and also comes with a license and media for Windows 10 Professional software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.</p>


Specifications	Description
	<p>Windows 7 Professional 32 (available through downgrade rights from Windows 10 Pro) (Japan only)</p> <p>NOTE: This system is preinstalled with Windows 7 Professional software and also comes with a license and media for Windows 10 Professional software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.</p> <p>Windows 7 Professional 64 (available through downgrade rights form Windows 8.1 Pro)</p> <p>NOTE: This system is preinstalled with Windows 7 Pro software and also comes with a license and media for Windows 8.1 Pro software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data</p> <p>Windows 7 Professional 32 (available through downgrade rights form Windows 8.1 Pro) (Japan only)</p> <p>NOTE: This system is preinstalled with Windows 7 Pro software and also comes with a license and media for Windows 8.1 Pro software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data</p> <p>Windows 7 Professional 64</p> <p>Windows 7 Professional 32</p> <p>FreeDOS 2.0</p> <p>Ubuntu Linux (not available with AMD Discrete A4 or A8 APUs)</p> <p>NOTE: Not all features are available in all editions or versions of Windows. Systems might require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows functionality.</p> 
Operating system (Web only supported)	<p>Windows 7 Professional 32</p> <p>Windows 10 Enterprise 64</p>

Specifications	Description
	<p>Windows 7 Enterprise 64</p> <p>Windows 7 Enterprise 32</p>
Processors	<p>AMD A10-8700P APU with Radeon R6 Graphics (1.8 GHz, up to 3.2 GHz, 2 MB L2 Cache, 4 cores)</p> <p>AMD A8-7410 APU with Radeon R5 Graphics (2.2 GHz, up to 2.5 GHz, 2 MB L2 Cache, 4 cores)</p> <p>AMD A4-7210 APU with Radeon R3 Graphics (1.8 GHz, up to 2.2 GHz, 2 MB L2 Cache, 4 cores)</p> <p>NOTE: This system requires a separately purchased 64-bit operating system and 64-bit software products to take advantage of the 64-bit processing capabilities of AMD technology. Multi-core processing with AMD technology is designed to improve performance of this system. Given the wide range of software applications available, performance will vary. AMD's numbering is not a measurement of clock speed. Processor speed denotes maximum performance mode; processors will run at lower speeds in battery optimization mode.</p>
Graphics	<p>Integrated UMA Graphics</p> <ul style="list-style-type: none"> • AMD A10-8700P APU with Radeon R6 graphics • AMD A8-7410 APU with Radeon R5 graphics • AMD A4-7210 APU with Radeon R3 graphics <p>AMD Switchable Discrete Graphics</p> <ul style="list-style-type: none"> • AMD A8-7410 APU with Radeon R7 M340 graphics, with 2 GB dedicated DDR3 video memory • AMD A4-7210 APU with Radeon R7 M340 graphics, with 2 GB dedicated DDR3 video memory <p>AMD Dual Graphics: AMD A10-8700P APU with Radeo R8 M350DX graphics, with 2 GB dedicated DDR3 video memory</p>
Display	<p>Internal: 15.6-inch diagonal HD* anti-glare LED-backlit (1366 x 768)</p> <p>External: Up to 32-bit per pixel color depth</p>



Specifications	Description
	<p>VGA: Port supports resolutions up to 2048 x 1536 at 60 Hz</p> <p>NOTE: Available on A4 and A8 APUs only. Supports either VGA or HDMI. Cannot support both VGA and HDMI simultaneously.</p> <p>HDMI: v1.4</p> <p>NOTE: Available on A4 and A8 APUs only. Supports either VGA or HDMI. Cannot support both VGA and HDMI simultaneously.</p> <p>NOTE: Resolutions are dependent upon monitor capability, and resolution and color depth settings. *HD content required to view HD images.</p>
Storage and drives	<p>Primary storage bay</p> <ul style="list-style-type: none"> • Supports all 7 mm / 9.5 mm, SATA 2.5 in hard drives • 500 GB 5400 rpm HDD • 500 GB 7200 rpm HDD • 1 TB 5400 rpm HDD <p>HP 3D DriveGuard (Windows only): The hard drive is mounted directly to the notebook frame, reducing the transmission of shock to the hard drive</p> <p>NOTE: For hard drives, GB = 1 billion bytes. Actual formatted capacity is less. Up to 30 GB (for Windows 10 and Windows 8.1) of system disk is reserved for the system recovery software.</p>
Memory	<p>Standard</p> <ul style="list-style-type: none"> • Two SODIMM slots (customer accessible) • Single Channel Support • DDR3L-1600 (transfer rates up to 1600 MT/s) • 2048 MB total system memory (2048 MB x 1) • 4096 MB total system memory (4096 MB x 1) • 6144 MB total system memory (4096 MB + 2048 MB) (single channel) • 8192 MB total system memory (4096 MB x 2) (single channel) • 8192 MB total system memory (8192 MB x 1) • 12288 MB total system memory (8192 MB + 4096 MB) (single channel) • 16384 MB total system memory (8192 MB x 2) (single channel)



Specifications	Description
	<p>Maximum</p> <ul style="list-style-type: none"> 16384 MB in slots 1 and 2 <p>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 performs at the lower memory speed.</p>
Networking	<p>Wireless</p> <ul style="list-style-type: none"> Realtek 802.11 b/g/n (1x1) Realtek 802.11b/g/n (1x1) Wi-Fi and Bluetooth 4.0 Combo* Broadcom 802.11b/g/n (1x1) Wi-Fi and Bluetooth 4.0 Combo* Broadcom 802.11 a/b/g/n (2x2) Wi-Fi Bluetooth 4.0 Combo* <p>Wireless access point and Internet service required and sold separately.</p> <p>Availability of public wireless access points limited.</p> <p>Bluetooth 4.0 is only supported via Combo card.</p> <p>NOTE: *Sold separately or as an optional feature.</p> <p>Communications</p> <ul style="list-style-type: none"> Integrated Ethernet 10/100/1000 (Gigabit) NIC
Audio	<p>HD Audio with DTS Studio Sound</p> <p>Integrated microphone (mono on non-webcam models only)</p> <p>Integrated microphone (dual Array on webcam models only)</p> <p>2 Stereo Speakers</p> <p>Function keys for microphone mute, volume up, volume down</p> <p>Stereo Audio-out (headphone)</p> <p>Stereo Audio-in (microphone)</p> <p>Optional Webcam* HP Camera (720p HD) (Internet access required)</p> 

Specifications	Description
	<p>NOTE: *Sold separately or as an optional feature.</p>
Clickpad	<p>Multitouch gestures enabled</p> <p>Support Windows 8 modern trackpad gestures</p> <p>Taps enabled as default</p> <p>Stylus writing support</p>

Keyboards/pointing devices

Specifications	Description
HP Premium Keyboard	<p>The HP spill-resistant keyboard is designed using a thin layer of Mylar film under the keyboard. The 101/102-key compatible keyboard features a full-pitch key layout with desktop keyboard features, such as editing keys, both left and right control and alt keys, and function keys. US and International key layouts are available. Includes a separate numeric keypad. Backlit keyboard available as an option.</p>
Buttons and function keys	<p>Separate launch buttons provide easy access to wireless on/off and speaker mute. Function keys provide control of features including: standby mode, display brightness, external display, microphone mute, volume down, volume up, and backlight toggle for backlit keyboard (select models only).</p> <p>Function keys</p> <p>ESC - System Information</p> <p>F1 - Sleep</p> <p>F2 - Blank</p> <p>F3 - Backlight Toggle (for backlit keyboard) or Blank</p> <p>F4 - Display Switching</p> <p>F5 - Brightness Down</p> <p>F6 - Brightness Up</p>




Specifications	Description
	<p>F7 - Blank</p> <p>F8 - Volume Down</p> <p>F9 - Volume Up</p> <p>F10 - Mic Mute</p> <p>F11 - Blank</p> <p>F12 - Blank</p>
<p>Hidden functions</p>	<p>Fn+R - Break</p> <p>Fn+S - Sys Rq</p> <p>Fn+C - Scroll Lock</p>
<p>Touchpad</p>	<p>On/off button (on board)</p> <p>Taps enabled as default</p> <p>Gestures (enabled by default)</p> <ul style="list-style-type: none"> • 2 Finger Scrolling • 2 Finger Zoom (Pinch) • OSD (enable/disable) • Win 8 2 Finger tap = right click • Win 8 Edge Swipes <p>Disabled by default</p> <ul style="list-style-type: none"> • 3 Finger Flick • 2 Finger Rotate • Momentum Motion • 1 Finger Vertical Scroll


Preinstalled software and security



Specifications	Description
BIOS	<p>HP BIOSphere</p> <p>NOTE: Available only on business PCs with HP BIOS.</p> <p>HP DriveLock, HP Automatic DriveLock</p> <p>HP BIOS Protection</p> <p>NOTE: May require a manual recovery step if all copies of BIOS are compromised or deleted.</p> <p>Master Boot Record Security</p> <p>Power On Authentication</p> <p>Pre-Boot Security</p> <p>Secure Erase</p> <p>NOTE: For the methods outlined in the National Institute of Standards and Technology Special Publication 800-88.</p> <p>Hybrid Boot (Windows 8.1 & later)</p> <p>Measure Boot (Windows 8.1 & later)</p> <p>Secure Boot (Windows 8.1 & later)</p> <p>Absolute Persistence Module</p> <p>NOTE: Absolute agent is shipped turned off, and will be activated when customers activate a purchased subscription. Subscriptions can be purchased for terms ranging multiple years. Service is limited, check with Absolute for availability outside the U.S. The Absolute Recovery Guarantee is a limited warranty. Certain conditions apply. Data Delete is an optional service provided by Absolute Software. If utilized, the Recovery Guarantee is null and void. In order to use the Data Delete service, customers must first sign a Pre-Authorization Agreement and either obtain a PIN or purchase one or more RSA SecurID tokens from Absolute Software.</p>
Multimedia	<p>Cyberlink Power DVD, BD</p> <p>Cyberlink Power2Go (Secure Burn)</p>




Specifications	Description
	Cyberlink YouCam BE (Windows 7 only)
Communication	<p>HP GPS and Location (Windows 7 only)</p> <p>NOTE: GPS access requires an unobstructed path to multiple satellites. Performance may be affected if/when used inside of buildings, bridges or heavily congested metropolitan areas. Requires separately purchased GPS navigation software available from multiple GPS applications.</p> <p>HP Connection Manager with support for HP Mobile Connect (Windows 7 only)</p> <p>HP Mobile Connect (Windows 8.1 & later)</p> <p>NOTE: HP Mobile Connect is only available on preconfigured devices with WWAN.</p> <p>Native Miracast Support</p> <p>NOTE: Miracast is a wireless technology your PC can use to project your screen to TVs, projectors, and streaming media players that also support Miracast. You can use Miracast to share what you're doing on your PC and present a slide show.</p>
HP Value Add Software	<p>HP 3D DriveGuard</p> <p>HP ePrint Driver</p> <p>NOTE: Requires an Internet connection to HP web-enabled printer and HP ePrint account registration. Requires optional broadband module. Broadband use requires separately purchased service contract. Check with service provider for coverage and availability in your area. Separately purchased data plans or usage fees may apply. Print times and connection speeds may vary.</p> <p>HP Hotkey</p> <p>HP Recovery Manager</p> <p>HP Recovery Disc Creator</p> <p>HP Unified Recovery Manager (Windows 8.1 and 10 only)</p> <p>HP Registration App (Windows 8.1 & later)</p> <p>HP Support Assistant</p> 

Specifications	Description
	<p>HP Noise Reduction Software</p> <p>HP Pixel Sharp</p>
3rd Party	Foxit PhantomPDF Express for HP
Microsoft products	<p>Buy Office</p> <p>Bing Search</p> <p>Skype</p> <p>NOTE: Skype is not offered in China.</p>
Manageability	<p>Preinstalled</p> <ul style="list-style-type: none"> • HP SoftPaq Download Manager (SDM) • LANDESK Management (subscription required) <p>Not preinstalled (available on manageability website)</p> <ul style="list-style-type: none"> • HP Driver Packs • HP BIOS Config Utility (BCU) • HP Client Catalog • HP CIK for Microsoft SCCM • HP System Software Manager (SSM)
Client security software	<p>Absolute Persistence Module</p> <p>NOTE: The Absolute Persistence agent is shipped turned off, and must be activated by customers when they purchase a subscription. Subscriptions can be purchased for terms ranging multiple years. Service is limited, check with Absolute for availability outside the U.S.</p> <p>HP Drive Encryption</p> <p>NOTE: Data is protected prior to Drive Encryption login. Turning the PC off or into hibernate logs out of Drive Encryption and prevents data access.</p> 

Specifications	Description
	<p>HP Security Manager</p> <p>Microsoft Security Essentials</p> <p>NOTE: Opt in and internet connection required for updates.</p> <p>Microsoft Defender</p>
Security	<p>Pre-boot Authentication</p> <p>Security lock slot (Lock sold separately)</p> <p>Optional Fingerprint Reader (sold separately)</p> <p>TPM</p>

NOTE: HP Cloud Recovery download tool (Cloud Recovery Client) is available under Software and Drivers section on the support page.


Power

Specifications	Description
Power supply	<p>Models with discrete graphics: HP 65W Smart AC Adapter</p> <p>Models with integrated graphics:</p> <ul style="list-style-type: none"> • HP 45W Smart AC Adapter • HP 45W Smart AC Adapter (two prong) (Japan only) (1.0 m power cord only)
Primary battery	<p>HP 4-cell battery - 44 WHr Li-ion</p> <p>Optional HP 6-cell battery- 55 WHr Long Life Li-ion</p> <p>Power cord length 1 meter or 1.8 meter</p> 

Weight and dimensions

Specifications	Description
Weight	<p>Starting at 2.15 kg (4.74 lb)</p> <p>NOTE: Weight varies by configuration and components.</p>
Dimensions (W x D x H)	<p>37.80 x 26.43 x 2.38 cm (14.88 x 10.41 x 0.94 in)</p> <p>NOTE: Height varies depending upon where on the notebook the measurement is made.</p>
Other weights (sold separately or as an optional feature)	<p>ODD, 4 cell Battery: 2.26 kg (4.98 lb)</p> <p>No-ODD, 6 cell Battery: 2.27 kg (5 lb)</p> <p>ODD, 6 cell Battery: 2.38 kg (5.25 lb)</p> <p>NOTE: Weight varies by configuration and components.</p>


Ports/slots

Specifications	Description
Ports	<p>2 USB 3.0 Ports</p> <p>2 USB 2.0 Ports</p> <p>1 HDMI</p> <p>1 VGA</p> <p>1 RJ-45 /Ethernet</p> <p>1 Headphone/Microphone Combo Jack</p> <p>1 Power Adapter connector</p> 

Specifications	Description
	<p>NOTE: All cables are sold separately.</p>
Media reader slot	<p>Support SD/SDHC/SDXC</p> <p>Push-Push Insertion/Removal</p>

System unit

Stand-alone power requirements (AC power)	Nominal Operating Voltage	19.5V	
	Average Operating Power	21W	
	Maximum Operating Power	Discrete < 65W UMA < 45W	
Temperature	Operating	0° to 35° C (32° to 95° F) (not writing optical) 5° to 35° C (41° to 95° F) (writing optical)	
	Non-operating	-20° to 60° C (-4° to 140° F)	
Relative humidity	Operating	10% to 90%, non-condensing	
	Non-operating	5% to 95%, 38.7° C (101.6° F) maximum wet bulb temperature	

Shock	Operating	40 G, 2 ms, half-sine
	Non-operating	200 G, 2 ms, half-sine
Random vibration	Operating	0.75 grms
	Non-operating	1.50 grms
Altitude (unpressurized)	Operating	-15.24 to 3,048 m (-50 to 10,000 ft)
	Non-operating	-15.24 to 12,192 m (-50 to 40,000 ft)
Planned industry standard certifications	UL	Yes
	CSA	Yes
	FCC Compliance	Yes
	ENERGY STAR	Select models NOTE: Configurations of the HP ProBook 455 G3 that are ENERGY STAR qualified are identified as HP ProBook 455 G3 ENERGY STAR on HP websites. 
	EPEAT	Registered Gold in United States

	NOTE: EPEAT registration varies by country.
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


Item	Specifications	Description
15.6-inch diagonal LED HD (1366 x 768) anti-glare	Dimensions (W x H)	36.0 x 22.43 cm (14.17 x 8.83 in)
	Weight	500g (1.10 lb)
	Diagonal Size	(39.6 cm (15.6 in)
	Surface Treatment	Anti-glare
	Contrast Ratio	400:1 (min)
	Refresh Rate	60 Hz
	Brightness	200 nit (typical)
	Pixel Resolution	Pitch

Item	Specifications	Description	
		Format	1366 x 768
		Configuration	RGB Stripe
	Backlight	LED	
	PPI	106 ppi	
	Viewing Angle	±30° Horizontal, ±10° Vertical (minimum) 30/30/20/10 (Left/Right/Down/Up) (minimum) 45/45/35/25 (Left/Right/Down/Up) (typical)	


Storage and drives

500 GB 5400 rpm SATA hard drive NOTE: For hard drives, GB = 1 billion bytes. Actual formatted capacity is less. Up to 30 GB (for Windows 10 and Windows 8.1) of system disk is reserved for the system recovery software.	Drive Weight	101 g (0.22 lb)
	Capacity	500 GB
	Height	7 mm (0.27 in)
	Width	70 mm (2.75 in) 

	Interface	ATA-8, SATA 2.6, 3.0 Gb/s, NCQ	
	Transfer Rate	Maximum	300 MB/s (Drive Capability)
	Rotational Speed	5400 rpm	
	Logical Blocks	976,773,168	
	Operating Temperature	0° to 60° C (32° to 140° F) [case temp]	
	Seek Time (typical reads, including settling)	Single Track	3 ms
		Average	13 ms
		Maximum	24 ms
	Features	ATA Security	

500 GB 7200 rpm SATA Hard Drive NOTE: For hard drives, GB = 1 billion bytes. Actual formatted capacity is less. Up to 30 GB (for Windows 10 and Windows 8.1) of system	Drive Weight	115 g (0.25 lb)	
	Capacity	500 GB	

disk is reserved for the system recovery software.

Height	7 mm (0.27 in)	
Width	70 mm (2.75 in)	
Interface	ATA-8, SATA 2.6, 3.0 Gb/s, NCQ	
Transfer Rate	Maximum	300 MB/s (Drive Capability)
Rotational Speed	7200 rpm	
Logical Blocks	976,773,168	
Operating Temperature	0° to 60° C (32° to 140° F) [case temp]	
Seek Time (typical reads, including settling)	Single Track	1.5 ms
	Average	11 ms
	Maximum	22 ms
Features	ATA Security 	

1 TB 5400 rpm SATA Hard Drive

NOTE: For hard drives, GB = 1 billion bytes. Actual formatted capacity is less. Up to 30 GB (for Windows 10 and Windows 8.1) of system disk is reserved for the system recovery software.

Drive Weight	115 g (0.25 lb)	
Capacity	1 TB	
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	Maximum	300 MB/s (Drive Capability)
Rotational Speed	5400 rpm	
Logical Blocks	1,953,525,168	
Operating Temperature	0° to 60° C (32° to 140° F) [case temp]	
Seek Time (typical reads, including settling)	Single Track	3 ms
	Average	13 ms


		Maximum	24 ms
	Features	ATA Security	

Networking/communications

Realtek 802.11b/g/n (1x1)

Specifications	Description
Wireless LAN standards	IEEE 802.11b IEEE 802.11g IEEE 802.11n
Interoperability	Wi-Fi certified
Frequency band	802.11b/g/n <ul style="list-style-type: none"> 2.402 – 2.482 GHz <div style="background-color: #f0f0f0; padding: 10px; margin-top: 10px;"> <p>NOTE: The United States Federal Communication Commissions (FCC) has declared as of September 1, 2014, products that utilize passive scanning on channel 12/13 and are capable of transmitting must fully comply with requirements of 15.247 or otherwise disable those channels.</p> </div>
Data rates	802.11b: 1, 2, 5.5, 11 Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: MCS 0 ~ MCS 07, (20MHz)



Specifications	Description
Modulation	Direct Sequence Spread Spectrum BPSK, QPSK, CCK, 16-QAM, 64-QAM
Security	<ul style="list-style-type: none"> • IEEE and Wi-Fi compliant 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware • 802.1x authentication • WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES • WPA2 certification • IEEE 802.11i • Cisco Certified Extensions, all versions through CCX4 and CCX Lite • WAPI
Network architecture models	<p>Ad-hoc (peer to peer)</p> <p>Infrastructure (access point required)</p>
Roaming	IEEE 802.11 compliant roaming between access points
Output power	<ul style="list-style-type: none"> • 802.11b : +16dBm minimum • 802.11g : +14dBm minimum • 802.11a : +14dBm minimum • 802.11n HT20(2.4GHz) : +13dBm minimum • 802.11n HT40(2.4GHz) : +13dBm minimum • 802.11n HT20(5GHz) : +12dBm minimum • 802.11n HT40(5GHz) : +12dBm minimum
Power consumption	<p>Transmit: 2.0 W (max)</p> <p>Receive: 1.6 W (max)</p> <p>Idle mode (PSP): 180 mW (WLAN Associated)</p> <p>Idle mode: 60 mW (WLAN unassociated)</p> <p>Radio disabled: 30 mW</p> 

Specifications	Description
Power management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver sensitivity	<p>802.11b, 1Mbps : -94dBm maximum</p> <p>802.11b, 11Mbps : -86dBm maximum</p> <p>802.11g, 6Mbps : -88dBm maximum</p> <p>802.11g, 54Mbps : -74dBm maximum</p> <p>802.11a, 6Mbps : -86dBm maximum</p> <p>802.11a, 54Mbps : -72dBm maximum</p> <p>802.11n, MCS07 : -69dBm maximum</p> <p>802.11n, MCS15 : -66dBm maximum</p>
Antenna type	<p>High efficiency antenna with spatial diversity, mounted in the display enclosure</p> <p>Two embedded antennas for 2.4GHz are provided to the card to support WLAN and Bluetooth communications. (Support dual antenna or single antenna, depend on platform requirement)</p>
Form factor	PCI-Express M.2 Mini Card
Dimensions	<p>Type 2230: 2.3 x 22.0 x 30.0 mm</p> <p>Type 1630: 2.3 x 16.0 x 30.0 mm</p>
Weight	<p>Type 2230: 2.8 g</p> <p>Type 1630: 2 g</p>




Specifications	Description
Operating voltage	3.3v +/- 9%
Temperature	Operating: -10° to 70° C (14° to 158° F) Non-operating: -40° to 80° C (-40° to 176° F)
Humidity	Operating: 10% to 90% (non-condensing) Non-operating: 5% to 95% (non-condensing)
Altitude	Operating: 0 to 3,048 m (10,000 ft) Non-operating: 0 to 15,240 m (50,000 ft)
LED activity	LED Amber – Radio OFF; LED White – Radio ON

Realtek 802.11b/g/n (1x1) + Bluetooth Combo

Specifications	Description
Wireless LAN standards	IEEE 802.11b IEEE 802.11g IEEE 802.11n
Interoperability	Wi-Fi certified
Frequency band	802.11b/g/n <ul style="list-style-type: none"> 2.402 – 2.482 GHz



Specifications	Description
	<p>NOTE: The United States Federal Communication Commissions (FCC) has declared as of September 1, 2014, products that utilize passive scanning on channel 12/13 and are capable of transmitting must fully comply with requirements of 15.247 or otherwise disable those channels.</p>
Data rates	<p>802.11b: 1, 2, 5.5, 11 Mbps</p> <p>802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</p> <p>802.11n: MCS 0 ~ MCS 07, (20MHz)</p>
Modulation	Direct Sequence Spread Spectrum BPSK, QPSK, CCK, 16-QAM, 64-QAM
Security	<ul style="list-style-type: none"> • IEEE and Wi-Fi compliant 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware • 802.1x authentication • WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES • WPA2 certification • IEEE 802.11i • Cisco Certified Extensions, all versions through CCX4 and CCX Lite • WAPI
Network architecture models	<p>Ad-hoc (peer to peer)</p> <p>Infrastructure (access point required)</p>
Roaming	IEEE 802.11 compliant roaming between access points
Output power	<ul style="list-style-type: none"> • 802.11b : +16dBm minimum • 802.11g : +14dBm minimum • 802.11n HT20(2.4GHz) : +13dBm minimum • 802.11n HT40(2.4GHz) : +13dBm minimum 

Specifications	Description
	<ul style="list-style-type: none"> 802.11n HT20(5GHz) : +12dBm minimum 802.11n HT40(5GHz) : +12dBm minimum
Power consumption	<p>Transmit: 2.0 W (max)</p> <p>Receive: 1.6 W (max)</p> <p>Idle mode (PSP): 180 mW (WLAN Associated)</p> <p>Idle mode: 60 mW (WLAN unassociated)</p> <p>Radio disabled: 30 mW</p>
Power management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver sensitivity	<p>802.11b, 1Mbps : -94dBm maximum</p> <p>802.11b, 11Mbps : -86dBm maximum</p> <p>802.11g, 6Mbps : -88dBm maximum</p> <p>802.11g, 54Mbps : -74dBm maximum</p> <p>802.11n, MCS07 : -69dBm maximum</p> <p>802.11n, MCS15 : -66dBm maximum</p>
Antenna type	<p>High efficiency antenna with spatial diversity, mounted in the display enclosure</p> <p>Two embedded antennas for 2.4GHz are provided to the card to support WLAN and Bluetooth communications. (Support dual antenna or single antenna, depend on platform requirement)</p>
Form factor	PCI-Express M.2 Mini Card
Dimensions	Type 2230: 2.3 x 22.0 x 30.0 mm



Specifications	Description
Weight	Type 1630: 2.3 x 16.0 x 30.0 mm Type 2230: 2.8 g Type 1630: 2 g
Operating voltage	3.3v +/- 9%
Temperature	Operating: -10° to 70° C (14° to 158° F) Non-operating: -40° to 80° C (-40° to 176° F)
Humidity	Operating: 10% to 90% (non-condensing) Non-operating: 5% to 95% (non-condensing)
Altitude	Operating: 0 to 3,048 m (10,000 ft) Non-operating: 0 to 15,240 m (50,000 ft)
LED activity	LED Amber – Radio OFF; LED White – Radio ON
HP Integrated Module with Bluetooth 4.0+EDR Wireless Technology	
Bluetooth specification	4.0+EDR Compliant
Frequency band	2402 to 2480 MHz
Number of available channels	79 (1 MHz) available channels



Specifications	Description												
Data rates and throughput	<p>3 Mbps data rate; throughput up to 2.17 Mbps</p> <p>Synchronous Connection Oriented links up to 3, 64 kbps, voice channels</p> <p>Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric or 1306.9 kbps symmetric</p>												
Transmit power	The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of +4 dBm for BR and EDR.												
Receiver sensitivity	<table border="1"> <thead> <tr> <th>Modulation</th> <th>0.01% BER</th> <th>0.001% BER</th> </tr> </thead> <tbody> <tr> <td>GFSK</td> <td>-80 dBm</td> <td>-70 dBm</td> </tr> <tr> <td>$\pi/4$-DQPSK</td> <td>-80 dBm</td> <td>-70 dBm</td> </tr> <tr> <td>8DPSK</td> <td>-80 dBm</td> <td>-70 dBm</td> </tr> </tbody> </table>	Modulation	0.01% BER	0.001% BER	GFSK	-80 dBm	-70 dBm	$\pi/4$ -DQPSK	-80 dBm	-70 dBm	8DPSK	-80 dBm	-70 dBm
Modulation	0.01% BER	0.001% BER											
GFSK	-80 dBm	-70 dBm											
$\pi/4$ -DQPSK	-80 dBm	-70 dBm											
8DPSK	-80 dBm	-70 dBm											
Power consumption	<p>Peak (Tx) 330 mW</p> <p>Peak (Rx) 230 mW</p> <p>Selective Suspend 17 mW</p>												
Range	Up to 10 m (33 ft)												
Electrical interface	USB 2.0 compliant												



Specifications	Description
Bluetooth software supported link topology	Microsoft Windows Bluetooth Software
Electrical interface	Point to Point, Multipoint Pico Nets up to 7 slaves
Bluetooth software supported security	Full support of Bluetooth Security Provisions
Power management	Microsoft Windows ACPI, and USB Bus Support
Power management certifications	Self-configurable to optimize power conservation in all operating modes, including Standby, Hold, Park, and Sniff
Security	All necessary regulatory approvals for supported countries
Bluetooth profiles supported certifications	FCC (47 CFR) Part 15C, Section 15.247 & 15.249
Power management certifications	ETS 300 328, ETS 300 826 Low Voltage Directive IEC950
Bluetooth profiles supported certifications	UL, CSA, and CE Mark Serial Port Profile (SPP) Service Discovery Application Profile (SDAP) Dial-Up Networking (DUN)



Specifications	Description
	<p>Generic Object Exchange Profile (GOEP)</p> <p>Object Push Profile (OPP)</p> <p>File Transfer Profile (FTP)</p> <p>Synchronization Profile (SYNC)</p> <p>Hard Copy Cable Replacement (HCRP)</p> <p>Personal Area Networking Profile (PAN)</p> <p>Human Interface Device Profile (HID)</p> <p>FAX Profile (FAX)</p> <p>Basic Imaging Profile (BIP)2</p> <p>Headset Profile (HSP)</p> <p>Hands Free Profile (HFP)</p> <p>Advanced Audio Distribution Profile (A2DP)</p>

HP Integrated Module with Bluetooth 4.0+EDR wireless technology

Specifications	Description
Bluetooth specification	4.0+EDR compliant
Frequency band	2402 to 2480 MHz
Number of available channels	79 (1 MHz) available channels
Data rates and throughput	<p>3 Mbps data rate; throughput up to 2.17 Mbps</p> <p>Synchronous Connection Oriented links up to 3, 64 kbps, voice channels</p>



Specifications	Description												
	Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric or 1306.9 kbps symmetric												
Transmit power	The Bluetooth component operates as a Class II Bluetooth device with a maximum transmit power of +4 dBm for BR and EDR.												
Receiver sensitivity	<table border="1"> <thead> <tr> <th>Modulation</th> <th>0.01% BER</th> <th>0.001% BER</th> </tr> </thead> <tbody> <tr> <td>GFSK</td> <td>-80 dBm</td> <td>-70 dBm</td> </tr> <tr> <td>$\pi/4$-DQPSK</td> <td>-80 dBm</td> <td>-70 dBm</td> </tr> <tr> <td>8DPSK</td> <td>-80 dBm</td> <td>-70 dBm</td> </tr> </tbody> </table>	Modulation	0.01% BER	0.001% BER	GFSK	-80 dBm	-70 dBm	$\pi/4$ -DQPSK	-80 dBm	-70 dBm	8DPSK	-80 dBm	-70 dBm
Modulation	0.01% BER	0.001% BER											
GFSK	-80 dBm	-70 dBm											
$\pi/4$ -DQPSK	-80 dBm	-70 dBm											
8DPSK	-80 dBm	-70 dBm											
Power consumption	Peak (Tx) 330 mW Peak (Rx) 230 mW Selective Suspend 17 mW												
Range	Up to 10 m (33 ft)												
Bluetooth software supported	Microsoft Windows Bluetooth software												
Electrical interface	USB 2.0 compliant Point to Point, Multipoint Pico Nets up to 7 slaves												



Specifications	Description
Power management	<p>Microsoft Windows ACPI, and USB bus support</p> <p>Self-configurable to optimize power conservation in all operating modes, including Standby, Hold, Park, and Sniff</p>
Security certifications	<p>All necessary regulatory approvals for supported countries/regions, including FCC (47 CFR) Part 15C, Section 15.247 & 15.249</p>
Bluetooth profiles supported	<p>Full support of Bluetooth security provisions</p> <p>ETS 300 328, ETS 300 826</p>
Certifications	<p>Low Voltage Directive IEC950</p> <p>UL, CSA, and CE Mark</p> <p>Serial Port Profile (SPP)</p> <p>Service Discovery Application Profile (SDAP)</p> <p>Dial-Up Networking (DUN)</p> <p>Generic Object Exchange Profile (GOEP)</p> <p>Object Push Profile (OPP)</p> <p>File Transfer Profile (FTP)</p> <p>Synchronization Profile (SYNC)</p> <p>Hard Copy Cable Replacement (HCRP)</p> <p>Personal Area Networking Profile (PAN)</p> <p>Human Interface Device Profile (HID)</p> <p>FAX Profile (FAX)</p> <p>Basic Imaging Profile (BIP)</p> <p>Headset Profile (HSP)</p> <p>Hands Free Profile (HFP)</p>




Specifications	Description
	Advanced Audio Distribution Profile (A2DP)

Broadcom 802.11 b/g/n (1x1) + Bluetooth combo

Specifications	Description
Wireless LAN standards	<p>IEEE 802.11b</p> <p>IEEE 802.11g</p> <p>IEEE 802.11n</p>
Interoperability	Wi-Fi certified
Frequency band	<p>802.11b/g/n</p> <ul style="list-style-type: none"> 2.402 – 2.482 GHz <p>NOTE: The FCC has declared as of January 1, 2015, products that utilize passive scanning on channel 12/13 and are capable of transmitting must fully comply with requirements of 15.247 or otherwise disable those channels.</p> <p>802.11a/n</p> <ul style="list-style-type: none"> 4.9 – 4.95 GHz (Japan) 5.15 – 5.25 GHz 5.25 – 5.35 GHz 5.47 – 5.725 GHz 5.825 – 5.850 GHz <p>NOTE: Indonesia supports only 5.725 - 5.825 GHz (CH149 - CH161)</p>
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: MCS 0 ~ MCS 07, (20MHz)



Specifications	Description
Modulation	Direct Sequence Spread Spectrum BPSK, QPSK, CCK, 16-QAM, 64-QAM
Security	<ul style="list-style-type: none"> • IEEE and Wi-Fi compliant 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware • 802.1x authentication • WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES • WPA2 certification • IEEE 802.11i • Cisco Certified Extensions, all versions through CCX4 and CCX Lite • WAPI
Network architecture models	Ad-hoc (peer to peer) Infrastructure (access point required)
Roaming	IEEE 802.11 compliant roaming between access points
Output power	<ul style="list-style-type: none"> • 802.11b : +16dBm minimum • 802.11g : +14dBm minimum • 802.11n HT20(2.4GHz) : +13dBm minimum • 802.11n HT40(2.4GHz) : +13dBm minimum • 802.11n HT20(5GHz) : +12dBm minimum • 802.11n HT40(5GHz) : +12dBm minimum
Power consumption	<p>Transmit: 2.0 W (max)</p> <p>Receive: 1.6 W (max)</p> <p>Idle mode (PSP): 180 mW (WLAN associated)</p> <p>Idle mode: 60 mW (WLAN unassociated)</p> 

Specifications	Description
	Radio disabled: 30 mW
Power management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Electrical interface	Point to Point, Multipoint Pico Nets up to 7 slaves
Receiver sensitivity	802.11b, 1Mbps : -94dBm maximum 802.11b, 11Mbps : -86dBm maximum 802.11g, 6Mbps : -88dBm maximum 802.11g, 54Mbps : -74dBm maximum 802.11n, MCS07 : -69dBm maximum 802.11n, MCS15 : -66dBm maximum
Antenna type	High efficiency antenna with spatial diversity, mounted in the display enclosure Two embedded antennas for 2.4GHz are provided to the card to support WLAN and Bluetooth communications. (Supports dual antenna or single antenna, depending on platform requirement)
Form factor	PCI-Express M.2 Mini Card
Dimensions	Type 2230: 2.3 x 22.0 x 30.0 mm Type 1630: 2.3 x 16.0 x 30.0 mm
Weight	Type 2230: 2.8 g Type 1630: 2 g




Specifications	Description
Operating voltage	3.3v +/- 9%
Temperature	Operating: -10° to 70° C (14° to 158° F) Non-operating: -40° to 80° C (-40° to 176° F)
Humidity	Operating: 10% to 90% (non-condensing) Non-operating: 5% to 95% (non-condensing)
Altitude	Operating: 0 to 3,048 m (10,000 ft) Non-operating: 0 to 15,240 m (50,000 ft)
LED activity	LED Amber – Radio OFF; LED White – Radio ON

HP Integrated Module with Bluetooth 4.0+EDR wireless technology

Specifications	Description
Bluetooth specification	4.0+EDR compliant
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




Specifications	Description Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric or 1306.9 kbps symmetric														
Transmit power	The Bluetooth component operates as a Class II Bluetooth device with a maximum transmit power of +4 dBm for BR and EDR.														
Receiver sensitivity	<table border="1"> <thead> <tr> <th>Modulation</th> <th>0.01% BER</th> <th>0.001% BER</th> </tr> </thead> <tbody> <tr> <td>GFSK</td> <td>-80 dBm</td> <td>-70 dBm</td> </tr> <tr> <td>$\pi/4$-DQPSK</td> <td>-80 dBm</td> <td>-70 dBm</td> </tr> <tr> <td>8DPSK</td> <td>-80 dBm</td> <td>-70 dBm</td> </tr> </tbody> </table>			Modulation	0.01% BER	0.001% BER	GFSK	-80 dBm	-70 dBm	$\pi/4$ -DQPSK	-80 dBm	-70 dBm	8DPSK	-80 dBm	-70 dBm
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GFSK	-80 dBm	-70 dBm													
$\pi/4$ -DQPSK	-80 dBm	-70 dBm													
8DPSK	-80 dBm	-70 dBm													
Power consumption	Peak (Tx) 330 mW Peak (Rx) 230 mW Selective Suspend 17 mW														
Range	Up to 10 m (33 ft)														
Bluetooth software supported	Microsoft Windows Bluetooth software														
Electrical interface	USB 2.0 compliant Point to Point, Multipoint Pico Nets up to 7 slaves 														

Specifications	Description
Power management	<p>Microsoft Windows ACPI, and USB bus support</p> <p>Self-configurable to optimize power conservation in all operating modes, including Standby, Hold, Park, and Sniff</p>
Security certifications	All necessary regulatory approvals for supported countries/regions, including FCC (47 CFR) Part 15C, Section 15.247 & 15.249
Bluetooth profiles supported	<p>Full support of Bluetooth security provisions</p> <p>ETS 300 328, ETS 300 826</p>
Certifications	<p>Low Voltage Directive IEC950</p> <p>UL, CSA, and CE Mark</p> <p>Serial Port Profile (SPP)</p> <p>Service Discovery Application Profile (SDAP)</p> <p>Dial-Up Networking (DUN)</p> <p>Generic Object Exchange Profile (GOEP)</p> <p>Object Push Profile (OPP)</p> <p>File Transfer Profile (FTP)</p> <p>Synchronization Profile (SYNC)</p> <p>Hard Copy Cable Replacement (HCRP)</p> <p>Personal Area Networking Profile (PAN)</p> <p>Human Interface Device Profile (HID)</p> <p>FAX Profile (FAX)</p> <p>Basic Imaging Profile (BIP)</p> <p>Headset Profile (HSP)</p> <p>Hands Free Profile (HFP)</p>



Specifications	Description
	Advanced Audio Distribution Profile (A2DP)

Broadcom 802.11 a/b/g/n (2x2) + Bluetooth combo

Specifications	Description
Wireless LAN standards	<p>IEEE 802.11a</p> <p>IEEE 802.11b</p> <p>IEEE 802.11g</p> <p>IEEE 802.11n</p>
Interoperability	Wi-Fi certified
Frequency band	<p>802.11b/g/n</p> <ul style="list-style-type: none"> 2.402 – 2.482 GHz <p>NOTE: The FCC has declared as of January 1, 2015, products that utilize passive scanning on channel 12/13 and are capable of transmitting must fully comply with requirements of 15.247 or otherwise disable those channels.</p> <p>802.11a/n</p> <ul style="list-style-type: none"> 4.9 – 4.95 GHz (Japan) 5.15 – 5.25 GHz 5.25 – 5.35 GHz 5.47 – 5.725 GHz 5.825 – 5.850 GHz <p>NOTE: Indonesia supports only 5.725 - 5.825 GHz (CH149 - CH161)</p> 
Antenna Structure	2 transmit; 2 receive (2x2)

Specifications	Description
Data rates	<p>802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</p> <p>802.11b: 1, 2, 5.5, 11 Mbps</p> <p>802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</p> <p>802.11n: MCS 0 ~ MCS 07, (20MHz)</p>
Modulation	<p>Direct Sequence Spread Spectrum</p> <p>BPSK, QPSK, CCK, 16-QAM, 64-QAM</p>
Security	<p>IEEE and Wi-Fi compliant 64 / 128 bit WEP encryption for a/b/g mode only</p> <p>AES-CCMP: 128 bit in hardware</p> <p>802.1x authentication</p> <p>WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES</p> <p>WPA2 certification</p> <p>IEEE 802.11i</p> <p>Cisco Certified Extensions, all versions through CCX4 and CCX Lite</p> <p>WAPI</p>
Network architecture models	<p>Ad-hoc (peer to peer)</p> <p>Infrastructure (access point required)</p>
Roaming	IEEE 802.11 compliant roaming between access points
Output power	<p>802.11b : +16dBm minimum</p> <p>802.11g : +14dBm minimum</p> <p>802.11a : +14dBm minimum</p>



Specifications	Description
	<p>802.11n HT20 (2.4GHz) : +13dBm minimum</p> <p>802.11n HT40 (2.4GHz) : +13dBm minimum</p> <p>802.11n HT20 (5GHz) : +12dBm minimum</p> <p>802.11n HT40 (5GHz) : +12dBm minimum</p>
Power consumption	<p>Transmit: 2.0 W (max)</p> <p>Receive: 1.6 W (max)</p> <p>Idle mode (PSP): 180 mW (WLAN associated)</p> <p>Idle mode: 60 mW (WLAN unassociated)</p> <p>Radio disabled: 30 mW</p>
Power management	<p>ACPI and PCI Express compliant power management</p> <p>802.11 compliant power saving mode</p>
Electrical interface	<p>Point to Point, Multipoint Pico Nets up to 7 slaves</p>
Receiver sensitivity	<p>802.11b, 1Mbps : -94dBm maximum</p> <p>802.11b, 11Mbps : -86dBm maximum</p> <p>802.11g, 6Mbps : -88dBm maximum</p> <p>802.11g, 54Mbps : -74dBm maximum</p> <p>802.11a, 6Mbps : -86dBm maximum</p> <p>802.11a, 54Mbps : -72dBm maximum</p> <p>802.11n, MCS07 : -69dBm maximum</p> <p>802.11n, MCS15 : -66dBm maximum</p> 

Specifications	Description
Antenna type	High efficiency antenna with spatial diversity, mounted in the display enclosure Two embedded antennas for 2.4GHz are provided to the card to support WLAN and Bluetooth communications. (Supports dual antenna or single antenna, depending on platform requirement)
Form factor	PCI-Express M.2 Mini Card
Dimensions	Type 2230: 2.3 x 22.0 x 30.0 mm Type 1630: 2.3 x 16.0 x 30.0 mm
Weight	Type 2230: 2.8 g Type 1630: 2 g
Operating voltage	3.3v +/- 9%
Temperature	Operating: -10° to 70° C (14° to 158° F) Non-operating: -40° to 80° C (-40° to 176° F)
Humidity	Operating: 10% to 90% (non-condensing) Non-operating: 5% to 95% (non-condensing)
Altitude	Operating: 0 to 3,048 m (10,000 ft) Non-operating: 0 to 15,240 m (50,000 ft)
LED activity	LED Amber – Radio OFF; LED White – Radio ON



Specifications	Description
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HP Integrated Module with Bluetooth 4.0+EDR wireless technology

Specifications	Description												
Bluetooth specification	4.0+EDR compliant												
Frequency band	2402 to 2480 MHz												
Number of available channels	79 (1 MHz) available channels												
Data rates and throughput	<p>3 Mbps data rate; throughput up to 2.17 Mbps</p> <p>Synchronous Connection Oriented links up to 3, 64 kbps, voice channels</p> <p>Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric or 1306.9 kbps symmetric</p>												
Transmit power	The Bluetooth component operates as a Class II Bluetooth device with a maximum transmit power of +4 dBm for BR and EDR.												
Receiver sensitivity	<table border="1"> <thead> <tr> <th>Modulation</th> <th>0.01% BER</th> <th>0.001% BER</th> </tr> </thead> <tbody> <tr> <td>GFSK</td> <td>-80 dBm</td> <td>-70 dBm</td> </tr> <tr> <td>$\pi/4$-DQPSK</td> <td>-80 dBm</td> <td>-70 dBm</td> </tr> <tr> <td>8DPSK</td> <td>-80 dBm</td> <td>-70 dBm</td> </tr> </tbody> </table>	Modulation	0.01% BER	0.001% BER	GFSK	-80 dBm	-70 dBm	$\pi/4$ -DQPSK	-80 dBm	-70 dBm	8DPSK	-80 dBm	-70 dBm
Modulation	0.01% BER	0.001% BER											
GFSK	-80 dBm	-70 dBm											
$\pi/4$ -DQPSK	-80 dBm	-70 dBm											
8DPSK	-80 dBm	-70 dBm											

Specifications	Description
Power consumption	<p>Peak (Tx) 330 mW</p> <p>Peak (Rx) 230 mW</p> <p>Selective Suspend 17 mW</p>
Range	Up to 10 m (33 ft)
Electrical interface	USB 2.0 compliant
Bluetooth software supported	Microsoft Windows Bluetooth software
Power management	<p>Microsoft Windows ACPI, and USB Bus Support</p> <p>Self-configurable to optimize power conservation in all operating modes, including Standby, Hold, Park, and Sniff</p>
Certifications	All necessary regulatory approvals for supported countries/regions, including FCC (47 CFR) Part 15C, Section 15.247, and 15.249
Security	All necessary regulatory approvals for supported countries/regions, including FCC (47 CFR) Part 15C, Section 15.247 & 15.249
Bluetooth profiles supported	<p>Serial Port Profile (SPP)</p> <p>Service Discovery Application Profile (SDAP)</p> <p>Dial-Up Networking (DUN)</p> <p>Generic Object Exchange Profile (GOEP)</p> <p>Object Push Profile (OPP)</p>



Specifications	Description
	<p>File Transfer Profile (FTP)</p> <p>Synchronization Profile (SYNC)</p> <p>Hard Copy Cable Replacement (HCRP)</p> <p>Personal Area Networking Profile (PAN)</p> <p>Human Interface Device Profile (HID)</p> <p>FAX Profile (FAX)</p> <p>Basic Imaging Profile (BIP)</p> <p>Headset Profile (HSP)</p> <p>Hands Free Profile (HFP)</p> <p>Advanced Audio Distribution Profile (A2DP)</p>

Realtek Ethernet (10/100/1000)

Specifications	Description
Ethernet features	<p>10 Mbit/s operation (10BASE-T; IEEE 802.3i; IEEE 802.3 clauses 13-14)</p> <p>100 Mbit/s operation (100BASE-TX; IEEE 802.3u; IEEE 802.3 clauses 21-30)</p> <p>1000 Mbit/s operation (1000BASE-T; IEEE 802.3ab; IEEE 8023 clauses 40)</p> <p>Auto-Negotiation (Automatic Speed Selection)</p> <p>Full Duplex Operation at all Speeds, Half Duplex operation at 10 and 100 Mbit/s</p> <p>IEEE 802.1p QoS (Quality of Service) Support</p> <p>IEEE 802.1q VLAN support</p> <p>IEEE 802.3x Flow Control (IEEE 802.3 clauses 31-32; configurable)</p> <p>IEEE 802.3az EEE (Energy Efficient Ethernet)</p> <p>Jumbo Frame 9K</p>



Specifications	Description
	Auto MDI/MDIX Crossover cable detection
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) Protocol Offload (ARP & NS) 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	PCI Express 1.1 to fully support ASPM L0s/L1 and CLKREQ
NIC Device Driver Name	Realtek PCIe GBE Ethernet Family Controller



Audio hardware

Specification	Description
Implementation	Conexant
Function key volume controls	Volume up, volume down, and mute
Full duplex	Yes
Microphone In	Stereo
Headphone/line Out	Stereo
Integrated microphone	Yes, dual digital microphone array

Audio Output Quality

Specification	Description
Frequency response	20Hz – 20kHz
Signal to noise ratio	106 dB (DAC), 102dB (ADC)
Total harmonic distortion	91dB THD+n on Line Out/HP (0.003%)
Play sampling rate(s)	Up to 192kHz



Specification	Description
Record sampling rate(s)	Up to 96Khz
DAC	16, 20 or 24-bit
ADC	16, 20 or 24-bit

Integrated Stereo Speakers

Specification	Description
Power Rating	2 Watts
Impedance	4 Ohms

Power

Item	Specification	Description	
HP 65W Smart AC Adapter	Dimensions	126.5 x 50 x 30 mm (4.98 x 1.97 x 1.18 in)	
	Weight	290g (0.62 lb) max	
	Input	90 to 265 VAC	
		Input Efficiency	87% min at 115 VAC



Item	Specification	Description	
		Input frequency range	47 to 63 Hz
		Input AC current	1.7 A at 90 VAC
Output		Output power	65W
		DC output	19.5V
		Hold-up time	5 msec at 115 VAC input
		Output current limit	< 11.0A
		Over voltage protection	< 29V max automatic shutdown
		Over short protection	Auto-recovery and no damage
		Connector	
Environmental Design		Operating temperature	0° to 35° C (32° to 95° F)
		Non-operating (storage) temperature	-20° to 85° C (-4° to 185° F)
		Altitude	0 to 5,000 m (0 to 16,400 ft)

Item	Specification	Description	
		Humidity	20% to 95%
		Storage Humidity	10% to 95%
	EMI and Safety Certifications	<p>CE Mark - full compliance with LVD and EMC directives</p> <p>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.</p> <p>MTBF - over 200,000 hours at 25°C ambient condition</p>	

Item	Specification	Description	
HP 45W Smart AC Adapter	Dimenstions	9.5 x 4.0 x 2.65 cm (3.74 x 1.57 x 1.04 in)	
	Weight	175g (0.386 lb) max	
	Input		90 to 265 VAC
		Input Efficiency	87.74% at 115Vac and 88.4% at 230Vac
		Input frequency range	47 to 63 Hz
Input AC current		1.4 A at 90 VAC	



Item	Specification	Description	
	Output	Output power	45W
		DC output	19.5V
		Hold-up time	5 msec at 115 VAC input
		Output current limit	< 8.0A
		Over voltage protection	< 29V max automatic shutdown
		Over short protection	Auto-recovery and no damage
	Connector	3 pin/grounded, mates with interchangeable cords	
	Environmental Design	Operating temperature	0° to 35° C (32° to 95° F)
		Non-operating (storage) temperature	-20° to 85° C (-4° to 185° F)
		Altitude	0 to 5,000 m (0 to 16,400 ft)
		Humidity	20% to 95%
		Storage Humidity	10% to 95%



Item	Specification	Description
	EMI and Safety Certifications	<p>CE Mark - full compliance with LVD and EMC directives</p> <p>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.</p> <p>MTBF - over 200,000 hours at 25°C ambient condition</p>

Item	Specification	Description		
HP 4-cell, Long Life 44 WHr Li-ion	Dimensions	33.40 x 275.80 x 20.60 mm (1.32 x 10.86 x 0.81 inch)		
	Weight	0.3 kg (0.66 lb)		
	Cells/type	4 cell Lithium-Ion		
	Energy	Voltage	14.8V	
		Amp-hour capacity	3.0Ah	
		Watt-hour capacity	44Wh	
	Temperature	Operating (Charging)	0° to 45° C (32° to 113° F)	
Operating (Discharging)		-10° to 60° C (14° to		

Item	Specification	Description	
			122° F)
		Non-operating	-20° to 60° C (-4° to 122° F)
	Battery Re-Charge Time	System in OFF or Standby Mode	< 3 hours
	Fuel Gauge LED	No	
	Warranty	1 year	
	Optional Travel Battery Available	No	

Item	Specification	Description	
HP 6-cell, Long Life 55 WHr Li-ion	Dimensions	45.59 x 275.8 x 33.89 mm (1.79 x 10.85 x 1.33 in)	
	Weight	330g (0.72 lb)	
	Cells/type	Cylindrical ICR18650 C4	
	Energy	Voltage	10.68V
Amp-hour capacity		5.15Ah	

Item	Specification	Description	
		Watt-hour capacity	55Wh
	Temperature	Operating (Charging)	0° to 45° C (32° to 113° F)
		Operating (Discharging)	-10° to 60° C (14° to 122° F)
		Non-operating	-20° to 60° C (-4° to 122° F)
	Battery Re-Charge Time	System in OFF or Standby Mode	3 hours
		System ON	3 to 5 hours
	Fuel Gauge LED	N/A	
	Warranty	3 years to 1000 cycles	
	Optional Travel Battery Available	No	

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