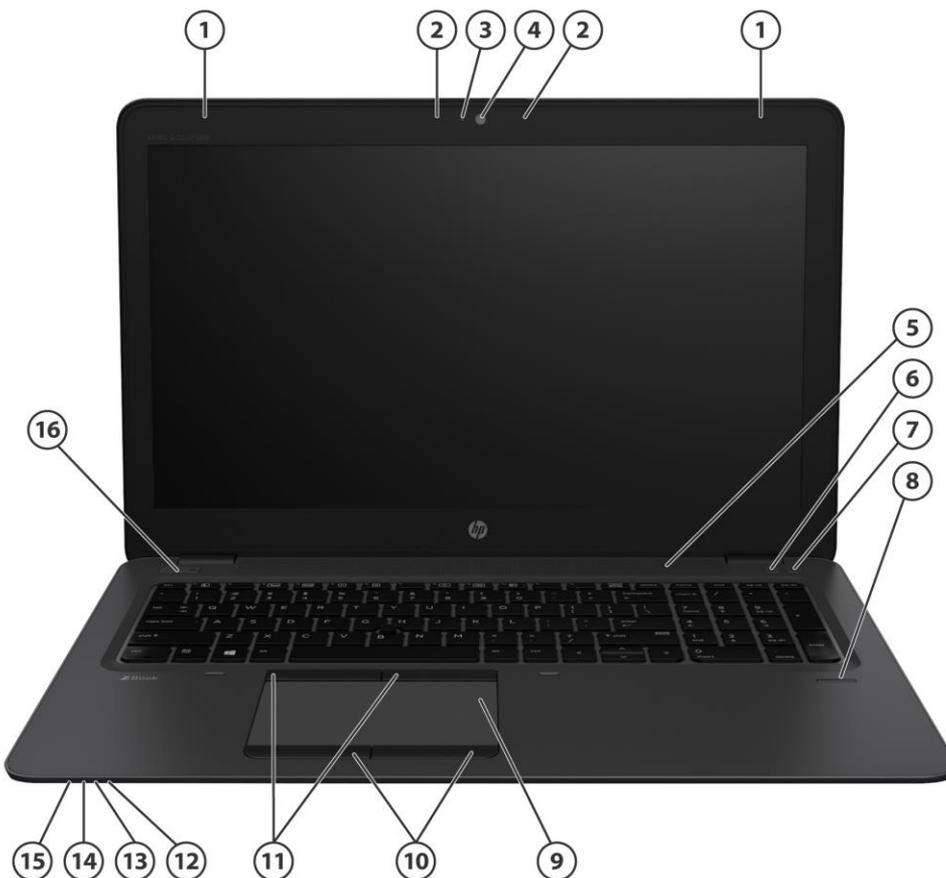


Overview

HP ZBook 15u G3 Mobile Workstation



Front

1. Wireless LAN antennas
2. Internal microphones (2)
3. Webcam light
4. Webcam
5. Speakers
6. Wireless On/Off button
7. Volume mute button
8. Fingerprint reader (select models only)
9. Touchpad
10. Lower Touchpad buttons(right and left click buttons)
11. Upper Touchpad buttons (right and left click buttons)
12. Storage light indicator
13. Battery light indicator
14. Power light indicator
15. Wireless light indicator
16. Power button

Overview



Left

- 1. Security lock slot
- 2. VGA port
- 3. USB 3.0 port (charging)
- 4. Smart Card reader



Right

- 1. USB 3.1 (Gen 1)
- 2. DisplayPort
- 3. SD Card Reader
- 4. Headphone/Microphone Combo Jack
- 5. USB 3.0 port
- 6. RJ-45 / Ethernet
- 7. Side Docking connector
- 8. SIM Module Slot
- 9. Power connector

Overview

At A Glance

- Windows® 10 editions, Windows® 7 editions, Ubuntu Linux®, or FreeDOS
- Full performance form factor and thinner industrial design than previous generation workstation grade products.
- Thin & light value performance industrial design, Casted magnesium-reinforced chassis, top cover frame features soft touch paint with lightweight aluminum insert anodized in HP's new "Space Silver" color with chemical etching. Backlight keyboard in full aluminum deck with magnesium bottom reinforcement, chemically strengthened glass touchpad, and updated system functions indicators. HP Spill Resistant Keyboard with Durakeys, touchpad buttons with Duracoat finish. Diamond cut process showcased around keyboard deck.
- Designed to pass military standard Mil-Std-810G testing*.
* MIL STD 810G testing is pending and is not intended to demonstrate fitness for U.S. Department of Defense contract requirements or for military use. Test results are not a guarantee of future performance under these test conditions. Damage under the MIL STD test conditions or any accidental damage requires an optional HP Accidental Damage Protection Care Pack. Workstation-caliber AMD® FirePro® discrete graphics: AMD® FirePro® W4190M (2 GB dedicated GDDR5); AMD® Enduro™ graphics technology.
- ISV certified to provide fast and reliable performance with workstation applications, including manipulation of 3D textures
- Choice of 6th generation Intel® Core™ i7 and i5 processors
- Intel® Core i7 with vPro and Core i5 with vPro technology (optional)
- HP Performance Advisor for optimal configuration, compatibility and performance
- Up to two SODIMMs, for system memory up to 32GB
- Supports up to 3 independent displays via internal LCD Panel, system DisplayPort, system VGA, or using the HP UltraSlim Docking Station DisplayPort and VGA ports (sold separately). Supports DisplayPort 1.2 monitors.
- Bang and Olufsen audio optimized for high fidelity audio with immersive surround sound with deep, rich bass and crystal clear dialog without distortion at high volume
- 3-cell (46 WHr) HP Long Life Battery
- 2 discrete buttons with LED indicator for convenient one touch access: Wireless On/Off, Volume Mute
- Widescreen 15-inch diagonal anti-glare LED-backlit display:
- FHD (1920x1080) standard viewing angle, FHD (1920x1080) ultrawide viewing angle, UHD (3840x2160) ultrawide viewing angle, or FHD Touch (1920x1080) standard viewing angle
- Supports wireless LAN and wireless WAN options for connectivity on the go.
- Two dedicated drive slots. (1) M.2 slots and (1) 2.5" drive bay. Both can be populated at the same time.
- Security features including HP Client Security Manager, with central management
- Low halogen, ENERGY STAR® certified and EPEAT® TBD registered in the U.S. EPEAT® status varies by country- please see epeat.net.
- HP BIOS self-healing technology including HP Sure Start to prevent, detect, and remedy known and unknown BIOS attacks.

NOTE: See important legal disclosures for all listed specs in their respective features sections.

Features

OPERATING SYSTEM

Preinstalled OS

- Windows® 10 Pro 64*
- Windows® 10 Home 64
- Windows® 7 Professional 64**
- Windows® 7 Professional 64 (available through downgrade rights from Windows 10 Pro)**
- FreeDOS 2.0

Supported OS

- Windows® 8.1 Enterprise 64*
- Windows® 8.1 Professional 64
- Windows® 7 Enterprise 32*
- Windows® 7 Enterprise 64*
- Windows® 10 Enterprise 64*

*Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. Windows 10 is automatically updated, which is always enabled. ISP fees may apply and additional requirements may apply over time for updates. See <http://www.microsoft.com>

** This system is preinstalled with Windows 7 Professional software and also comes with a license and media for Windows 10 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.

PROCESSOR*

- 6th Generation Intel® Core™ i7 6600U (2.6 GHz, 4 MB cache, 2 cores)* Up to 3.4 GHz with Intel® Turbo Boost Technology
- 6th Generation Intel® Core™ i7 6500U (2.5 GHz, 4 MB cache, 2 cores)* Up to 3.1 GHz with Intel® Turbo Boost Technology
- 6th Generation Intel® Core™ i5 6300U (2.4 GHz, 3 MB cache, 2 cores)* Up to 3.0 GHz with Intel® Turbo Boost Technology
- 6th Generation Intel® Core™ i5 6200U (2.3 GHz, 3 MB cache, 2 cores)* Up to 2.8 GHz with Intel® Turbo Boost Technology

* Multi-Core is designed to improve performance of certain software products. Not all customers or software applications will necessarily benefit from use of this technology. Performance and clock frequency will vary depending on application workload and your hardware and software configurations. Intel's numbering is not a measurement of higher performance.

Also note that the Intel® Turbo Boost is based on max GHz for a single core.

CHIPSET

Non-applicable, processor specific

Features

INTEL® CORE I5 WITH VPRO/CORE I7 WITH VPRO TECHNOLOGY CAPABLE

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

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

NOTE: Some functionality of Intel® Core i5 with vPro/Core i7 with vPro technology, such as Intel Active Management technology and Intel Virtualization technology, requires additional third-party software in order to run. Availability of future "virtual appliances" applications for Intel® Core i5 with vPro/Core i7 with vPro technology is dependent on third-party software providers. Compatibility with future "virtual appliances" is yet to be determined.

GRAPHICS

Intel® HD 5500 Graphics*

AMD® FirePro® W4190M (2 GB dedicated GDDR5)**

Microsoft DirectX 12 (Shader Model 5.0) and OpenGL 4.4 capable

AMD® Enduro™ Technology supported.

* HD content required to view HD images

**Supports up to 3 independent displays via internal LCD Panel, system DisplayPort, system VGA, or using the HP UltraSlim Docking Station DisplayPort and VGA ports (sold separately).

DISPLAY

Internal

15.6" diagonal LED backlit FHD UWVA IPS eDP anti-glare + PSR(Panel Self Refresh) (1920 x 1080);

15.6" diagonal LED backlit FHD SVA eDP anti-glare (1920 x 1080);

15.6" diagonal LED UHD UWVA IPS anti-glare (3840 x 2160)

15.6" diagonal Touch LED-backlit FHD SVA (1920 x 1080)

External

Up to 30-bit (2³⁰) per pixel "Deep Color"
(total of 1,073,741,824 color variations)

VGA

Port supports resolutions up to 1920 x 1200 at 60 Hz, and lower resolutions up to 75 Hz.

DisplayPort w/MST (Multi-stream Transport)

Supports resolutions up to UHD 3840 x 2160, 24/30-bit color depth at 60 Hz, and WUXGA (1920 x 1200) monitors, with 24/30-bit color depth up to 120 Hz.

DisplayPort Features

Features

- **Multi-stream Transport (MST):** Multi-stream Transport is a DisplayPort 1.2 feature that allows daisy chaining of DisplayPort 1.2 monitors (requires monitor with DisplayPort 1.2 MST capability), or the use of DisplayPort 1.2 hubs with MST to achieve a maximum of 3 active displays.

DVI-D (single link)

DVI support requires a DP-to-DVI adapter (sold separately). Dual-Link DVI is supported with an active USB powered adapter (sold separately).

NOTE: Resolutions are dependent upon monitor capability, and resolution and color depth settings.

STORAGE AND DRIVES

Primary Storage Bay

SATA, 2.5" Hard Drive*

1 TB 5400 rpm Hard Drive
500 GB 7200 rpm Hard Drive
500 GB 7200 rpm Self Encrypting Drive (Opal2)
500 GB 7200 rpm Self Encrypting Drive FIPS 140-2 compliant
500 GB 5400 rpm Hybrid Drive (8 GB cache)

M.2 SATA Solid State Drive

128 GB SATA-3 TLC Solid State Drive (available in 1H16)

M.2 SATA SED SSD

256 GB SATA-3 Self-Encrypting (Opal 2) MLC Solid State Drive

HP Z Turbo Drive (NVMe PCIe SSD)

256 GB PCIe NVMe Solid State Drive
512 GB PCIe NVMe Solid State Drive

HP 3D DriveGuard (Windows only)

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

NOTE: For Solid State Drives or Hard Drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 30 GB (for Windows 8.1 and 10) is reserved for system recovery software.

DRIVE CONTROLLERS

2.5" Storage Bays and M.2 Storage Bay (SATA):
HP Z Turbo Drive:

SATA-3 for HDD and SATA-3 for SSD
PCIe NVMe SSD

Features

MEMORY

Standard

32 GB DDR4 1.35V Non ECC SDRAM (Transfer rates up to 2133MT/s)
Two SODIMM slots supporting dual-channel memory
4 GB, 8GB and 16 GB SODIMMs

Maximum

Upgradeable to 32768 MB with optional 16384 MB SODIMMs in 2 slots

Dual-channel

Maximized dual-channel performance requires SODIMMs of the same size and speed in both memory channels.

* Maximum memory capacities assume Windows 64-bit operating systems or Linux. With Windows 32-bit operating systems, memory above 3 GB may not all be available due to system resource requirements.

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.

NETWORKING/COMMUNICATIONS

Communications

Integrated Intel® I219-LM Gigabit* Network Connection (vPro configurations)
Intel® WGI219V 10/100/1000 Ethernet (non-vPro configurations)

Wireless

Secure, integrated wireless LAN and wireless WAN options featuring support for the latest industry standards. Broadband Wireless (WWAN) requires a Windows operating system and is available in select countries as a standard, factory configurable feature only. Integrated Bluetooth is also available (factory configurable only) combined with the supported wireless LAN option.

802.11 Wireless LAN*

Intel® Dual Band Wireless-AC 8260 802.11 a/b/g/n/ac (2x2) WiFi + Bluetooth 4.2 Combo Adaptor* (vPro)
Intel® Dual Band Wireless-AC 8260 802.11 a/b/g/n/ac (2x2) WiFi + Bluetooth 4.2 Combo Adaptor* (non-vPro)
Intel® Dual Band Wireless-AC 3165 802.11 ac (1x1) WiFi and Bluetooth 4.0 Combo Adapter (non-vPro)

Wireless WAN - Mobile Broadband **

HP It4120 Qualcomm® Snapdragon™ X5 LTE Mobile Broadband Module
HP hs3110 HSPA+ Intel® Mobile Broadband Module

* Wireless cards are optional or add-on features and requires separately purchased wireless access point and internet service. Availability of public wireless access points limited. The specifications for the 802.11ac WLAN are draft specifications and are not final. If the final specifications differ from the draft specifications, it may affect the ability of the notebook to communicate with other 802.11ac WLAN devices.

** WWAN use requires separately purchased service contract. Check with service provider for coverage and availability in your area. Connection speeds will vary due to location, environment, network conditions, and other factors. 4G LTE not available on all products, and in all regions.

Features

AUDIO/MULTIMEDIA

Audio

Bang and Olufsen audio

Integrated stereo speakers

Integrated microphone (dual-microphone array when equipped with optional webcam)

Button for volume mute; function keys for volume up and down

Combo mic-in / stereo headphone-out jack

Webcam

720p HD webcam*

- HD format (widescreen)
- Supports videoconferencing and still image capture
- High quality fixed focus lens
- Video capture at various resolutions up to 1280x720 resolution (720p) and up to 30fps
- M-JPEG compression supports higher frame rates for video capture and videoconferencing
- Improved low light sensitivity
- Improved dynamic range

* HD content required to view HD images.

KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS

Keyboard

Optional backlit keyboard with Function key control to toggle backlit brightness setting - off/full/half brightness

The HP spill-resistant keyboard is designed using a thin layer of Mylar film under the keyboard and a drain system that funnels fluid through a hole in the bottom of the notebook. This minimizes the risk of damage to sensitive components underneath. The 100-key compatible keyboard features a full-pitch key layout with desktop keyboard features, such as editing keys, both left and right control and alt keys, function keys, and 18.0 x 18.4 mm key pitch (center-to-center spacing). U.S. and International key layouts are available. Other features include hot keys for instant access to power conservation and brightness.

Pointing Devices

Touchpad with On/Off button, two-way scroll, gestures, two pick buttons

Point stick with two additional point stick buttons

Image sensor touchpad for enhanced performance and improved precision on scroll and gesture

Buttons and Function Keys

Separate launch buttons provide easy access to the following features: wireless on/off, volume mute. Function keys provide control of the following features: standby mode, external display, volume down, volume up, HP Power Assistant (Windows® 7 only), and display brightness.

Features

SOFTWARE AND SECURITY

Preinstalled Software with Windows Operating System

BIOS

HP BIOSphere¹
HP Sure Start with Dynamic Protection
HP DriveLock | HP Automatic DriveLock
HP BIOS Protection²
BIOS Update via Network
Master Boot Record Security
Power On Authentication
Pre-Boot Security
HP Spare Key¹⁷
Secure Erase³
Hybrid Boot
Measure Boot
Secure Boot
Absolute Persistence Module⁴
Pre-boot Authentication

Multi Media

Cyberlink Power DVD, BD (supports file playback)
Cyberlink YouCam BE (Windows 7 only)

Communication

HP GPS and Location (Windows 7 only)⁵
HP Connection Manager with support for HP Mobile Connect (Windows 7 only)⁶
HP Mobile Connect Pro (Windows 8.1 and Windows 10 only)⁶
Intel® Wireless Display (WiDi) Software for Windows⁷
Native Miracast Support⁸

HP Value Add Software

HP 3D DriveGuard
HP ePrint Driver⁹
HP Hotkey
HP Recovery Manager¹⁶
HP Recovery Disc Creator
HP Registration App (Windows 8.1 only)
HP Support Assistant
HP Noise Reduction Software
HP Performance Advisor
HP Remote Graphics Software
HP Velocity

3rd Party

Foxit PhantomPDF Express for HP

Microsoft Products

Buy Office
Bing Search
Skype¹⁰

Manageability

HP Driver Packs¹¹

Features

HP SoftPaq Download Manager (SDM)
HP System Software Manager (SSM)¹¹
HP BIOS Config Utility (BCU)¹¹
HP Client Catalog¹¹
HP CIK for Microsoft SCCM¹¹
HP Image Assistant¹¹
LANDESK Management¹²

For more information on HP Client Management Solutions refer to: <http://www.hp.com/go/clientmanagement>.

Client Security Software

HP Client Security

- HP Security Manager (including Credential Manager and Password Manager)
- HP Drive Lock
- HP Fingerprint Sensor
- HP Password Manager
- Absolute Persistence Module
- Power On Authentication

Microsoft Security Essentials¹⁴

Microsoft Defender¹⁴

Standard

Trusted Platform Module (TPM) 1.2 Embedded Security Chip (Common Criteria EAL4+ Certified). Field upgradeable to TPM 2.0¹⁵

HP Fingerprint Reader

For more information on HP Client Security Software Suite, refer to <http://www.hp.com/go/clientsecurity>.

1 Available only on business PCs with HP BIOS.

2 May require a manual recovery step if all copies of BIOS are compromised or deleted

3 For the methods outlined in the National Institute of Standards and Technology Special Publication 800-88.

4 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. For full details visit: <http://www.absolute.com/company/legal/agreements/computrace-agreement>. 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.

5 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.

6 HP Mobile Connect Pro is only available on preconfigured devices with WWAN. For geographic availability refer to <http://www.hp.com/go/mobileconnect>

7 Integrated Intel® Wi-Di feature is available on select configurations only and requires separately purchased projector, TV or computer monitor with an integrated or external Wi-Di receiver. External Wi-Di receivers connect to the projector, TV or computer monitor via a standard HDMI cable, also sold separately.

8 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. For more information: <http://windows.microsoft.com/en-us/windows-8/project-wireless-screen-miracast>

9 Requires an Internet connection to HP web-enabled printer and HP ePrint account registration (for a list of eligible printers, supported documents and image types and other HP ePrint details, see <http://www.hp.com/go/eprintcenter>). 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.

10 Skype is not offered in China.

11 Not preinstalled, however available for download at <http://www.hp.com/go/clientmanagement>

12 Subscription required.

14 Opt in and internet connection required for updates.

Features

15 This product ships with TPM 1.2 with option to upgrade to TPM 2.0. Upgrade utility is expected to be available by the end of 2015 via HP Customer Support

16 Models shipped with Windows 7 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 36 GB (for Windows 7) of system and up to 36 GB (for Windows 10) disk is reserved for system recovery software

17 Requires initial user setup

Workstation ISV Certifications

Find the latest list of certifications at: <http://www.hp.com/go/isv>

HP Remote Graphics Software

The remote desktop solution for serious workstation users and their most demanding applications.

Download at: <http://www.hp.com/go/RGS>

HP Performance Advisor

HP Performance Advisor enables optimal configuration of HP Mobile Workstations delivering stability and best performance. HP Performance Advisor will guide your system setup allowing a "custom" configuration that best matches the workstation to user requirements.

Download at: <http://www.hp.com/go/performanceadvisor>

Security

See Software section above.

Other Standard Security Features

Integrated Smart Card Reader

One-Step Logon

Security lock slot

Support for Intel® AT

Optional Security Features

HP Fingerprint Sensor (optional)

Absolute Data Protect* with GPS Tracking - Subscription based security solution providing the ability to track, initiate physical recovery, conduct asset management, and perform remote data delete by utilizing GPS technology. GPS functionality requires HP Mobile Broadband Module.

* The Absolute Data Protect 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.

HP CENTRAL MANAGEMENT

HP offers a variety of scalable hardware, software, and BIOS-based security features to help you defend your organization against viruses and other threats. These integrated security features safeguard what matters to you the most - your data, device and identity. Now, be confident your fleet of devices is protected in multiple layers of HP Client Security protection.

HP BIOS Protection keeps you up and running with enhanced protection against virus attacks and other threats. And if the BIOS is accidentally compromised, the auto recovery feature automatically restores it to its fully functional state.

HP Sure Start detects and negates a BIOS attack with automatic recovery of the BIOS even when the installation is accidentally compromised (i.e. power outage). When HP Sure Start heals the BIOS an event log is generated that an IT administrator can retrieve so the business is aware of a BIOS attack. Golden copy of BIOS is stored in protected nonvolatile memory providing redundant, hardware-based protection against a new generation of attacks. This helps to future-proof

Features

your technology and business.

An optional fingerprint reader and integrated Smart Card Reader help keep your identity secure. The security cable slot helps keep your notebook physically secure.

You can even permanently destroy data on your hard drive in preparation for your system disposal or redeployment with Secure Erase.

POWER

Power Supply

HP 65W Slim Smart AC Adapter

Primary Battery

HP 3-cell Long Life Polymer Battery (46 WHr)

Battery Life

Battery life up to **xx** hours and **xx** minutes*

System Standby Time

Up to **TBD** weeks**

*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 MobileMark12 battery benchmark <http://www.bapco.com/products/mobilemark2007> for additional details.

** Standby life will vary depending on various factors including battery, Memory, CPU, EC and LAN chip. The maximum capacity of the battery will naturally decrease with time and usage.

Power Conservation

AMD® Enduro™ Technology

Hibernation

Standby

ACPI compliance

ENVIRONMENTAL

US ENERGY STAR®

IT ECO declaration

EPEAT® registered where applicable. EPEAT® registration varies by country. See <http://www.epeat.net> for registration status by country.

NOTE: 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.

WEIGHTS & DIMENSIONS

Weight

Starting at 4.18 lb. (1.89 kg)

Dimensions (w x d x h)

15.09 x 10.15 x 0.78 in

383.3 x 257.7 x 19.9 mm

Features

NOTE: Height varies depending upon where on the notebook the measurement is made. Weight varies by configuration and components. Weight includes 3 cell 46Whr battery, without hard drive and with 256 GB Z Turbo Drive (PCIe SSD).

Features

PORTS/SLOTS

Ports

Left side:

- (1) VGA
- (1) USB 3.0 Charging Port
- (1) Security lock slot

Right side:

- (1) USB 3.1 Gen 1
- (1) USB 3.0 Port
- (1) DisplayPort 1.2
- (1) Headphone/Microphone Combo
- (1) RJ-45 / Ethernet
- (1) Side Docking connector
- (1) Power connector

Digital Media Slots

- (1) SD UHS-II Flash Media slot – Supports next generation SD (Secure Digital), backward compatible to SDHC, SDXC
 - (1) Integrated Smart Card Reader (Compatible with ISO 7816 compliant Smart Cards PC/SC interface support)
-

SERVICE AND SUPPORT

Limited 3-year or 1-year limited warranty options available, depending on country. Batteries have a default one year limited warranty except for Long Life batteries which will have same 1-year or 3-year limited warranty as the platform. Optional¹ HP Care Pack Services are extended service contracts which go beyond your standard limited 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/cpc>.

Sold separately or as an optional feature.

1. Service levels and response times for HP Care Packs may vary depending on your geographic location. Service starts on date of hardware purchase. Restrictions and limitations apply. HP services are governed by the applicable HP terms and conditions of service provided or indicated to Customer at the time of purchase. Customer may have additional statutory rights according to applicable local laws, and such rights are not in any way affected by the HP terms and conditions of service or the HP Limited Warranty provided with your HP Product. Consult your local HP Customer Support Center for details.

Technical Specifications – System Unit

SYSTEM UNIT

Stand-Alone Power Requirements (AC Power)	Nominal Operating Voltage	19.5 V dc @ 3.3 A		
	Average Operating Power		Windows® 7 (32-bit)	Windows® 7 (64-bit)
		AMD® FirePro® Graphics	16.28 W	16.8 W
	Max Operating Power	< 65 W		
Temperature	Operating	32° to 95° F (0° to 35° C) (not writing optical) 41° to 95° F (5° to 35° C) (writing optical)		
	Non-operating	-4° to 140° F (-20° to 60° C)		
Relative Humidity	Operating	10% to 90%, non-condensing		
	Non-operating	5% to 95%, 101.6° F (38.7° C) 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	-50 to 10,000 ft. (-15.24 to 3,048 m)		
	Non-operating	-50 to 40,000 ft. (-15.24 to 12,192 m)		
Planned Industry Standard Certifications	UL	Yes		
	CSA	Yes		
	FCC Compliance	Yes		
	ENERGY STAR®	Select models*		
	EPEAT	Gold target**		
	ICES	Yes		
	Australia / NZ A-Tick Compliance	Yes		
	CCC	Yes		
	Japan VCCI Compliance	Yes		
	KCC	Yes		
	BSMI	Yes		
	CE Marking Compliance	Yes		

* Configurations of the HP ZBook 15u G3 that are ENERGY STAR® qualified are identified as HP ZBook 15u G3 ENERGY STAR® on HP websites and on <http://www.energystar.gov>.

** EPEAT registration varies by country. See <http://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>.

Technical Specifications – Displays

DISPLAYS

15.6" diagonal LED-backlit FHD UWVA IPS eDP anti-glare + Panel Self Refresh (PSR) (1920 x 1080)	Dimensions (W x H)	13.54 x 7.64in (34.4x19.4 cm)
	Diagonal Size	15.6 in (39.6 cm)
	Weight	360g (max)
	Surface Treatment	Anti-glare
	Contrast Ratio	600:1 (typical)
	Refresh Rate	60 Hz
	Brightness	300 nit (typical)
	Pixel Resolution	Format 1920 x 1080 (FHD)
		Configuration RGB Stripe
	Backlight	LED
	PPI	142
	Viewing Angle	80° Horizontal, ±80° Vertical (minimum) 80/80/80/80 (Left/Right/Down/Up) (min)

15.6" diagonal LED backlight FHD eDP SVA Anti-glare (1920 x 1080)	Outline Dimensions (W x H x D)	360.0 x 224.3 x 3.2 mm max
	Active Area	344.16 x 193.59 mm
	Weight	360 max.
	Diagonal Size	15.6"
	Surface Treatment	AG
	Contrast Ratio	400:1 (typ)
	Refresh Rate	60Hz
	Brightness	300nits
	Pixel Resolution	Format 1920 x 1080 (FHD)
		Configuration RGB Stripe
	Interface	eDP 1.2 (2 lane)
	LCD Mode	TN
	PPI	142
Viewing Angle	SVA 45/45/25/35	

15.6" diagonal LED backlight FHD Slim DP SVA (1920 x 1080) Touch with Camera	Outline Dimensions (W x H x D)	360.0 x 224.3 x 3.2 mm max
	Active Area	344.16 x 193.59 mm
	Weight	360 max.
	Diagonal Size	15.6"
	Surface Treatment	AG/BV
	Contrast Ratio	500:1 (typ) - BV, 400:1 (typ) - AG
	Touch Enabled	Yes
	TSP Type	Capacitive
	Refresh Rate	60Hz

Technical Specifications – Displays

Brightness	300nits	
Pixel Resolution	Format	1920 x 1080 (FHD)
	Configuration	RGB Stripe
Interface	eDP 1.2 (2 lane)	
LCD Mode	TN	
PPI	142	
Viewing Angle	SVA 45/45/25/35	

15.6-inch UHD UWVA IPS LED anti-glare (3840 x 2160)	Active Area (W x H)	13.54 x 7.59 in (34.4 x 19.4 cm)	
	Dimensions (W x H)	15.6 in (39.6 cm)	
	Weight	380 g (max)	
	Surface Treatment	Anti-glare	
	Contrast Ratio	400:1 (typical)	
	Refresh Rate	60 Hz	
	Brightness	300 nit typical	
	Pixel Resolution	Format	1920 x 1080 (FHD)
		Configuration	RGB Stripe
	Backlight	LED	
	PPI	141	
	Viewing Angle	85/85/85/85 (Left/Right/Down/Up) (typical)	

Technical Specifications – Storage

STORAGE AND DRIVES*

500 GB 5400rpm Self Encrypting Drive (FIPS-140-2) (Opal 2)	Drive Weight	0.21 lbs (95 g)	
	Capacity	500 GB	
	Height	0.28 in (7 mm)	
	Width	2.75 in (69.85 mm)	
	Interface	ATA-8, SATA 3.0	
	Transfer Rate	Synchronous (maximum) 600 MB/s	
	Seek Time (typical reads, including settling)	Single Track	1.5 ms
		Average	12ms
		Maximum	18mm-22ms
	Cache	32GB	
	Rotational Speed	7200 rpm	
	Logical Blocks	976,773,168	
	Operating Temperature	32° to 140° F (0° to 60° C) [top cover temp]	
Features	ATA Security; TCG Opal 2.x, FIPS, S.M.A.R.T., NCQ, Ultra DMA		

500 GB 7200rpm Hard Drive	Drive Weight	0.20 lbs (92 g)-0.21 lbs (95 g)	
	Capacity	500 GB	
	Height	0.28 in (7 mm)	
	Width	2.75 in (69.85 mm)	
	Interface	ATA-8, SATA 3.0	
	Transfer Rate	Synchronous (maximum) 600 MB/s	
	Seek Time (typical reads, including settling)	Single Track	1.5ms-2.0ms
		Average	11ms-13ms
		Maximum	18ms-22ms
	Cache	32GB	
	Rotational Speed	7200 rpm	
	Logical Blocks	976,773,168	
	Operating Temperature	32° to 140° F (0° to 60° C) [case temp]	
Features	ATA Security		

500 GB 7200rpm Self-Encrypting Drive (Opal 2)	Drive Weight	0.21 lbs (95 g)	
	Capacity	500GB	
	Height	0.28 in (7 mm)	
	Width	2.75 in (69.85 mm)	
	Interface	ATA-8, SATA 3.0	
	Transfer Rate	Synchronous (maximum) 600 MB/s	
	Seek Time (typical reads, including settling)	Single Track	1.5ms
		Average	12ms
		Maximum	18ms- 22ms
	Cache	32GB	
	Rotational Speed	7200rpm	
	Logical Blocks	976,773,168	
	Operating Temperature	32° to 140° F (0° to 60° C) [top cover temp]	
Features	ATA Security; TCG Opal 2.x, S.M.A.R.T., NCQ, Ultra DMA		

Technical Specifications – Storage

1 TB 5400rpm Hard Drive	Drive Weight	0.21 lbs (94 g)- 0.21 lbs (99 g)		
	Capacity	1TB		
	Height	0.28 in (7.2 mm)		
	Width	2.75 in (69.85 mm)		
	Interface	ATA-8, SATA 3.0		
	Transfer Rate	Synchronous (maximum)	600 MB/s	
	Seek Time (typical reads, including settling)	Single Track	2ms	
		Average	12ms-13ms	
		Maximum	18ms-23ms	
	Cache	Up to 32GB		
	Rotational Speed	5400rpm		
	Logical Blocks	1,953,525,168		
	Operating Temperature	32° to 140° F (0° to 60° C) [case temp]		
Features	S.M.A.R.T., NCQ, Ultra DMA			
500 GB Hybrid, 8 GB cache	Drive Weight	0.21 lb (95 g)		
	Capacity	500 GB		
	Height	0.276 in (7 mm)		
	Width	2.76 in (70.1 mm)		
	Interface	ATA-8, SATA 2.6, 6.0 Gb/s, NCQ		
	Transfer Rate	Synchronous (maximum)	600 MB/s (Drive Capability)	
	Seek Time (typical reads, including settling)	Single Track	2 ms	
		Average	12 ms	
		Maximum	NIL ms	
	Cache	64GB		
	Rotational Speed	5400 rpm		
	Logical Blocks	976,773,168		
	Operating Temperature	32° to 140° F (0° to 60° C) [case temp]		
Features	ATA Security			
128 GB M2 2280 SATA-3 TLC Solid State Drive	Drive Weight	0.019 lb (8.5 g)-0.022 lb (10 g)		
	Capacity	128 GB		
	Height	0.09 in (2.23 mm)- 0.14 in (3.58 mm)		
	Width	0.87 in (22 mm)		
	Interface	ATA-8, SATA 3.0		
	Performance	Maximum Sequential Read	Up to 540 MB/s	
		Maximum Sequential Write	Up to 300 MB/s	
	Logical Blocks	250,069,680		
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]		
	Features	ATA Security, DIPM; TRIM; DEVSLP		
256 GB M2 2280 SATA-3 Self-Encrypting Drive (Opal 2) MLC Solid State	Drive Weight	0.02 lb (10 g)		
	Capacity	256 GB		
	Height	0.14 in (3.58 mm)- 0.09 in (2.23 mm)		

Technical Specifications – Storage

Drive	Width	0.87 in (22 mm)		
	Interface	ATA-8, SATA 3.0		
	Performance	Maximum Sequential Read	Up to 540 MB/s	Maximum Sequential Write UP to 460 MB/s
		Logical Blocks	500,118,192	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]		
	Features	ATA Security; TCG Opal 2.0, DIPM; TRIM; DEVSLP		
HP Z Turbo Drive 512 GB, M.2 NVMe PCIe Solid State Drive	Drive Weight	0.022 lb (<10 g)		
	Capacity	512 GB		
	Height	0.14 in (3.7 mm)		
	Width	0.87 in (22 mm)		
	Generation	SM951 NVMe		
	NAND Type	MLC		
	Form-Factor (I/O)	M.2 2280		
	Interface	PCIe GEN3X4		
	Performance	Maximum Sequential Read	Up to 2260MB/s	Maximum Sequential Write Up to 1600MB/s
		Logical Blocks	1,000,215,216	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]		
	Features	ATA Security, TRIM; L1.2		

Technical Specifications – Storage

HP Z Turbo Drive 256 GB, M.2 NVMe PCIe Solid State Drive	Drive Weight	0.022 lb (<10 g)		
	Capacity	256 GB		
	Height	0.09 in (2.3 mm)		
	Width	0.87 in (22 mm)		
	Generation	SM951 NVMe		
	NAND Type	MLC		
	Form-Factor (I/O)	M.2 2280		
	Interface	PCIe GEN3X4		
	Performance	Maximum Sequential Read	Maximum Sequential Write	
		Up to 2260MB/s	Up to 1260 MB/s	
	Logical Blocks	500,118,192		
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]		
	Features	ATA Security, TRIM; L1.2		

*For hard drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 16 GB (for Windows® 7) of system and up to 30 GB (for Windows® 8) disk is reserved for system recovery software.

Technical Specifications – Security

SECURITY

HP Fingerprint Sensor	Voltage	3.0-3.6V
	Operating temperature	14° - 167°F (-10° - 75°C)
	Current consumption image	36mA
	Low latency wait for finger	950 uA
	Capture rate	3000 lines/sec
	ESD Resistance	IEC 6100-4-2 4B (+/-15KV)
	Detection Matrix	200*1 (plus another secondary line); 508 dpi, sensor area 12*3 mm

Technical Specifications – Networking

NETWORKING/COMMUNICATION

Intel® I219-LM Gigabit Network Connection (vPro configurations)	Ethernet Features	10 Mbit/s operation (10BASE-T; IEEE 802.3i; IEEE 802.3 clauses 13-14) 100 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 802.3. Clauses 40) Auto-Negotiation (Automatic Speed Selection) Full Duplex Operation at all Speeds, Half Duplex operation at 10 and 100 Mbit/s IEEE 802.1p QoS (Quality of Service) Support IEEE 802.1q VLAN support IEEE 802.3x Flow Control (IEEE 802.3 clauses 31-32; configurable) IEEE 802.3az EEE(Energy Efficient Ethernet) Jumbo Frame 9K Auto MDI/MDIX Crossover cable detection
	Power Management	ACPI compliant - multiple power modes Energy Detect Low Power Mode(Green Ethernet)
	Performance Features	TCP/IP/UDP Checksum Offload (configurable) Protocol Offload(ARP & NS) Large send offload and Giant send offload Receiving Side Scaling MACSec Offload (802.3ae) Intel® vPro iSCSI Boot RSS is kernel based support (e.g. in Win Server 2013) Ultra Low Power at cable disconnect (<1mW) enables platform support for connected standby.
	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 x1 to fully support ASPM L0s/L1 and CLKREQ. NOTE: Intel® I219-LM Gigabit interface is not PCIe compliant. It operates at half of PCIe specification V1.1 (2.5GT/S) speed.
	NIC Device Driver Name	Intel® Ethernet Network Connection I219-LM

Technical Specifications – Networking

Intel® I219-V Gigabit Network Connection (Non-vPro configurations)	Ethernet Features	10 Mbit/s operation (10BASE-T; IEEE 802.3i; IEEE 802.3 clauses 13-14) 100 10 Mbit/s operation (10BASE-T; IEEE 802.3i; IEEE 802.3 clauses 13-14) 100 Mbit/s operation (100BASE-TX; IEEE 802.3u; IEEE 802.3 clauses 21-30) 1000 Mbit/s operation (1000BASE-T; IEEE 802.3ab; IEEE 802.3. Clauses 40) Auto-Negotiation (Automatic Speed Selection) Full Duplex Operation at all Speeds, Half Duplex operation at 10 and 100 Mbit/s IEEE 802.1p QoS (Quality of Service) Support IEEE 802.1q VLAN support IEEE 802.3x Flow Control (IEEE 802.3 clauses 31-32; configurable) IEEE 802.3az EEE(Energy Efficient Ethernet) Jumbo Frame 9K Auto MDI/MDIX Crossover cable detection
	Power Management	ACPI compliant - multiple power modes Energy Detect Low Power Mode(Green Ethernet)
	Performance Features	TCP/IP/UDP Checksum Offload (configurable) Protocol Offload(ARP & NS) Large send offload and Giant send offload Receiving Side Scaling MACSec Offload (802.3ae) Intel Non-vPro iSCSI Boot
	Manageability	Wake-on-LAN from standby and hibernation (Magic Packet and Microsoft Wake-Up Frame); Wake-on-LAN from off (Magic Packet only) PXE 2.1 Remote Boot Statistics Gathering (SNMP MIB II, Ethernet-like MIB, Ethernet MIB (802.3x, clause 30)) Comprehensive diagnostic and configuration software suite Virtual Cable Doctor for Ethernet cable status
	Interface	PCI Express 1.1 x1 to fully support ASPM L0s/L1 and CLKREQ. NOTE: Intel 82579 PCIe interface is not PCIe compliant. It operates at half of PCIe specification V1.1 (2.5GT/S) speed.
	NIC Device Driver Name	Intel 82579LM/82579V Ethernet Network Connection

Technical Specifications – Networking

**HP It4120 Qualcomm®
Snapdragon™ X5 LTE Mobile
Broadband Module***

Technology/Operating Bands	LTE: 2100 (Band 1), 1900 (Band 2), 1800 (Band 3), 1700/2100 (Band 4), 850 (Band 5), 2600 (Band 7), 900 (Band 8), 700 (Band 12 lower), 700 (Band 13 upper), 700 (Band 17 lower), 800 (Band 20), 700 (Band 28). HSPA+: 2100 (Band 1), 1900 (Band 2), 1700/2100 (Band 4), 850 (Band 5), 900 (Band 8) MHz EV-DO: 850 (BC0), 1900 (BC1) MHz (Only work with Verizon network) E-GPRS: 1900 (Band 2), 1800 (Band 3), 850 (Band 5), 900 (Band 8) MHz
Wireless Protocol Standards	3GPP Release 10 LTE Specification CAT.4, 20MHz BW WCDMA R99, 3GPP Release 5, 6, 7 and 8 UMTS Specification 1xEVDO Release 0, A and B. E-GPRS: Class B, Multi-slot class 12, coding schemes CS1 - CS4 and MSC1 - MSC9
GPS	Standalone, A-GPS (MS-A, MS-B and XTRA)
GPS Bands	1575.42 MHz (± 1.023 MHz), GLONASS 1596-1607MHz
Maximum Data Rates	LTE: 150 Mbps (Download), 50 Mbps (Upload) DC-HSPA+: 42 Mbps (Download), 5.76 Mbps (Upload) HSPA+: 21Mbps (Download), 5.76 Mbps (Upload) CDMA 1xRTT: 153.6 kbps (Download), 153.6 kbps (Upload) EVDO Rel.A: 3.1 Mbps (Download), 1.8 Mbps (Upload) EVDO Rel.B: 14.7 Mbps (Download), 5.4Mbps (Upload) EDGE: 236.8 kbps (Download), 236.8 kbps (Upload) GPRS: 85.6 kbps(Download), 85.6 kbps (Upload)
Maximum Output Power	LTE: 23 dBm HSPA+: 23.5 dBm 1xRTT/EVDO: 24dBm E-GPRS 1900/1800: 26 dBm E-GPRS 900/850: 27 dBm GPRS 1900/1800: 29.5 dBm GPRS 900/850: 32.5 dBm
Maximum Power Consumption	LTE: 1,200 mA (peak); 900 mA (average) HSPA+: 1,100 mA (peak); 800 mA (average) 1xRTT/EVDO: 1,000 mA (peak); 700 mA (average)
Form Factor	M.2, 3042-S3 Key B
Weight	6.2 g
Dimensions (Length x Width x Thickness)	1.65 x 1.18 x 0.09 in (42 x 30 x 2.3 mm)

* Mobile Broadband is an optional feature. Connection requires wireless data service contract, network support, and is not available in all areas. Contact service provider to determine the coverage area and availability. Connection speeds will vary due to location, environment, network conditions, and other factors. 4G LTE not available on all products or in all countries.

Technical Specifications – Networking

HP hs3110 HSPA+ Intel® Mobile Broadband Module*

Technology/Operating Bands	LTE: 2100 (Band 1), 1900 (Band 2), 1800 (Band 3), 850 (Band 5), 2600 (Band 7), 900 (Band 8), 800 MHz (Band 20, DD800) MHz HSPA+: 2100 (Band 1), 1900 (Band 2), 850 (Band 5), 900 (Band 8) MHz E-GPRS: 1900 (Band 2), 1800 (Band 3), 850 (Band 5), 900 (Band 8) MHz
Wireless Protocol Standards	WCDMA R99, 3GPP Release 5, 6 and 7 UMTS Specification E-GPRS: Class B, Multi-slot class 33, coding schemes CS1 - CS4 and MSC1 - MSC9
GPS	Standalone, A-GPS
GPS Bands	1575.42 MHz (± 1.023 MHz)
Maximum Data Rates	HSPA+: 21.6 Mbps (Download), 5.76 Mbps (Upload) E-GPRS: 296 kbps (Download), 236.8 kbps (Upload) GPRS: 107 kbps (Download), 85.6 kbps (Upload)
Maximum Output Power	HSPA+: 24 dBm E-GPRS 1800/1900: 26 dBm E-GPRS 850/900: 27 dBm GPRS 1800/1900: 30 dBm GPRS 850/900: 33 dBm
Maximum Power Consumption	HSPA+: 1,100 mA (peak); 800 mA (average) E-GPRS: 2,800 mA (peak); 700 mA (average)
Form Factor	M.2, 3042-S3 Key B
Weight	6 g
Dimensions (Length x Width x Thickness)	1.65 x 1.18 x 0.09 in (42 x 30 x 2.3 mm)

*Mobile Broadband is an optional feature. Connection requires wireless data service contract, network support, and is not available in all areas. Contact service provider to determine the coverage area and availability. Connection speeds will vary due to location, environment, network conditions, and other factors. 4G LTE not available on all products or in all countries.

Technical Specifications – Networking

<p>Intel® Dual Band Wireless-AC 8260 802.11 AC/a/b/g/n (2x2) WiFi + Bluetooth® 4.2 Combo Adaptor* (vPro)</p>	<p>Wireless LAN Standards</p>	<p>IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11n</p>
	<p>Interoperability</p>	<p>Wi-Fi certified</p>
	<p>Frequency Band</p>	<p>802.11b/g/n 2.402 - 2.482 GHz 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 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 Note: Indonesia only supports 5.725 - 5.825 GHz (CH149 - CH161)</p>
	<p>Data Rates</p>	<ul style="list-style-type: none"> • 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11b: 1, 2, 5.5, 11 Mbps • 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz) • 802.11ac : MCS0 ~ MCS9, (1SS, and 2SS) (20MHz, 40MHz, and 80MHz)
	<p>Modulation</p>	<p>Direct Sequence Spread Spectrum CCK, BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM</p>
	<p>Security¹</p>	<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
	<p>Network Architecture Models</p>	<p>Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)</p>
	<p>Roaming</p>	<p>IEEE 802.11 compliant roaming between band Access Points</p>
	<p>Output Power²</p>	<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
	<p>Power Consumption</p>	<p>Transmit: 2.0 Watts (max) Receive: 1.6 Watts (max) Idle mode (PSP): 180 mW (WLAN Associated)</p>

Technical Specifications – Networking

	Idle mode: 50 mW (WLAN unassociated) Connect Standby: 10mW (WLAN + BT) Radio disabled: 5 mW
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity³	802.11b, 1Mbps : -94dBm maximum 802.11b, 11Mbps : -86dBm maximum 802.11g, 6Mbps : -88dBm maximum 802.11g, 54Mbps : -74dBm maximum 802.11a, 6Mbps : -88dBm maximum 802.11a, 54Mbps : -74dBm maximum 802.11n, MCS07 : -69dBm maximum 802.11n, MCS15 : -66dBm maximum 802.11ac, 1SS, MCS-0 : -86dBm maximum 802.11ac, 1SS, MCS-9 : -61dBm maximum 802.11ac, 2SS, MCS-0 : -83dBm maximum 802.11ac, 2SS, MCS-9 : -58dBm maximum
Antenna Type	High efficiency antenna with spatial diversity, mounted in the display enclosure Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO and Bluetooth communications
Form Factor	PCI-Express M.2 MiniCard
Dimensions	Type 2230 : 2.3 x 22.0 x 30.0 mm Or Type 1630 : 2.3 x 16.0 x 30.0 mm
Weight	Type 2230 : 2.8g Or Type 1630 : 2g
Operating Voltage	3.3v +/- 9%
Temperature	Operating 14° to 158° F (-10° to 70° 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 Non-operating 0 to 10,000 ft (3,048 m) 0 to 50,000 ft (15,240 m)
LED Activity	LED Amber – Radio OFF; LED White – Radio ON

Technical Specifications – Networking

HP Integrated Module with Bluetooth® 4.0+EDR Wireless Technology	Bluetooth® Specification	4.0/4.1/4.2 Compliant												
	Frequency Band	2402 to 2480 MHz												
	Number of Available Channels	Legacy : 0~79 (1 MHz/CH) BLE : 0~39 (2 MHz/CH)												
	Data Rates and Throughput	Legacy : 3 Mbps data rate; throughput up to 2.17 Mbps BLE : 1 Mbps data rate; throughput up to 0.2 Mbps Legacy : Synchronous Connection Oriented links up to 3, 64 kbps, voice channels Legacy : Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)												
	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	Peak (Tx) 330 mW Peak (Rx) 230 mW Selective Suspend 17 mW													
Antenna	Internally integrated within module													
Range	Legacy Up to 33 ft (10 m) BLE Up to 99 ft (30 m)													
Electrical Interface	USB 2.0 compliant													
Bluetooth® Software Supported	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													
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, including: FCC (47 CFR) Part 15C, Section 15.247 & 15.249													
Power management certifications	ETS 300 328, ETS 300 826 Low Voltage Directive IEC950 UL, CSA, and CE Mark													
Certifications	Serial Port Profile (SPP)1													
Bluetooth® Profiles Supported	Service Discovery Application Profile (SDAP) Dial-Up Networking (DUN)1,2 Generic Object Exchange Profile (GOEP)1,2 Object Push Profile (OPP)1,2 Hard Copy Cable Replacement (HCRP)1,2 Personal Area Networking Profile (PAN)1,2 Human Interface Device Profile (HID)1,2 Hands Free Profile (HFP) Advanced Audio Distribution Profile (A2DP) Audio Video Remote Control Profile (AVRCP)													

Technical Specifications – Networking

Bluetooth® V4.1/V4.2 support feature V4.1: ESR5/6/7 compliant
V4.2: ESR8 compliant, LE Secure Connection – Basic.

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).

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.

Technical Specifications – Networking

- 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
- 802.11ac 80MHz(5GHz) : +11dBm minimum

Power Consumption	Transmit: 2.0 W (max) Receive: 1.6 W (max) Idle mode (PSP): 180 mW (WLAN Associated) Idle mode: 60 mW (WLAN unassociated) Radio disabled: 30 mW
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity³	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) 802.11b:-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:-69 dBm (150 Mbps), -66 dBm (300 Mbps)
Antenna type	High efficiency antenna with spatial diversity, mounted in the display enclosure Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications
Form Factor	PCI-Express Half-MiniCard
Dimensions	0.134 x 1.06 x 1.18 in (3.4 x 26.8 x 30 mm)
Weight	3.1g
Operating Voltage	3.3v +/- 9%
Temperature	Operating 14° to 158° F (-10° to 70° 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 Amber - Radio OFF; LED White - 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 (OFDM modulation).

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

Technical Specifications – Networking

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	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	Better than -20 dBm at 0.1 % raw bit error rate
Power Consumption	Peak (Tx) 330 mW Peak (Rx) 230 mW Selective Suspend 17 mW
Antenna	Internally integrated within module
Range	Up to 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
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} 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

* Wireless access point and internet service required. Availability of public wireless access points limited.

Technical Specifications – Networking

<p>Intel® Dual Band Wireless-AC 3160 802.11 ac (1x1) WiFi and Bluetooth® 4.0 Combo Adapter (non-vPro)</p>	<p>Wireless LAN Standards</p> <ul style="list-style-type: none"> IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11ac <p>Interoperability</p> <p>Wi-Fi certified</p> <p>Frequency Band</p> <p>802.11b/g/n</p> <ul style="list-style-type: none"> • 2.402 – 2.482 GHz
	<p style="color: blue;">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 style="color: blue;">Note: Indonesia only supports 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 • 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz) • 802.11ac : MCS0 ~ MCS7, (1SS) (20MHz, 40MHz, and 80MHz)
Modulation	<p>Direct Sequence Spread Spectrum BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM</p>
Security¹	<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) Infrastructure (Access Point Required)</p>
Roaming	<p>IEEE 802.11 compliant roaming between access points</p>
Output Power²	<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 • 802.11ac 80MHz(5GHz) : +11 dBm minimum

Technical Specifications – Networking

Power Consumption	Transmit: 2.0 W (max) Receive: 1.6 W (max) Idle mode (PSP): 180 mW (WLAN Associated) Idle mode: 60 mW (WLAN unassociated) Radio disabled: 30 mW
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity³	802.11b, 1Mbps : -94dBm maximum 802.11b, 11Mbps : -86dBm maximum 802.11g, 6Mbps : -88dBm maximum 802.11g, 54Mbps : -74dBm maximum 802.11a, 6Mbps : -86dBm maximum 802.11a, 54Mbps : -72dBm maximum 802.11n, MCS07 : -69dBm maximum 802.11n, MCS15 : -66dBm maximum 802.11ac, 1SS, MCS-0 : -86dBm maximum 802.11ac, 1SS, MCS-9 : -61dBm maximum 802.11ac, 2SS, MCS-0 : -83dBm maximum 802.11ac, 2SS, MCS-9 : -58dBm maximum
Antenna type	High efficiency antenna with spatial diversity, mounted in the display enclosure Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications
Form Factor	PCI-Express M.2 MiniCard
Dimensions	Type 2230 : 2.3 x 22.0 x 30.0 mm Or Type 1630 : 2.3 x 16.0 x 30.0 mm
Weight	Type 2230 : 2.8g Or Type 1630 : 2g
Operating Voltage	3.3v +/- 9%
Temperature	Operating 14° to 158° F (-10° to 70° 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 – Audio

AUDIO/MULTIMEDIA – BANG & OLUFSEN

Hardware	Implementation	Conexant CX7501
	Function Key	Volume up, volume down, and mute
	Volume Controls	
	Full Duplex	Yes
	Microphone In	Stereo
	Headphone/Line Out	Stereo
	Integrated Microphone	Yes, dual digital microphone array when equipped with optional webcam
Audio Output Quality	Frequency Response	20 Hz - 20 kHz
	Signal to Noise Ratio	106dB (DAC), 102dB (ADC)
	Total Harmonic Distortion	91dB THD+n on LineOut/HP (0.003%)
	Noise Floor	-110 dB
	Play Sampling Rate(s)	Up to 192kHz
	Record Sampling Rate(s)	Up to 96kHz
	DAC	16, 20 or 24-bit
	ADC	16,20 or 24-bit
Integrated Stereo Speakers	Power Rating	2 Watts
	Impedance	4 Ohms

Technical Specifications – Power

POWER

HP 65W Smart 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	87% min at 115 VAC/230VAC
		Input frequency range	47 to 63 Hz
		Input AC current	1.7 A at 90 VAC, 0.85 A at 180 VAC
	Output	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 95° F (0° to 35° C)
		Non-operating (storage) temperature	-4° to 149° F (-20° to 65° C)
		Altitude	0 to 10,000 ft. (0 to 3,048 m)
		Humidity	20% to 80%
Storage Humidity		10% to 90%	
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.		

HP Long Life 3-cell Polymer Battery (46Whr)	Dimensions (H x W x L)	7.8 x 4.01 x 0.3 in(19.89x10.28x0.84 cm)		
	Weight	280 g		
	Cells/Type	3-cell Lithium-Ion Polymer		
	Energy	Voltage	11.1	
		Amp-hour capacity	4.504Ah	
		Watt-hour capacity	46Wh	
	Temperature	Operating (Charging)	32° to 113° F (0° to 45° C)	
		Operating (Discharging)	14° to 140° F(-10° to 60° C)	
		Non-operating	-4° to 140° F (-20° to 60° C)	
	Battery Re-Charge Time	System in OFF or Standby Mode	3 hours	
Fuel Gauge LED	No			
Warranty	1 year or 3 years*			

*Battery warranty depends on the platform warranty.

Technical Specifications – Power

Optional Travel Battery Available	No
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ENVIRONMENTAL DATA

TBD

Country of Origin

China

Options and Accessories (sold separately and availability may vary by country)

Type	Description	Part #
Memory	HP 4GB DDR4-2133 SODIMM (Core processors only)	T7B76AA
	HP 8GB DDR4-2133 SODIMM (Core processors only)	T7B77AA
Cases	HP Executive 15.6 Black Top Load	P6N18AA
	HP Business Case(up to 15.6")	H5M92AA
Docking	HP UltraSlim Docking Station	D9Y32AA
	HP Executive Travel Hub	T0K29AA
	HP Travel Hub	T0K30AA
	HP 3005pr USB 3.0 Port Replicator	H1L08AA
Input/Output - Mice	Comfort Grip Mouse	H2L63AA
	HP Stylish USB KB/Mouse	H4B80AA#xxx
	HP Slim Bluetooth Keyboard	H4Q44AA#xxx
	HP 3-Button Laser Mouse	H4B81AA#xxx
	HP USB Essential Keyboard and Mouse	H6L29AA#xxx
	HP Ultra Mobile Wireless Mouse	H6F25AA#xxx
	HP Wireless Keyboard and Mouse	G1K29AA#xxx
	HP X4000 Bluetooth Mouse	H3T50AA#xxx
	HP Slim Bluetooth Mouse	F3J92AA#xxx
	HP USB Smart Card Reader	F6V67AA
HP Ultrathin Wireless Mouse	L9V78AA	
Power Adapters	HP 65W Slim A/C Adapter	H6Y82AA
	HP 90W Slim A/C Adapter	H6Y83AA
	HP 90W Slim Combo AC Adapter w/USB	H6Y84AA
	HP 65W Smart AC Adapter	H6Y89AA
	HP 90W Smart AC Adapter	H6Y90AA
	45W 2-prong 4.5 mm DC jack AC Adapter	L6F60AA#ABJ
Adapters	HP Wireless display adapter	J1V25AA#xxx
	USB dual output graphics adapter	C5U89AA
	HP Conferencing Keyboard	K8P74AA#xxx
	HP Speaker Phone	K7V16AA
	HP Wired Headset	K7V17AA
	HP USB-C™ to VGA Adapter	N9K76AA
	HP USB-C™ to DisplayPort Adapter	N9K78AA
	HDMI to VGA Adapter	H4F02AA
	HDMI to DVI adapter	F5A28AA
USB-C to DisplayPort Adapter	N9K78AA	
Storage - External	HP External USB Optical Drive	F2B56AA

Options and Accessories (sold separately and availability may vary by country)

Storage	HP 500GB 7200rpm HDD	F3B97AA
	HP 750GB 7200rpm HDD	H2P67AA
	HP 180GB Solid State Drive	H4T75AA
	HP 512GB Solid State Drive	J2V75AA
	HP 1TB 7200RPM 9.5mm SATA HDD	L3M56AA
	HP 256GB SED Solid State Drive (Opal 2)	K1Z11AA
	HP 256GB M2 NVME PCIe SSD (2280)	TBD
	HP 512GB M2 NVME PCIe SSD (2280)	TBD
Security	HP UltraSlim Keyed Cable Lock	H4D73AA
	HP Dual Head Cable Lock (Non-Master key)	T1A64AA
	HP Dual Head Cable Lock (Master Key)	T1A65AA
	HP 15.6" Notebook PC Privacy Filter	J7H71AA

NOTE: External power supplies, power cords, cables and peripherals are not low halogen. Service parts obtained after purchase may not be low halogen.

Summary of Changes

Date of change:	Version History:		Description of change:
	From v1 to v2		

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