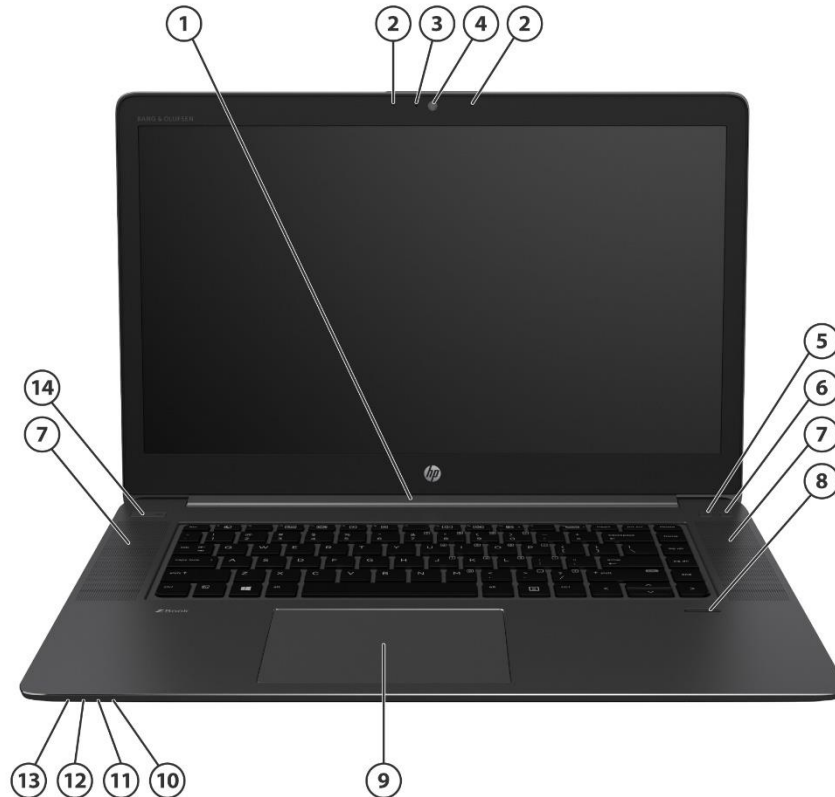


Overview

HP ZBook Studio G4 Mobile Workstation

FRONT VIEW



- | | | | |
|----|---|-----|--------------------------|
| 1. | WLAN Antennas (2) | 9. | Clickpad |
| 2. | Internal microphones (2) | 10. | Storage light indicator |
| 3. | Webcam Light (with webcam) | 11. | Battery light indicator |
| 4. | Optional 720p HD Webcam | 12. | Power light indicator |
| 5. | Wireless button | 13. | Wireless light indicator |
| 6. | Volume mute button | 14. | Power button |
| 7. | Speakers | | |
| 8. | Fingerprint reader (select models only) | | |

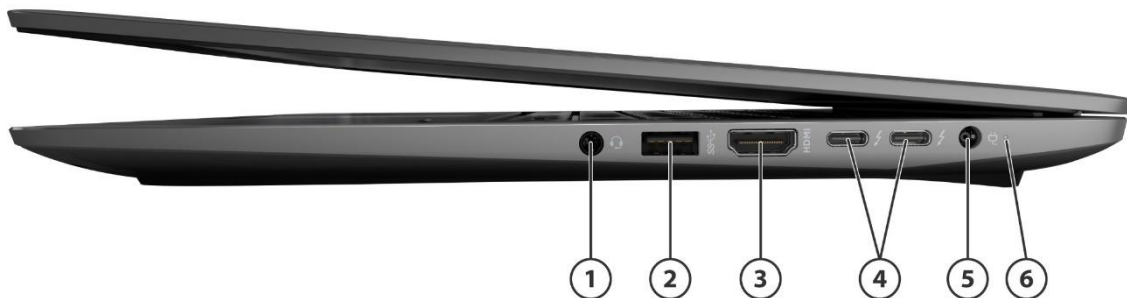
Overview

LEFT VIEW



- | | |
|-----------------------|--------------------------|
| 1. Security lock slot | 4. USB 3.0 port Charging |
| 2. RJ-45 (Ethernet) | 5. SD Card reader |
| 3. USB 3.0 port | |

RIGHT VIEW



- | | |
|---|-----------------------------|
| 1. Audio in (microphone) / Audio-out (headphone) jack | 4. (2) Thunderbolt™ 3 ports |
| 2. USB 3.0 port | 5. Power connector |
| 3. HDMI 1.4 port | 6. Power LED |

Overview

At A Glance

- Windows 10 editions, or FreeDOS
- Thin & light full performance industrial design, CNC machined top cover and keyboard deck. Top cover anodized in HP's new "Space Silver" color. Bottom housing is constructed out of lightweight magnesium for durability. Backlight keyboard in full aluminum deck, chemically strengthened glass large click pad, and updated system functions indicators. Diamond cut process showcased around keyboard deck and click pad.
- HP Spill Resistant Keyboard with Durakeys
- Designed to pass MIL-STD 810G testing
- Workstation-caliber NVIDIA® Quadro® discrete graphics, HP ZBook Studio special edition: NVIDIA® Quadro® M1200M (with 4GB dedicated GDDR5 graphics memory); NVIDIA® Optimus.
- Intel® Integrated graphics: Intel® HD Graphics 630 integrated on Core™ i5 and i7. Intel® HD Graphics, P630 Intel® HD graphics configurable on Intel i5 and i7 processors.
- ISV certified to provide fast and reliable performance with workstation applications, including manipulation of 3D textures (**Note: HD 630 will not be ISV certified**)
- Choice of 7th generation Intel® Core™ i7 and i5 quad-core or Xeon® processors.
- Intel® Core™ i7 with vPro or Intel® Xeon® with vPro technology (optional)
- HP Performance Advisor for optimal configuration, compatibility and performance
- Up to two SODIMMs, for system memory up to 32GB. ECC memory with Intel® Xeon® processors.
- Supports multi-display, including up to three displays without the use of a docking solution, with hybrid graphics enabled. Supports up to five with HP ZBook Dock with Thunderbolt™ 3 (sold separately), with hybrid graphics enabled.
- Two (2) Thunderbolt™ 3 ports (supporting DP 1.2, USB 3.1, PCIe Gen 3 devices) on the new USB-C™ connector, for high speed data/video/audio transfer support.
- 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
- Long life battery solution: optional 4-cell (64 Whr) or 8-cell (92.4 Whr)
- 2 discrete buttons with LED indicator for convenient one touch access - Wireless On/Off, Volume Mute
- Widescreen 15.6-inch diagonal anti-glare LED-backlit display:
FHD (1920x1080) ultrawide viewing angle, UHD (3840x2160) ultrawide viewing angle, UHD (3840x2160) ultrawide viewing angle with HP DreamColor Technology, or FHD Touch (1920x1080) ultrawide viewing angle
- Wireless connectivity options:
 - Intel® Dual Band Wireless-AC 8260 802.11 ac/a/b/g/n (2x2) WiFi and Bluetooth® 4.2 combo (vPro) or,
 - Intel® Dual Band Wireless-AC 8260 802.11 ac/a/b/g/n (2x2) WiFi and Bluetooth® 4.2 combo (non-vPro)
- Two dedicated drive slots. (2) M.2 slots. Both can be populated at a time with the 64Whr Battery and one at a time with the 92Whr battery.
- Security features including HP Client Security Manager, managed via single console.
- Low halogen HP BIOS technology, including HP Sure Start Gen 3 to identify and recover from unknown BIOS attacks.

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

Features

OPERATING SYSTEM

Preinstalled Windows 10 Pro 64¹
Windows 10 Home 64¹
Windows 10 Home Single Language 64¹

FreeDOS 2.0

Supported Windows 10 Enterprise 64¹
Red Hat Enterprise Linux (RHEL) 7
Ubuntu Linux 16.04

1. 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>.

NOTE: Your product does not support Windows 8 or Windows 7. In accordance with Microsoft's support policy, HP does not support the Windows[®] 8 or Windows 7 operating system on products configured with Intel and AMD 7th generation and forward processors or provide any Windows[®] 8 or Windows 7 drivers on <http://www.support.hp.com>

PROCESSOR*

Intel[®] Xeon[®]E3-1535M v6 with Intel[®] HD graphics P630 (3.10 GHz, 2400 MHz, 8MB L3 cache, 4 Cores, 45W)
Up to 4.20 GHz with Intel[®] Turbo Boost Technology

Intel[®] Xeon[®] E3-1505M v6 with Intel[®] HD graphics P630 (3.00 GHz, 2400 MHz, 8 MB L3 Cache, 4 Cores, 45W)
Up to 4.00 GHz with Intel[®] Turbo Boost Technology

Intel[®] Core[™] i7-7820HQ with Intel[®] HD graphics 630 (2.90 GHz, 2400 MHz, 8 MB L3 Cache, 4 Cores, 45W)
Up to 3.90 GHz with Intel[®] Turbo Boost Technology

Intel[®] Core[™] i7-7700HQ with Intel[®] HD graphics 630 (2.80 GHz, 2400 MHz, 6 MB L3 Cache, 4 Cores, 45W)
Up to 3.80 GHz with Intel[®] Turbo Boost Technology

Intel[®] Core[™] i5-7440HQ with Intel[®] HD graphics 630 (2.80 GHz, 2400 MHz, 6 MB L3 Cache, 4 Cores, 45W)
Up to 3.80 GHz with Intel[®] Turbo Boost Technology

Intel[®] Core[™] i5-7300HQ with Intel[®] HD graphics 630 (2.50 GHz, 2400 MHz, 6 MB L3 Cache, 4 Cores, 45W)
Up to 3.50 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.

Features

CHIPSET

Mobile Intel® CM238

Features

INTEL® CORE™ i7 WITH VPRO/XEON® WITH VPRO TECHNOLOGY CAPABLE

Intel® Core™ i7 with vPro™ and XEON® 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 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/Xeon® 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/XEON® with vPro technology is dependent on third- party software providers. Compatibility with future "virtual appliances" is yet to be determined.

Features

GRAPHICS

Intel Integrated

Intel® HD graphics 630*
Intel® HD graphics P630*

Discrete

NVIDIA® Quadro® M1200M with 4GB dedicated GDDR5 graphics memory
Microsoft DirectX 12 (Shader Model 5.0) and OpenGL 4.4 capable

* HD content required to view HD images.

NOTE: NVIDIA® Quadro® mobile professional graphics support up to four independent displays when using an HP ZBook Dock with Thunderbolt™ 3 (sold separately) or DisplayPort™ 1.2 hubs with MST.

NVIDIA® Optimus Technology supported

NOTE 1: Color management on the UHD DreamColor panel is not supported while NVIDIA® Optimus Technology is activated.

DisplayPort™ 1.2 protocol features supported on Thunderbolt™ 3 ports:

- Legacy displays (HDMI, DVI, VGA) may be attached to Thunderbolt™ port with the use of a certified dongle.
- DisplayPort™ monitors capable of supporting DisplayPort™ 1.2 may be directly attached to the Thunderbolt™ port to achieve HBR2 with the use a dongle.
- Thunderbolt™ 3 enabled monitors may be directly attached to the Thunderbolt port to achieve HBR2 and MST.
- DisplayPort™ 1.2 MST feature ("daisy-chain" feature) is supported through Thunderbolt™ 3 port on Thunderbolt™ 3 enabled devices or DisplayPort™ 1.2 monitors (requires monitor with DisplayPort™ 1.2 MST capability) with the use of a dongle.
- Up to 2 streams (eight lanes) of DisplayPort™ 1.2 are supported over a single Thunderbolt™ 3 port. Up to (2) 4K displays 24/30-bit color depth at 60 Hz or (1) 5K display supported over a single Thunderbolt™ 3 port. (Requires Intel® certified Thunderbolt™ cable).
- DisplayPort™ 1.2 w/MST (Multi-stream Transport): Supports resolutions up to Full 4K, 24/30-bit color depth at 60 Hz, and WUXGA (1920 x1200) monitors, 24/30-bit color depth at 120 Hz.

* Thunderbolt™ 3 is superset port supporting DisplayPort™ 1.2, USB 3.1 Gen 2, and PCIe Gen 3 devices over the new USB-C™ connector. Install all the latest drivers for your Thunderbolt™ device before connecting the device to the Thunderbolt™ port. Thunderbolt™ cable and Thunderbolt™ device (sold separately) must be compatible with Windows. To determine whether your device is Thunderbolt™ Certified for Windows, see <https://Thunderbolttechnology.net/products>.

Multi-Display Support

Without ZBook Dock with Thunderbolt™ 3:

HP ZBook Studio with hybrid graphics and without the use of the ZBook dock supports up to a maximum of three independent displays. These three displays are the internal panel plus two external displays connected to two of the three following ports: HDMI 1.4, Thunderbolt™ 3, Thunderbolt™ 3. HP ZBook Studio configuration with Intel® integrated graphics and without the use of the ZBook dock supports up to a maximum of three independent displays. These three displays are

Features

the internal panel plus two external displays connected to two of the three following ports: HDMI, Thunderbolt™ 3, Thunderbolt™ 3.

With ZBook Dock with Thunderbolt™ 3:

The ZBook Dock with Thunderbolt™ 3 has a Thunderbolt™ 3 port, VGA port, and two DisplayPort™ 1.2 ports. When used together with the HP ZBook Studio configuration with hybrid graphics, a maximum of 5 independent displays are supported. These five displays are internal panel plus four external displays connected to the ZBook dock's Thunderbolt™ 3, VGA, and two DisplayPort™ ports. When used together with the HP ZBook Studio configuration with Intel® integrated graphics, a maximum of 3 independent displays are supported.

Without ZBook Dock with Thunderbolt™ 3 (using DP 1.2 MST)

Multi-stream Transport (MST) is a DP 1.2 feature that allows daisy chaining of DisplayPort™ 1.2 monitors (requires built in support of DisplayPort™ 1.2 MST in monitor), or the use of DisplayPort™ 1.2 hubs with MST to achieve 5 active displays without a docking station on configurations with hybrid graphics enabled.

* [HP ZBook Dock with Thunderbolt™ 3 sold separately.](#)

DISPLAY

Internal

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

15.6-inch diagonal UHD UWVA IPS LED anti-glare (3840x2160)

15.6-inch diagonal UHD UWVA IPS LED anti-glare DreamColor (3840x2160)*

15.6-inch diagonal Touch LED-backlit FHD UWVA IPS (1920 x 1080)

External

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

* UHD+ Dreamcolor planned to be available in 1H17

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

Features

STORAGE AND DRIVES

HP Z Turbo Drives (NVMe PCIe SSD)

256GB PCIe (NVMe) TLC Solid State Drive
256GB PCIe (NVMe) MLC Solid State Drive
512GB PCIe (NVMe) MLC Solid State Drive
512GB PCIe (NVMe) TLC Opal 2 Solide State Drive
1TB PCIe (NVMe) MLC Solid State Drive

M.2 SATA SSD

256 GB SATA-3 Self-Encrypting (Opal 2) MLC Solid State Drive
512GB SATA-3 SS TLC SSD FIPS-140-2
128 GB SATA 6 Gb/sec SATA SSD

M.2 SATA SED SSD

256 GB SATA Self Encrypting Drive(SED)
512 GB SATA Self Encrypting Drive(SED) *(Available in 1H16)*

*For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 30 GB (for Windows 10) is reserved for system recovery software.

DRIVE CONTROLLERS

M.2 Storage Slots (SATA):	SATA-3 for SSD
HP Z Turbo Drive:	PCIe NVMe SSD
RAID:	0, 1 supported*

NOTE: Raid 0, 1 supported only on SATA drives.

MEMORY

Standard

32GB DDR4 1.2V ECC or Non-ECC SDRAM (Transfer rates up to 2133MT/s)
Two SODIMM slots supporting dual-channel memory
4 GB, 8GB and 16 GB SODIMMs (for Intel® Core™ Processors)
8GB and 16 GB ECC SODIMMs (for Intel® XEON® Processors)

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.

NOTE 1: Non-ECC memory only available with Intel® Core™ processors. ECC memory only available with Intel® Xeon® processors.

NOTE 2: 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. Maximum memory capacities assume Windows 64-bit operating systems or LINUX®.

Features

NETWORKING/COMMUNICATIONS

Communications

Integrated Intel® I219-LM Gigabit* Network Connection

Wireless

Secure, integrated wireless LAN options featuring support for the latest industry standards. Integrated Bluetooth® is also available (factory configurable only) and is combined with the supported wireless LAN feature.

802.11 Wireless LAN options

Intel® Dual Band Wireless-AC 8265 802.11 AC/a/b/g/n (2x2) WiFi + Bluetooth® 4.2 Combo Adaptor** (vPro)

Intel® Dual Band Wireless-AC 8265 802.11 AC/a/b/g/n (2x2) WiFi + Bluetooth® 4.2 Combo Adaptor** (non-vPro)

* The term "10/100/1000" or "Gigabit" Ethernet indicates compatibility with IEEE standard 802.3ab for Gigabit Ethernet, and does not connote actual operating speed of 1 Gb/s. For high-speed transmission, connection to a Gigabit Ethernet server and network infrastructure is required.

** 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.

AUDIO/MULTIMEDIA

Audio

Bang and Olufsen HD 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 microphone-in / stereo headphone-out jack

Webcam

Optional 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.

Features

KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS

Keyboard

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 helps reduce the risk of damage to sensitive components underneath. The 85-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 18.7 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

Large clickpad with On/Off button, two-way scroll, gestures, two integrated buttons within clickpad surface
Image sensor clickpad 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, and display brightness.

Features

SOFTWARE AND SECURITY

Preinstalled Software with Windows® Operating System

BIOS

HP BIOSphere Gen3¹

HP Sure Start Gen3 ²

HP DriveLock | HP Automatic DriveLock

BIOS Update via Network

Master Boot Record Security

Power On Authentication

Secure Erase³

Absolute Persistence Module⁴

Pre-boot Authentication

Multi Media

Cyberlink Power MediaPlayer

Communication / Connectivity

HP Mobile Connect Pro⁵

Native Miracast Support⁶

HP LAN-WLAN Protection

HP MAC Address Manager (select models only)

HP Wireless Wakeup (select models only)

HP SureConnect

HP Value Add Software

HP 3D DriveGuard 6

HP ePrint Driver + JetAdvantage⁷

HP Hotkey Support

HP Recovery Manager

HP Jumpstart

HP Support Assistant¹²

HP Noise Cancellation Software

HP Performance Advisor

HP Remote Graphics Software

HP Velocity

Microsoft Products

Buy Office

Bing Search

Skype⁸

Features

Manageability

HP Driver Packs⁹
HP SoftPaq Download Manager (SDM)
HP System Software Manager (SSM)⁹
HP BIOS Config Utility (BCU)⁹
HP Client Catalog⁹
HP Manageability Integration Kit for Microsoft SCCM¹⁰
HP Image Assistant
LANDESK Management¹¹

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

Client Security Software

- HP Client Security Suite Gen3¹³
- HP Security Manager (including Credential Manager and Password Manager)
- HP Fingerprint Sensor
- Power On Authentication
- Device Access Manager

Microsoft Defender¹⁴

HP WorkWise¹⁵

Standard

For Windows 10, Trusted Platform Module (TPM) 2.0 (Infineon SLB9670). Common Criteria EAL4+ Certified.

HP Fingerprint Reader

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

1. Requires Intel® 7th generation processors
2. Available on HP Elite products equipped with Intel® 7th generation processors.
3. For the methods outlined in the National Institute of Standards and Technology Special Publication 800-88. Supported on Elite platforms with BIOS version F.03 or higher
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. HP Mobile Connect Pro is only available on preconfigured devices with WWAN. For geographic availability refer to <http://www.hp.com/go/mobileconnect>
6. 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>
7. 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.
8. Skype is not offered in China.
9. Not preinstalled, however available for download at <http://www.hp.com/go/clientmanagement>

Features

10. HP Manageability Integration Kit can be downloaded from <http://www8.hp.com/us/en/ads/clientmanagement/overview.html>
11. Subscription required.
12. Requires Windows and Internet Access
13. Requires Windows and Intel® 7th generation processors.
14. Opt in and internet connection required for updates
15. HP WorkWise smartphone app is available as a free download on the App Store and Google Play

Workstation ISV Certifications

See 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

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 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.

Features

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 your technology and business.

An optional fingerprint reader to 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.

Features

POWER

Power Supply

External HP 150W Slim Smart AC adapter
(153 x 66 x 22 mm)

Primary Battery

HP Long Life 4-cell Prismatic Battery (64 WHr) *
HP Long Life 8-cell Polymer Battery (92 WHr) *

Battery Life

Battery life up to 16 hours 47 minutes (with 92Whr battery, FHD panel, Z Turbo Drive, Intel graphics)**
Battery life up to 15 hours 49 minutes (with 92Whr battery, FHD panel, Z Turbo Drive, NVIDIA M1200, Hybrid graphics)**

NOTE: Battery is internal and no replaceable by the costumer

System Standby Time

Up to TBD weeks***

* Available with 3-year limited warranty only

**Windows 10 MM14 battery life will vary depending on various factors including 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 <http://www.bapco.com> 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

NVIDIA® Optimus®
Hibernation
Standby
ACPI compliance

ENVIRONMENTAL

US ENERGY STAR®
IT ECO declaration
EPEAT®

WEIGHTS & DIMENSIONS

Weight

Starting at 4.6 lbs (2.09 kg)

Dimensions (w x d x h)

14.76 in x 10.04 in x 0.71 in
375 mm x 255 mm x 18 mm

Features

NOTE: Height varies depending upon where on the notebook the measurement is made. Weight varies by configuration and components. Weight includes Quad Core™ CPU, FHD, Intel® HD graphics, 4GBx1 SODIMM, HP Z Turbo Drive, WLAN/BT, FPR, 4-cell battery.

PORTS/SLOTS

Ports

Left side:

- (1) RJ-45 (Ethernet)
- (1) USB 3.0
- (1) USB 3.0 Charging Port
- (1) Security lock slot

Right side:

- (1) Power Connector
- (2) Thunderbolt™ 3 (supporting DisplayPort™ 1.2, USB 3.1 Gen2, PCIe Gen 3 devices)
- (1) HDMI 1.4
- (1) USB 3.0
- (1) Stereo microphone in / headphone-out combo jack

Thunderbolt™ 3

Thunderbolt™3 ports supports DisplayPort™ 1.2, USB 3.1 Gen 2, and PCIe Gen 3 devices over the new USB-C™ port connector. The port is compatible with existing DisplayPort™ displays, devices, and cables. Install all the latest drivers for your Thunderbolt™ device before connecting the device to the Thunderbolt™ port. Thunderbolt™ cable and Thunderbolt™ device (sold separately) must be compatible with Windows®. To determine whether your device is Thunderbolt™ Certified for Windows®, see <https://Thunderbolttechnology.net/products>.

Digital Media Slots

- (1) SD UHS-II Flash Media slot – Supports next generation SD (Secure Digital), backward compatible to SDHC, SDXC)
-

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.
-

System Technical Specifications

SYSTEM UNIT

Stand-Alone Power Requirements (AC Power)	Nominal Operating Voltage	19.5 V	
	Average Operating Power	DreamColor Without DreamColor	25 W (Windows® 10 64-bit) 16.8 W (Windows® 10 64-bit)
	Max Operating Power	< 200 W	
Temperature	Operating	32° to 95° F (0° to 35° C)	
	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)	
Industry Standard Certifications	UL	Yes	
	CSA	Yes	
	FCC Compliance	Yes	
	ENERGY STAR®	Select models*	
	EPEAT®	Gold **	
	ICES	Planned	
	Australia / NZ A-Tick Compliance	Planned	
	CCC	Planned	
	Japan VCCI Compliance	Planned	
	KC	Planned	
	BSMI	Planned	
	CE Marking Compliance	Planned	
MIL STD 810G	Planned***		

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

** EPEAT® registered where applicable. EPEAT registration varies by country. See <http://www.epeat.net> for registration status by country. See HP's 3rd party option store for solar energy accessory www.hp.com/go/options.

*** 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.

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)

Active Area (W x H)	13.54 x 7.59 in (34.4 x 19.4 cm)	
Dimensions (W x H)	15.6 in (34.4 x 19.4 cm)	
Weight	360 g (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	141	
Viewing Angle	85/85/85/85 (Left/Right/Down/Up) (typical)	

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	270 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)	

15.6-inch UHD+ UWVA IPS LED anti-glare Dreamcolor* (3840x2160)

Dimensions (W x H)	13.62 x 7.59 in (34.6 x 19.4 cm)	
Diagonal Size	15.6 in (39.6 cm)	
Weight	345 g (max)	
Surface Treatment	Anti-glare	
Contrast Ratio	1000:1 (typ)	
Refresh Rate	60 Hz	
Brightness	270 nit typical	
Pixel Resolution	Format	3840x2160
	Configuration	RGB Stripe
Backlight	LED	
PPI	282	
Viewing Angle	85/85/85/85 (Left/Right/Down/Up) (typical)	

Technical Specifications – Displays

** UHD+ Dreamcolor to be available in 1H17*

15.6-inch FHD TOUCH UWVA IPS LED (1920x1080)	Dimensions (W x H)	13.62 x 7.59 in (36 x 22.4 cm max)	
	Diagonal Size	15.6 in (39.6 cm)	
	Weight	345 g (max)	
	Surface Treatment	Anti-glare	
	Contrast Ratio	600:1 (typ)	
	Refresh Rate	60 Hz	
	Brightness	300 nit typ	
	Pixel Resolution	Format	1920 x 1080 (FHD)
		Configuration	RGB Stripe
	Backlight	LED	
	PPI	142	
	Viewing Angle	85/85/85/85 (Left/Right/Down/Up) (typical)	

Technical Specifications – Storage and Drives

STORAGE AND DRIVES

Internal Storage

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	Maximum Sequential Write
		Up to 540 MB/s	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	

512 GB M2 2280 SATA-3 Self-Encrypting Drive (Opal 2) MLC Solid State Drive	Drive Weight	0.02 lb (<10 g)	
	Capacity	512GB	
	Height	0.09 in (2.3mm)	
	Width	0.87 in (22 mm)	
	Interface	ATA-8, SATA 3.0	
	Performance	Maximum Sequential Read	
		Up to 540 MB/s	
	Logical Blocks	1,000,215,216	
Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]		

256 GB M2 2280 SATA-3 Self-Encrypting Drive (Opal 2) TLC Solid State Drive	Drive Weight	0.02 lb (<10 g)	
	Capacity	256 GB	
	Height	0.14 in (3.58 mm)- 0.09 in (2.23 mm)	
	Width	0.87 in (22 mm)	
	Interface	ATA-8, SATA 3.0	
	Performance	Maximum Sequential Read	Maximum Sequential Write
		Up to 540 MB/s	UP to 460 MB/s
	Logical Blocks	500,118,192	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	

Technical Specifications – Storage and Drives

SSD 1TB 2280 M2 PCIe-3x4 DS NVMe	Drive Weight	0.022 lb (<10 g)		
	Capacity	1TB		
	Height	0.14 in (3.7 mm)		
	Width	0.87 in (22 mm)		
	Generation	NVMe		
	NAND Type	MLC		
	Form-Factor (I/O)	M.2 2280		
	Interface	PCIe GEN3X4		
	Performance	Maximum Sequential Read	Maximum Sequential Write	
		Up to 2400MB/s	Up to 1500MB/s	
	Logical Blocks	2,000,409,264		
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]		
	Features	ATA Security, L1.2		

HP Z Turbo Drive 512 GB, M.2 NVMe MLC 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	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 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		

HP Z Turbo Drive 256 GB, M.2 NVMe MLC Solid State Drive	Drive Weight	0.022 lb. (<10 g)		
	Capacity	256 GB		
	Height	0.09 in (2.3 mm)		
	Width	0.87 in (22.1 mm)		
	Generation	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	

Technical Specifications – Storage and Drives

Logical Blocks	500,118,192
Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
Features	ATA Security; TRIM; L1.2

HP Z Turbo Drive 1 TB, M.2 NVMe MLC Solid State Drive

Drive Weight	0.022 lb (<10 g)
Capacity	1TB
Height	0.09 in (2.3 mm)
Width	0.87 in (22 mm)
Generation	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

HP Z Turbo Drive 256 GB, M.2 NVMe TLC 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	NVMe
NAND Type	TLC
Form-Factor (I/O)	M.2 2280
Interface	PCIe GEN3X4
Performance	Maximum Sequential Read Maximum Sequential Write
	Up to 2600MB/s Up to 900 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

HP Z Turbo Drive 512 GB, M.2 NVMe TLC Opal 2 Solid State Drive

Drive Weight	0.022 lb (<10 g)
Capacity	512 GB
Height	0.09 in (2.3 mm)
Width	0.87 in (22 mm)
Generation	NVMe
NAND Type	TLC
Form-Factor (I/O)	M.2 2280
Interface	PCIe GEN3X4

Technical Specifications – Storage and Drives

	Performance	Maximum Sequential Read	Maximum Sequential Write
		Up to 1800MB/s	Up to 980 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	
512 GB, M.2 SATA FIPS-140-2 Solid State Drive	Drive Weight	0.022 lb (<10 g)	
	Capacity	512 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 30 GB (for Windows 10) disk is reserved for system recovery software.

Technical Specifications – Security

SECURITY

HP Fingerprint Sensor	Mobile Voltage Operation	3.0V-3.6V Single Supply
	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/Communications

5.25 - 5.35 GHz
5.47 - 5.725 GHz
5.825 - 5.850 GHz

Note: Indonesia no support this band)

Data Rates

- 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 ~ MCS9, (1SS, and 2SS) (20MHz, 40MHz, and 80MHz)

Modulation

Direct Sequence Spread Spectrum
BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM

Security¹

- IEEE and WiFi 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 band Access Points

Output Power²

- 802.11b : +16dBm minimum
- 802.11g : +14dBm minimum
- 802.11a : +14dBm minimum
- 802.11n HT20(2.4GHz) : +14dBm minimum
- 802.11n HT40(2.4GHz) : +12dBm minimum
- 802.11n HT20(5GHz) : +14dBm minimum
- 802.11n HT40(5GHz) : +12dBm minimum

Power Consumption

Transmit: 2.0 Watts (max)
Receive: 1.6 Watts (max)
Idle mode(PSP): 180 mW (WLAN associated)
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

Technical Specifications – Networking/Communications

	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)
LED Activity	LED Amber - Radio OFF; LED White - Radio ON
	<ol style="list-style-type: none"> 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).

HP Integrated Module with Bluetooth® 4.2 Wireless Technology

Bluetooth® Specification	4.2 Compliant
Dimensions	1.18 x 0.26 x 0.13 in (30 x 6.5 x 3.25 mm))
Frequency Band	2402 to 2480 MHz
Number of Available Channels	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	

Modulation	0.01% BER	0.001% BER
GFSK	-80 dBm	-70 dBm
π/4-DQPSK	-80 dBm	-70 dBm
8DPSK	-80 dBm	-70 dBm

Technical Specifications – Networking/Communications

Power Consumption	Peak (Tx) 330 mW Peak (Rx) 230 mW Selective suspend 17 mW
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 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} Hard Copy Cable Replacement (HCRP) ^{1,2} Personal Area Networking Profile (PAN) ^{1,2} Human Interface Device Profile (HID) ^{1,2} Advanced Audio Distribution Profile (A2DP) Audio Video Remote Control Profile (AVRCP)
Bluetooth® V4.2 support feature	V4.2: ESR8 compliant, LE Secure Connection – Basic.

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/Communications

Intel® Dual Band Wireless-N 8265 AC 802.11 AC/a/b/g/n (2x2) WiFi + Bluetooth® 4.2 Combo Adaptor* (non- vPro)	Wireless LAN Standards	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11ac
	Interoperability	Wi-Fi certified
	Frequency Band	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. 802.11a/n 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: No support for this band in Indonesia.
	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 ~ MCS9, (1SS, and 2SS) (20MHz, 40MHz, and 80MHz)
	Modulation	Direct Sequence Spread Spectrum BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM
	Security¹	<ul style="list-style-type: none"> • IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware • 802.1x authentication • 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 band Access Points
	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) : +14dBm minimum • 802.11n HT40(2.4GHz) : +12dBm minimum • 802.11n HT20(5GHz) : +14dBm minimum • 802.11n HT40(5GHz) : +12dBm minimum

Technical Specifications – Networking/Communications

Power Consumption	Transmit: 2.0 Watts (max) Receive: 1.6 Watts (max) Idle mode(PSP): 180 mW (WLAN associated) 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 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)
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 (CCK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).

HP Integrated Module with Bluetooth® 4.2 Wireless Technology

Bluetooth® Specification	4.2 Compliant
Dimensions	1.18 x 0.26 x 0.13 in (30 x 6.5 x 3.25 mm))
Frequency Band	2402 to 2480 MHz
Number of Available Channels	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

Technical Specifications – Networking/Communications

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

Modulation	0.01% BER	0.001% BER
GFSK	-80 dBm	-70 dBm
π/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

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
 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}
 Hard Copy Cable Replacement (HCRP)^{1,2}
 Personal Area Networking Profile (PAN)^{1,2}
 Human Interface Device Profile (HID)^{1,2}
 Advanced Audio Distribution Profile (A2DP)
 Audio Video Remote Control Profile (AVRCP)

Bluetooth® V4.2 support feature

V4.2: ESR8 compliant, LE Secure Connection – Basic.

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 – Audio/Multimedia

AUDIO/MULTIMEDIA – BANG & OLUFSEN

Hardware	Implementation	Conexant CX7700
	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
Internal Stereo Speaker	Power Rating	1 Watts
	Impedance	4 ohms

Technical Specifications – Power

POWER

HP 150W Slim Smart AC Adapter	Dimensions	6.02 x 2.60 x .87 in ((153 x 66 x 22 mm)	
	Weight	0.71 lbs (320 g)	
	Input	100 to 240 VAC	
		Input Efficiency	88% min at 115 VAC
		Input frequency range	47 to 63 Hz
		Input AC current	2.9 A at 90 VAC, 1.45 A at 180 VAC
	Output	Output power	200W
		DC output	19.5V
		Hold-up time	5 msec at 115 VAC input
		Output current limit	<16A, Over voltage protection- 29V max automatic shutdown
	Connector	3 pin/grounded, mates with interchangeable cords	
	Environmental Design	Operating temperature	32° to 104° F (0° to 40° C)
		Non-operating (storage) temperature	-4° to 149° F (-20° to 65° C)
		Altitude	0 to 10,000 ft (0 to 3,048 m)
		Humidity	20% to 80%
	Storage Humidity	10% to 90%	
EMI and Safety Certifications	CE Mark- full compliance with LVD and EMC directives; Worldwide safety standards- IEC950, EN60950, UL1950, Class 1, SELV; Agency approvals- C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCIB, NOM-1 NYCE; MTBF- over 200,000 hours at 25°C ambient condition.		

HP Long Life 4-cell Prismatic Battery (64 WHr)	Dimensions (H x W x L)	0.29 x 3.35 x 10.2 in (0.74cm x 8.5cm x 25.8cm)	
	Weight (max)	315g	
	Cells/Type	4-cell; Prismatic	
	Energy	Voltage	15.2V
		Amp-hour capacity	4.21Ah
		Watt-hour capacity	64Wh
	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
	System ON	3 to 5 hours	
Fuel Gauge LED	No		
Warranty*	3 year		

* 3-year platform warranty is required for a 3-year Long Life Battery warranty.

Technical Specifications – Power

HP Long Life 8-cell Prismatic Battery (92 WHr)	Dimensions (H x W x L)	0.3 x 13.08 x 3.34 in (0.76 x 33.23 x 8.49cm)		
	Weight (max)	380g		
	Cells/Type	8-cell Polymer		
	Energy	Voltage	15.4V	
		Amp-hour capacity	5.975Ah	
		Watt-hour capacity	92Wh	
	Temperature	Operating (Charging)	32° to 122°F (0° to 50° C)	
		Operating (Discharging)	14° to 140°F (-10° to 60° C)	
		Non-operating	>140° F (>60° C)	
	Battery Re-Charge Time	System in OFF or Standby Mode	3 hours	
		System ON	3 to 5 hours	
	Fuel Gauge LED	No LED		
	Warranty*	3 year		
* 3-year platform warranty is required for a 3-year Long Life Battery warranty.				

Technical Specifications – Environmental

ENVIRONMENTAL DATA

Eco-Label Certifications & declarations

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:

- IT ECO declaration
- US ENERGY STAR®
- EPEAT® Gold registered in the United States. See <http://www.epeat.net> for registration status in your country.

System Configuration

The configuration used for the Energy Consumption and Declared Noise Emissions data for the Notebook model is based on a “Typically Configured Notebook”.

Energy Consumption (in accordance with US ENERGY STAR® test method)

	115VAC, 60Hz	230VAC, 50Hz	100VAC, 50Hz
Normal Operation (Sort idle)	14.50 W	15.04 W	14.58 W
Normal Operation (Long idle)	5.75 W	5.63 W	5.87 W
Sleep	0.74 W	0.78 W	0.77 W
Off	0.41 W	0.43 W	0.42 W

Note:

Energy efficiency data listed is for an ENERGY STAR® compliant product if offered within the model family. HP computers marked with the ENERGY STAR® Logo are compliant with the applicable U.S. Environmental Protection Agency (EPA) ENERGY STAR® specifications for computers. If a model family does not offer ENERGY STAR® compliant configurations, then energy efficiency data listed is for a typically configured PC featuring a hard disk drive, a high efficiency power supply, and a Microsoft Windows® operating system.

Heat Dissipation*

	115VAC, 60Hz	230VAC, 50Hz	100VAC, 50Hz
Normal Operation (Short idle)	49 BTU/hr	51 BTU/hr	50 BTU/hr
Normal Operation (Long idle)	20 BTU/hr	19 BTU/hr	20 BTU/hr
Sleep	2 BTU/hr	3 BTU/hr	3 BTU/hr
Off	1 BTU/hr	1 BTU/hr	1 BTU/hr

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

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

	Sound Power (L _{WAd} , bels)	Sound Pressure (L _{pAm} , decibels)
Typically Configured – Idle	2.8	19
Fixed Disk – Random writes	3.2	24
Optical Drive – Sequential reads		

Longevity and Upgrading

This product can be upgraded, possibly extending its useful life by several years. Upgradeable features and/or components contained in the product may include:

- 3 USB ports
- 2 Thunderbolt™ 3 ports
- 2 M.2 Storage Slots*
- 1 SD Card reader
- 2 SODIMM memory slots
- 1 HDMI 1.4 port

Technical Specifications – Environmental

Spare parts are available throughout the warranty period and or for up to “5” years after the end of production.

**When the Long Life 92Whr battery is installed (factory or accessory), it occupies the space of the secondary M.2 slot.*

Batteries

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

Batteries used in the product do not contain:

- Mercury greater the 1ppm by weight
- Cadmium greater than 20ppm by weight

Battery size: CR2032 (coin cell)

Battery type: Lithium

Battery size: 4-cell high capacity Lithium-Ion battery (optional 8 cell available)

Battery type:

Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC.
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold level, see www.epeat.net
- Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.
- This product contains 0.0% post-consumer recycled plastic (by wt.)
- This product is 95.8% recycle-able when properly disposed of at end of life.

Packaging Materials

External:	PAPER/Corrugated	379 g
Internal:	PLASTIC/Polyethylene low density - LDPE	11 g
	PLASTIC/Polyethylene Expanded - EPE	33 g
	PLASTIC/Polypropylene - PP	5 g

The plastic packaging material contains at least 81.5% recycled content.

The corrugated paper packaging materials contains at least 80.0% recycled content.

Material Usage

This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at <http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/gse.pdf>):

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants – may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds

Technical Specifications – Environmental

- Mercuric Oxide Batteries
- Nickel – finishes must not be used on the external surface designed to be frequently handled or carried by the user.
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Biphenyl Ethers (PBBEs)
- Polybrominated Biphenyl Oxides (PBBOs)
- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) – except for wires and cables, has been voluntarily removed from most applications.
- Radioactive Substances
- Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

Packaging Usage

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

- Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.
- Eliminate the use of ozone-depleting substances (ODS) in packaging materials.
- Design packaging materials for ease of disassembly.
- Maximize the use of post-consumer recycled content materials in packaging materials.
- Use readily recyclable packaging materials such as paper and corrugated materials.
- Reduce size and weight of packages to improve transportation fuel efficiency.
- Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.

End-of-life Management and Recycling

Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: <http://www.hp.com/go/reuse-recycle> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: <http://www.hp.com/go/recyclers>. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.

HP, Inc. Corporate Environmental Information

For more information about HP's commitment to the environment:

Global Citizenship Report

<http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html>

Eco-label certifications

<http://www8.hp.com/us/en/hp-information/environment/ecolabels.html>

ISO 14001 certificates:

<http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842>

and

<http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf>

COUNTRY OF ORIGIN

Technical Specifications – Environmental

China

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

Type	Description	Part #
	HP 4GB DDR4-2400 SODIMM (Core processors only)	Z4Y84AA
	HP 8GB DDR4-2400 SODIMM (Core processors only)	Z4Y85AA
	HP 16GB DDR4-2400 SODIMM (Core processors only)	Z4Y86AA
	HP 8GB DDR4-2133 EEC SODIMM (Xeon® processors only)	V1D58AA
	HP 16GB DDR4-2133 EEC SODIMM (Xeon® processors only)	V1D59AA
Cases	HP Executive 15.6 Midnight Top Load	1KM15AA
	HP Business Case (up to 15.6")	H5M92AA
Docking	HP Zbook 150W TB3 Dock	P5Q58AA
	HP Executive Travel Hub	TOK29AA
	HP Travel Hub	TOK30AA
	HP 3005pr USB 3.0 Port Replicator w/USB-C adapter	Y4H06AA
	HP USB-Type C™ Elite Dock	X7W54AA
Input/Output - Mice	Comfort Grip Mouse	H2L63AA
	HP 3-Button Laser Mouse	H4B81AA#xxx
	HP Ultra Mobile Wireless Mouse	H6F25AA#xxx
	HP X4000 Bluetooth® Mouse	H3T50AA#xxx
	HP Slim Bluetooth® Mouse	F3J92AA#xxx
	HP Ultrathin Wireless Mouse	L9V78AA
	HP Wireless (Link-5) Keyboard	T6U20AA
	HP Slim USB Keyboard and Mouse	T6T83AA
	HP Slim Wireless Keyboard and Mouse	T6L04AA
	HP USB Essential Keyboard and Mouse	H6L29AA#xxx
	HP Mobile Hot Spot	M5T50AA
	7.4 to 4.5mm Adapter	K0Q39AA
Power Adapters	HP 150W Slim A/C Adapter	W2F74AA
Adapters	HP Wireless display adapter	J1V25AA#xxx
	HP Conferencing Keyboard	K8P74AA#xxx
	HP Speaker Phone	K7V16AA
	HP UC Wired Headset	K7V17AA
	HP UC Wireless Earpiece	W3K08AA
	HP UC Wireless Duo Headset	W3K09AA
	HP USB-C™ to VGA Adapter	N9K76AA
	HP USB-C™ to DisplayPort Adapter	N9K78AA
	HDMI to DVI adapter	F5A28AA
	HP ZBook Thunderbolt 3, 1M cable	Z4P20AA
Storage - External	HP External USB Optical Drive	F2B56AA

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

Storage	HP 256GB 2280 M2 PCIe 3x4 NVME	V3K66AA
	HP 512GB 2280 M2 PCIe 3x4 DS NVME	V3K67AA
Security	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
	HP Essential Combination Lock	TOY16AA
	HP Combination Lock	TOY15AA
	HP Keyed Cable lock	TOY14AA
	HP Keyed Cable Lock 10mm	T1A62AA

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:
April 24, 2017	From v1 to v2	Removed	Integrated Bluetooth compatibility with 4.0, 4.1
July 3, 2017	From v2 to v3	Changed	The HP Long Life 8-cell Battery info under Power section
July 31, 2017	From v3 to v4	Removed	HP Touchpoint Manager from the Software section
September 7, 2017	From v4 to v5	Added	Red Hat Enterprise Linux (RHEL) 7 and Ubuntu Linux 16.04 added to the supported section of operating system.
January 24, 2018	From v5 to v6	Changed	Battery size in Batteries section
January 29, 2018	From v6 to v7	Added	New note to Longevity and Upgrading section
February 28, 2018	From v7 to v8	Added	Note to power supply section

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