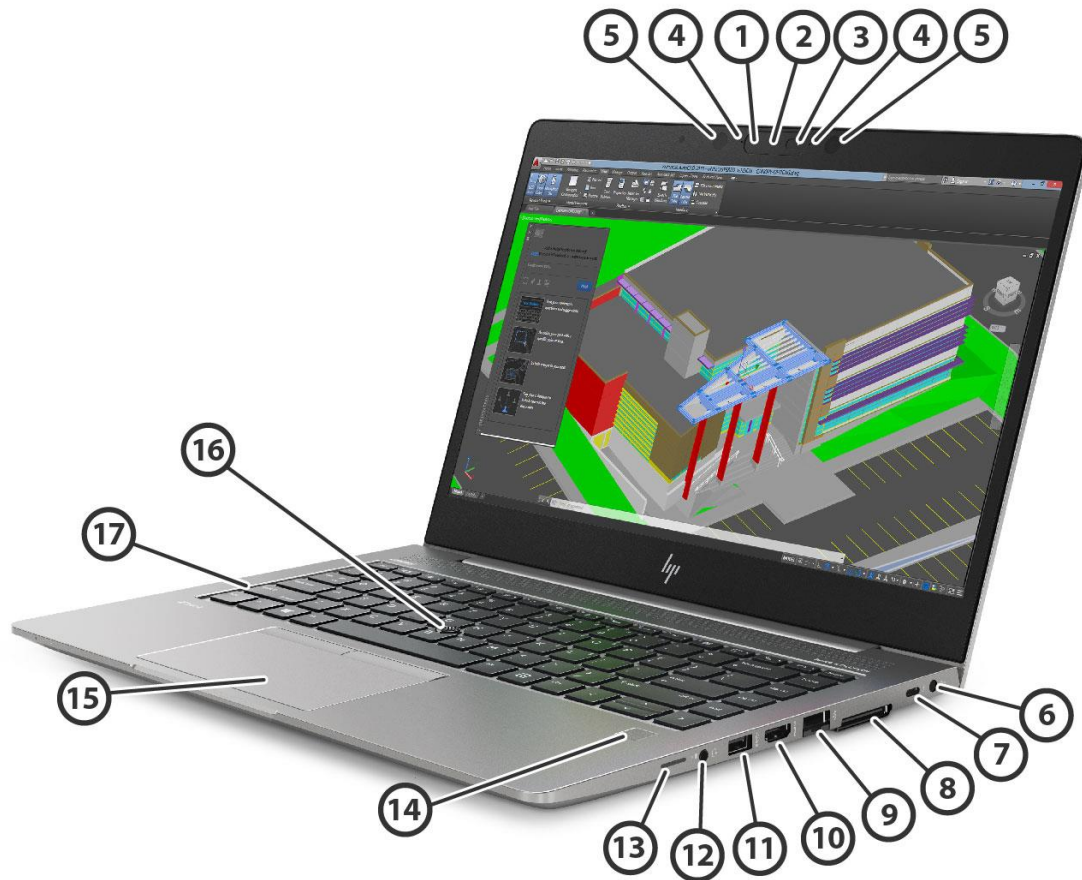


### Overview

### HP ZBook 14u G5 Mobile Workstation

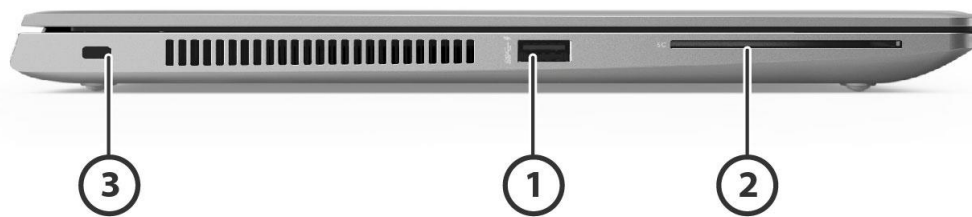


#### Front

- |  |                                    |
|--|------------------------------------|
| 1. HD Camera (Select models only)      | 10. HDMI port (Cable not included) |
| 2. IR Camera (Select models only)      | 11. USB 3.1 Gen 1 port             |
| 3. Webcam LED (Select models only)     | 12. Audio combo jack               |
| 4. Internal microphones                | 13. SIM card slot <sup>1</sup>     |
| 5. IR Camera LEDs (Select models only) | 14. Fingerprint reader             |
| 6. Power connector                     | 15. Clickpad                       |
| 7. USB Type-C™ with Thunderbolt™       | 16. Pointstick                     |
| 8. Docking connector                   | 17. HP Collaboration Keyboard      |
| 9. Ethernet port                       |                                    |

<sup>1</sup>All units have a SIM card slot and icon but units that do not support WWAN are shipped with a non-removable SIM slot plug

### Overview



#### Left

1. 1 USB 3.0 (charging)
2. 1 smart card reader
3. Security lock slot

### Overview

#### At A Glance

- Eye-catching ultraslim design, premium precision-crafted machined aluminum (CNC), seamless formed aluminum chassis for clean, crisp, premium look and feel
- .
- Designed to pass 14 MIL-STD-810G tests\*.
- Workstation-caliber AMD Radeon Pro™ discrete graphics: AMD Radeon Pro™ WX3100 (2 GB dedicated GDDR5); AMD Enduro™ graphics technology.
- Intel® Integrated graphics: Intel® HD Graphics 620 integrated on 7<sup>th</sup> Generation Intel Core processors. Intel® UHD Graphics 630 integrated on 8<sup>th</sup> Generation Intel Core processors.
- ISV certified to provide fast and reliable performance with workstation applications, including manipulation of 3D textures
- Choice of dual core 7<sup>th</sup> generation Intel® Core™ i5 or quad core 8<sup>th</sup> 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 supporting up to 32 GB DDR4-2400 MHz dual channel memory.
- Supports up to 3 independent displays via internal LCD Panel, system DisplayPort™, system VGA, or using the HP UltraSlim Docking Station or HP Thunderbolt Docking Station. Supports DisplayPort™ 1.2 monitors.
- Featuring HP Collaboration Keyboard with Clickpad to manage most commonly used conferencing functions with a single keystroke. HP Spill Resistant Collaboration Keyboard with Durakeys, touchpad buttons with Duracoat finish. Backlight keyboard in full aluminum deck with magnesium bottom reinforcement, chemically strengthened glass touchpad, and updated system functions indicators. 2 discrete buttons with LED indicator for convenient one touch access: Wireless On/Off, Volume Mute 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, and new discrete amp. HP Long life battery solution: 3-cell (50 WHr) supporting HP Fast Charge
- 
- 14-inch diagonal LED-backlit display:
  - FHD IPS eDP anti-glare, 67% sRGB at 220 nits (1920x1080)
  - FHD IPS eDP + PSR anti-glare, 100% sRGB at 400 nits with ambient light sensor (1920x1080)
  - UHD IPS eDP + PSR anti-glare, 100% sRGB at 400 nits with ambient light sensor (3840x 2160)
  - FHD IPS eDP touch screen with Corning Gorilla Glass 3, 67% sRGB at 220 nits (1920x1080)
  - HP SureView Integrated Privacy Display FHD IPS eDP + PSR touch screen with Corning Gorilla Glass 3, 100% sRGB at 700 nits with ambient light sensor Touch (1920x1080)
- Wireless connectivity options:
  - Intel® Dual Band Wireless-AC 8265 802.11 AC (2x2) WiFi and Bluetooth 4.2 combo adaptor (vPro™)
  - Intel® Dual Band Wireless-AC 8265 802.11 AC (2x2) WiFi and Bluetooth 4.2 combo adaptor (non-vPro™)
  - Realtek RTL8822BE 802.11ac 2x2 Wi-Fi and Bluetooth 4.2 combo adapter
  - Optional integrated wireless 4G (LTE) mobile broadband module support
- One dedicated drive slots. (1) M.2 slot support up to 2 TB of storage
- Enterprise grade security with HP SureStart Gen4, HP Privacy Camera3, HP Sure View2, HP Sure Run, HP Sure Recover, and Fingerprint reader2
- Low halogen, ENERGY STAR® certified and EPEAT® TBD registered in the U.S. EPEAT® status varies by country - please see [epeat.net](http://epeat.net).

\* 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. Accidental damage requires an optional HP Accidental Damage Protection Care Pack.

**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 10 Home 64 Advanced\*  
  
FreeDOS 2.0

**Supported OS**      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.windows.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\*

7th Generation Intel® Core™ i5 7300U vPro™ with Intel® HD 620 graphics (2.6 GHz, 3 MB cache, 2 cores) \* Up to 3.5 GHz with Intel® Turbo Boost Technology

7th Generation Intel® Core™ i5 7200U with Intel® HD 620 graphics (2.5 GHz, 3 MB cache, 2 cores) \* Up to 3.1 GHz with Intel® Turbo Boost Technology

8th Generation Intel® Core™ i7 8650U vPro™ with Intel® UHD 630 graphics (1.9 GHz, 8 MB cache, 4 cores) \* Up to 4.2 GHz with Intel® Turbo Boost Technology

8th Generation Intel® Core™ i7 8550U with Intel® UHD 630 graphics (1.8 GHz, 8 MB cache, 4 cores) \* Up to 4.0 GHz with Intel® Turbo Boost Technology

8th Generation Intel® Core™ i5 8350U vPro™ with Intel® HD 620 graphics (1.7 GHz, 6 MB cache, 4 cores) \* Up to 3.6 GHz with Intel® Turbo Boost Technology

8th Generation Intel® Core™ i5 8250U with Intel® UHD 630 graphics (1.6 GHz, 6 MB cache, 4 cores) \* Up to 3.4 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, branding and/or naming 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

Intel® Kaby Lake Chipset integrated with 7<sup>th</sup> Generation processor  
Intel® Kaby Lake – R Chipset integrated with 8<sup>th</sup> Generation processor

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#### 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® 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.

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#### GRAPHICS

Intel® HD 620 Graphics\*  
Intel® UHD 630 Graphics\*\*  
AMD Radeon Pro™ WX3100 (2 GB dedicated GDDR5) \*\*\*  
Microsoft DirectX® 12 (Shader Model 5.0) and OpenGL® 4.3capable  
AMD Enduro™ Technology supported.

\* HD content required to view HD images; only available on 7<sup>th</sup> Generation Intel® processors

\*\* UHD content required to view UHD images; only available on 8<sup>th</sup> Generation Intel® processors

\*\*\* 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).

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#### DISPLAY

- **Internal**
  - 14.0" diagonal FHD IPS eDP anti-glare, 67% sRGB at 220 nits (1920x1080)
  - 14.0" diagonal FHD IPS eDP + PSR anti-glare, 100% sRGB at 400 nits with ambient light sensor (1920x1080)
  - 14.0" diagonal UHD IPS eDP + PSR anti-glare, 100% sRGB at 400 nits with ambient light sensor (3840x 2160)
  - 14.0" diagonal FHD IPS eDP touch screen with Corning Gorilla Glass 3, 67% sRGB at 220 nits (1920x1080)
  - HP SureView Integrated Privacy Display 14.0" diagonal FHD IPS eDP + PSR touch screen with Corning Gorilla Glass 3, 100% sRGB at 700 nits with ambient light sensor Touch (1920x1080)

#### External

Up to 30-bit (2<sup>^</sup>30) per pixel "Deep Color"  
(total of 1,073,741,824 color variations)

### Features

**HDMI 1.4b**

Supports resolution up to 4k @ 24 Hz

**Without HP Thunderbolt Dock G2:**

HP ZBook 14u with hybrid graphics and without the use of a dock supports up to a maximum of three independent displays. These three displays are the internal panel plus two external displays connected two of the three following ports: HDMI 1.4, Thunderbolt™ 3, Thunderbolt™ 3. HP ZBook 14u configuration with Intel® integrated graphics and without the use of a dock supports up to a maximum of three independent displays. Any three display combination of the system panel plus 2 of the following HDMI, Thunderbolt™ 3, Thunderbolt™ 3.

**With HP UltraSlim Dock G2:**

Supports up to 2 independent displays when docked on the HP UltraSlim Dock - Max. resolution = 2.5K @ 60Hz (DP1) & 2.5K @ 60Hz (DP2)11

**With HP Thunderbolt Dock G2:**

The HP Thunderbolt Dock G2 has Thunderbolt™ 3 port, VGA, two DisplayPort™ 1.3, and a USB-C port. When used together with the HP ZBook 14u configuration with hybrid graphics, a maximum of three independent displays are supported. These three displays are internal panel and two external displays connected to the ZBook dock's Thunderbolt™ 3, VGA, or two DisplayPort™ ports. When used together with the HP ZBook 14u configuration with Intel® integrated graphics, a maximum of three independent displays are supported. Any three display combination of the system panel, system ports and ZBook Dock ports. Max. resolution = 4K @60Hz (DP1) & 4K @60Hz (DP2) with Thunderbolt

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

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### Features

#### **STORAGE AND DRIVES**

One (1) dedicated M.2 drive slots, supporting up to 2 TB of storage

M.2 SATA Solid State Drive  
128 GB SATA Solid State Drive

512 GB SATA TLCFIPS-140-2 Solid State Drive

#### **HP Z Turbo Drive (NVMe PCIe SSD)**

256 GB PCIe (NVMe) TLC Solid State Drive  
512 GB PCIe (NVMe) TLC Solid State Drive  
1 TB PCIe (NVMe) TLC Solid State Drive  
2 TB PCIe (NVMe) TLC Solid State Drive  
256 GB PCIe (NVMe) TLC Self Encrypting (SED) Solid State Drive  
512 GB PCIe (NVMe) TLC Self Encrypting (SED) Solid State Drive  
256 GB PCIe (NVMe) MLC Solid State Drive  
512 GB PCIe (NVMe) MLC Solid State Drive  
1 TB PCIe (NVMe) MLC Solid State Drive

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

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### Features

#### DRIVE CONTROLLERS

M.2 Storage Bay (SATA):	SATA-3 for Solid State Drive
HP Z Turbo Drive:	PCIe Gen 3 x 4 lanes NVMe Solid State Drive
RAID:	Not supported

#### MEMORY

##### Standard

Up to 32 GB DDR4 1.2V Non ECC SDRAM  
Transfer rates up to 2133MT/s on Intel Kaby Lake Chipset or Transfer rates up to 2400MT/s on Intel Kaby Lake – R Chipset  
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

Intel® I219-LM Gigabit\* Network Connection (vPro configurations)  
Intel® I219-V Gigabit\* Network Connection (non-vPro configurations)

\* 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

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 8265 802.11 ac (2x2) WiFi + Bluetooth 4.2 Combo Adaptor\* (vPro)  
Intel® Dual Band Wireless-AC 8265 802.11 ac (2x2) WiFi + Bluetooth 4.2 Combo Adaptor\* (non-vPro)  
Realtek RTL8822BE 802.11 ac (2x2) WiFi + Bluetooth 4.2 Combo Adapter\*

##### Wireless WAN - Mobile Broadband \*\*



### Features

Intel XMM 7360 LTE-Advanced Broadband Module (optional)  
HP It4132, LTE/HSPA+ 4G Mobile Broadband Module (optional)

#### **Miracast\*\*\***

Native Miracast Support

#### **Near Field Communications (NFC)**

NXP NPC300 Near Field Communication Module (optional)

\* 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.

\*\*\* Miracast is a wireless technology your PC can use to project your screen to TVs, projectors, and streaming

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## AUDIO/MULTIMEDIA

#### **Audio**

Audio custom tuned by HP and Bang and Olufsen audio

Integrated stereo speakers

Integrated HP World Facing 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**

720 HD webcam

720 HD webcam with infrared imaging (IR) – (optional)

- Microsoft Hello Certification: Microsoft face authentication in Windows 10 is an enterprise-grade identity verification mechanism
- Microsoft Skype for Business1 Certified
- HD format (widescreen 16:9)
- 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

HP Privacy Camera Shutter (only available on non-touch configurations)

\* HD content required to view HD images.

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## KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS

#### **Keyboard**

Optional backlit HP Collaboration 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

### Features

underneath. The 86-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

Clickpad with multi-touch gestures enabled, taps enabled as default  
Microsoft Precision Touchpad Default Gestures Support  
Dual Point Stick

#### Function Keys

Function keys provide control of the following features: standby mode, external display, volume down, volume up, and display brightness.

F1 - Display Switching  
F2 - Blank or SureView  
F3 - Brightness Down  
F4 - Brightness Up  
F5 - Audio Mute  
F6 - Volume Down  
F7 - Volume Up  
F8 - Mic Mute  
F9 - Blank or Backlit Toggle  
F10 - Numlk  
F11 - Wireless  
F12 - Calendar  
>Share/Present  
>Call Answer  
>Call End

#### Hidden Functions

Fn+R = Break  
Fn+S = Sys Rq  
Fn+C = Scroll Lock

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## SOFTWARE AND SECURITY

1. Requires Intel® 7th generation processors or greater
2. Available on HP Elite and Z products equipped with Intel® 7th generation processors or greater
3. For the methods outlined in the National Institute of Standards and Technology Special Publication 800-88. Supported on Elite and Z 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>

### Features

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>). 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>
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® or AMD 8th 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. As of September 2017, HP WorkWise will no longer support iOS or iPhone® devices.
16. HP BIOSphere Gen4 features may vary depending on the PC platform and configurations requires 8th Gen Intel® processors.
17. Secure Erase 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.
18. HP Sure Start Gen4 is available on HP EliteBook products equipped with Intel® 8th generation processors
19. HP Fingerprint Sensor sold separately or as an optional feature.
20. RAID configuration is optional and does require a second hard drive.
21. HP Sure Click is available on select HP platforms and supports Microsoft® Internet Explorer and Chromium™. Check <http://h20195.www2.hp.com/v2/GetDocument.aspx?docname=4AA7-0922ENW> for all compatible platforms as they become available.
22. HP Sure Run is available on HP Elite products equipped with Intel® or AMD® 8th generation processors
23. HP Sure Recover is available on HP Elite PCs with 8th generation Intel® or AMD processors and requires an open, wired network connection. You must back up important files, data, photos, videos, etc. before using HP Sure Recover to avoid loss of data

### 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

Get the most out of your HP Workstation on day one—and every day thereafter. Designed for all users regardless of technical background, this ultra-savvy software wizard is the simplest and most effective way to make sure your computer is always operating at its optimum potential.

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

### Features

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.

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### 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.

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.

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### Features

#### POWER

##### Power Supply

HP Smart 45 W External AC power adapter<sup>42</sup>  
HP Smart 45 W External AC power adapter, 2-prong (Japan only)<sup>42</sup>  
HP Smart 65 W External AC power adapter<sup>42</sup>  
HP Smart 65 W EM External AC power adapter<sup>42</sup>  
45 W USB Type-C™ adapter<sup>42</sup>  
65 W USB Type-C™ adapter<sup>42</sup>  
HP 65W Slim Smart AC Adapter

##### Primary Battery

HP Long Life 3-cell Lithium Polymer Battery (50 WHr) supporting HP Fast Charge Technology

##### Power Cord

2-wire plug - 1.0m (Japan only)<sup>42</sup>  
3-wire plug - 1.0m<sup>42</sup>  
3-wire plug - 1.8m<sup>42</sup>  
Duckhead power cord - 1.0m<sup>42</sup>  
Duckhead power cord - 1.8m<sup>42</sup>

##### Battery Life

Battery life up to 10 hours \*

**NOTE:** Battery is internal and not replaceable by the customer

##### System Standby Time

Up to 1 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 MobileMark14 battery benchmark <https://bapco.com/products/mobilemark-2014/> 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® Polaris™ Technology  
Hibernation  
Standby  
ACPI compliance

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#### 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. See HP's 3rd party option store for solar energy accessory [www.hp.com/go/options](http://www.hp.com/go/options).

**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.

### Features

#### WEIGHTS & DIMENSIONS

##### Weight

Starting at 3.27 lb (non-touch); Starting at 3.56 lb (touch)<sup>45</sup>  
Starting at 1.48 kg (non-touch); Starting at 1.61 kg (touch)<sup>45</sup>

##### Dimensions (w x d x h)

###### Non-touch

12.84 x 9.22 x 0.7 in  
32.6 x 23.4 x 1.79 cm

###### Touch

12.22 x 9.03 x 0.71 in  
31 x 22.93 x 1.81 cm

**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).

#### PORTS/SLOTS

##### Ports

###### Left side:

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

###### Right side:

- (1) Thunderbolt 3™
- (1) USB 3.0 Port
- (1) Headphone/Microphone Combo
- (1) RJ-45 / Ethernet
- (1) Side Docking connector
- (1) Power connector
- (1) SIM Card Slot

##### Digital Media Slots

- (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 the same 1-year or 3-year limited warranty as the platform. 24/7 operation will not void the HP warranty. Optional<sup>1</sup> 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>.

1. Sold separately or as an optional feature. 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.

## Features

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### Technical Specifications – System Unit

#### SYSTEM UNIT

<b>Stand-Alone Power Requirements</b> (AC Power)	<b>Nominal Operating Voltage</b>	19.5 V dc @ 3.3 A
	<b>Average Operating Power</b>	<b>Windows® 10 (64-bit)</b> AMD FirePro™ Graphics
<b>Temperature</b>	<b>Max Operating Power</b>	< 45 W with UMA < 65 W with discrete
	<b>Operating</b>	32° to 95° F (0° to 35° C) (not writing optical) 41° to 95° F (5° to 35° C) (writing optical)
<b>Relative Humidity</b>	<b>Non-operating</b>	-4° to 140° F (-20° to 60° C)
	<b>Operating</b>	10% to 90%, non-condensing
<b>Shock</b>	<b>Non-operating</b>	5% to 95%, 101.6° F (38.7° C) maximum wet bulb temperature
	<b>Operating</b>	40 G, 2 ms, half-sine
<b>Random Vibration</b>	<b>Non-operating</b>	200 G, 2 ms, half-sine
	<b>Operating</b>	0.75 grms
<b>Altitude</b> (unpressurized)	<b>Non-operating</b>	1.50 grms
	<b>Operating</b>	-50 to 10,000 ft. (-15.24 to 3,048 m)
<b>Planned Industry Standard Certifications</b>	<b>Non-operating</b>	-50 to 15,000 ft. (-15.24 to 12,192 m)
	<b>UL</b>	Yes
	<b>CSA</b>	Yes
	<b>FCC Compliance</b>	Yes
	<b>ENERGY STAR®</b>	Select models*
	<b>EPEAT®</b>	Gold target**
	<b>ICES</b>	Yes
	<b>Australia / NZ A-Tick Compliance</b>	Yes
	<b>CCC</b>	Yes
	<b>Japan VCCI Compliance</b>	Yes
	<b>KCC</b>	Yes
	<b>BSMI</b>	Yes
	<b>CE Marking Compliance</b>	Yes
<b>MIL STD***</b>	Passed 14 Mil STD Tests	

\* Configurations of the HP ZBook 14u G5 that are ENERGY STAR® certified are identified as HP ZBook 14u G5 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.

\*\*\* 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

<b>14.0" diagonal LED AG backlight FHD eDP + PSR (1920 x 1080) (400 nits) 100% sRGB</b>	<b>Outline Dimensions (W x H)</b>	316.11 x 197.98 (mm) max.
	<b>Active Area</b>	309.31 x 173.99 (mm)
	<b>Weight</b>	<285g max.
	<b>Diagonal Size</b>	14.0 (inch)
	<b>Thickness</b>	3.0mm max.
	<b>Interface</b>	eDP 1.3 + PSR (2 lane)
	<b>Panel Technology</b>	IPS
	<b>Surface Treatment</b>	Anti-Glare (AG)
	<b>Touch enabled</b>	No
	<b>Contrast Ratio</b>	600:1 (typical)
	<b>Refresh Rate</b>	60 Hz
	<b>Brightness</b>	400 nits typical (panel only)
	<b>Pixel Resolution</b>	<b>Format</b> 1920 x 1080 (FHD)
		<b>Configuration</b> RGB
	<b>Backlight</b>	LED
	<b>Color Gamut Coverage</b>	100% sRGB
	<b>Color Depth</b>	6 bits + Hi FRC
	<b>PPI</b>	157
	<b>Viewing Angle</b>	UWVA 85/85/85/85
	<b>14.0" diagonal LED backlight FHD IPS eDP touch screen with Corning Gorilla Glass 3 (1920 x 1080) (220 nits) 67% sRGB</b>	<b>Outline Dimensions (W x H)</b>
<b>Active Area</b>		309.312 x 173.988(mm)
<b>Weight</b>		<413g max.
<b>Diagonal Size</b>		14.0 - inch
<b>Thickness</b>		3.2mm max.
<b>Interface</b>		eDP 1.2
<b>Panel Technology</b>		IPS
<b>Surface Treatment</b>		Corning Gorilla Glass 3
<b>Touch enabled</b>		Yes
<b>Contrast Ratio</b>		600:1 (typical)
<b>Refresh Rate</b>		60 Hz
<b>Brightness</b>		220 nits typical (panel only)
<b>Pixel Resolution</b>		<b>Format</b> 1920 x 1080 (FHD)
		<b>Configuration</b> RGB
<b>Backlight</b>		LED
<b>Color Gamut Coverage</b>		67% sRGB
<b>Color Depth</b>		6 bits + Hi FRC
<b>PPI</b>		157
<b>Viewing Angle</b>		UWVA 85/85/85/85

### Technical Specifications – Displays

<b>HP SureView Integrated Privacy Display 14.0” diagonal LED backlight FHD IPS Touch Screen with Corning Gorilla Glass 3 eDP + PSR (1920 x 1080) (700 nits) 100% sRGB</b>	<b>Outline Dimensions (W x H)</b>	315.41x 196.14 (mm) max.
	<b>Active Area</b>	309.31 x 173.99 (mm)
	<b>Weight</b>	<225g max.
	<b>Diagonal Size</b>	14.0 – inch
	<b>Thickness</b>	3.0mm max.
	<b>Interface</b>	eDP 1.4a + PSR (2 lane)
	<b>Panel Technology</b>	IPS
	<b>Surface Treatment</b>	Corning Gorilla Glass 3
	<b>Touch enabled</b>	Yes
	<b>Contrast Ratio</b>	"Privacy mode 150:1 (typ.) – Privacy, 110:1(min.)- Privacy
	<b>Refresh Rate</b>	120 Hz
	<b>Pixel Resolution</b>	<b>Format</b> 1920 x 1080 (FHD)
		<b>Configuration</b> RGB
	<b>Backlight</b>	LED
	<b>Color Gamut Coverage</b>	100% sRGB
	<b>Color Depth</b>	6 bits + Hi FRC
<b>PPI</b>	157	
<b>Viewing Angle</b>	Privacy mode CR>2: UWVA 50/50/85/85	

### Technical Specifications – Storage

#### STORAGE AND DRIVES\*

<b>128 GB M.2 SATA TLC Solid State Drive</b>	<b>Drive Weight</b>	0.02 lb (10g)		
	<b>Capacity</b>	128 GB		
	<b>Height</b>	0.09 in (2.3mm)		
	<b>Width</b>	0.87 in (22mm)		
	<b>Interface</b>	ATA-8, SATA 3.0		
	<b>NAND Type</b>	TLC		
	<b>Form Factor I/O</b>	M.2 2280		
	<b>Performance</b>	<b>Maximum Sequential Read</b>	<b>Maximum Sequential Write</b>	
		Up to 520 MB/s	Up to 450 MB/s	
		<b>Logical Blocks</b>	250,069,680	
	<b>Operating Temperature</b>	32 to 158F (0 to 70C) [ambient temp]		
	<b>Features</b>	DIPM; TRIM; DEVSLP		
<b>512 GB M.2 SATA Self-Encrypting Drive TLC Solid State Drive</b>	<b>Drive Weight</b>	0.02 lb (10 g)		
	<b>Capacity</b>	512 GB		
	<b>Height</b>	0.09 in (2.23 mm)		
	<b>Width</b>	0.87 in (22 mm)		
	<b>Interface</b>	ATA-8, SATA 3.0		
	<b>NAND Type</b>	TLC		
	<b>Form-Factor (I/O)</b>	M.2 2280		
	<b>Performance</b>	<b>Maximum Sequential Read</b>	<b>Maximum Sequential Write</b>	
		Up to 530 MB/s	Up to 515 MB/s	
		<b>Logical Blocks</b>	500,118,192	
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]		
	<b>Features</b>	ATA Security; TCG Opal 2.0, DIPM; TRIM; DEVSLP		
<b>HP Z Turbo Drive 1 TB M.2 NVMe MLC Solid State Drive</b>	<b>Drive Weight</b>	0.02 lb (10 g)		
	<b>Capacity</b>	1024 GB		
	<b>Height</b>	0.09 in (2.3 mm)		
	<b>Width</b>	0.87 in (22 mm)		
	<b>NAND Type</b>	MLC		
	<b>Form-Factor (I/O)</b>	M.2 2280		
	<b>Interface</b>	PCIe NVMe Gen3X4		
	<b>Drive Weight</b>	0.02 lb (10 g)		
	<b>Performance</b>	<b>Maximum Sequential Read</b>	<b>Maximum Sequential Write</b>	
		Up to 3,000 MB/s	Up to 2,900 MB/s	
	<b>Logical Blocks</b>	2,000,409,264		
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]		
	<b>Features</b>	ATA Security (Option), TRIM; L1.2		
<b>HP Z Turbo Drive 512 GB, M.2 NVMe MLC Solid State Drive</b>	<b>Drive Weight</b>	0.022 lb (10 g)		
	<b>Capacity</b>	512 GB		
	<b>Height</b>	0.09 in (2.3 mm)		
	<b>Width</b>	0.87 in (22 mm)		
	<b>NAND Type</b>	MLC		
	<b>Form-Factor (I/O)</b>	M.2 2280		

### Technical Specifications – Storage

<b>HP Z Turbo Drive 256 GB, M.2 NVMe MLC Solid State Drive</b>	<b>Interface</b>	PCIe NVMe Gen3X4	
	<b>Performance</b>	<b>Maximum Sequential Read</b>	<b>Maximum Sequential Write</b>
		Up to 3000 MB/s	Up to 1500MB/s
	<b>Logical Blocks</b>	1,000,215,216	
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]	
	<b>Features</b>	ATA Security (option), TRIM; L1.2	
	<b>Drive Weight</b>	0.02 lb (10 g)	
	<b>Capacity</b>	256 GB	
	<b>Height</b>	0.09 in (2.23 mm)	
	<b>Width</b>	0.87 in (22 mm)	
<b>HP Z Turbo Drive 2 TB, M.2 NVMe TLC Solid State Drive</b>	<b>NAND Type</b>	MLC	
	<b>Form-Factor (I/O)</b>	M.2 2280	
	<b>Interface</b>	PCIe NVMe Gen3X4	
	<b>Performance</b>	<b>Maximum Sequential Read</b>	<b>Maximum Sequential Write</b>
		Up to 3,100 MB/s	Up to 1,400 MB/s
	<b>Logical Blocks</b>	500,118,192	
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]	
	<b>Features</b>	ATA Security (Option); TRIM; L1.2	
	<b>Drive Weight</b>	0.02 lb (10 g)	
	<b>Capacity</b>	2 TB	
<b>HP Z Turbo Drive 1 TB, M.2 NVMe TLC Solid State Drive</b>	<b>Height</b>	0.09 in (2.3 mm)	
	<b>Width</b>	0.87 in (22 mm)	
	<b>NAND Type</b>	TLC	
	<b>Form-Factor (I/O)</b>	M.2 2280	
	<b>Interface</b>	PCIe NVMe Gen3X4	
	<b>Performance</b>	<b>Maximum Sequential Read</b>	<b>Maximum Sequential Write</b>
		2,900 MB/s	2,100 MB/s
	<b>Logical Blocks</b>	3,907,029,168	
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]	
	<b>Features</b>	ATA Security; DIPM; TRIM; DEVSLP	
<b>HP Z Turbo Drive 1 TB, M.2 NVMe TLC Solid State Drive</b>	<b>Drive Weight</b>	0.02 lb (10g)	
	<b>Capacity</b>	1 TB	
	<b>Height</b>	0.09 in (2.3mm)	
	<b>Width</b>	0.87 in (22mm)	
	<b>NAND Type</b>	TLC	
	<b>Form-Factor (I/O)</b>	M.2 2280	
	<b>Interface</b>	PCIe NVMe Gen3X4	
	<b>Performance</b>	<b>Maximum Sequential Read</b>	<b>Maximum Sequential Write</b>
		Up to 2800 MB/s	Up to 1600 MB/s
	<b>Logical Blocks</b>	2,000,409,264	
<b>Operating Temperature</b>	32 to 158F (0 to 70C) [ambient temp]		
<b>Features</b>	TRIM; L1.2		

### Technical Specifications – Storage

<b>HP Z Turbo Drive 512 GB, M.2 NVMe TLC Solid State Drive</b>	<b>Drive Weight</b>	0.02 lb (10g)		
	<b>Capacity</b>	512 GB		
	<b>Height</b>	0.09 in (2.3mm)		
	<b>Width</b>	0.87 in (22mm)		
	<b>NAND Type</b>	TLC		
	<b>Form-Factor (I/O)</b>	M.2 2280		
	<b>Interface</b>	PCIe NVMe Gen3X4		
	<b>Drive Weight</b>	0.02 lb (10 g)		
	<b>Performance</b>	<b>Maximum Sequential Read</b>	<b>Maximum Sequential Write</b>	
		Up to 2600 MB/s	Up to 1400 MB/s	
	<b>Logical Blocks</b>	1,000,215,216		
	<b>Operating Temperature</b>	32 to 158F (0 to 70C) [ambient temp]		
	<b>Features</b>	TRIM; L1.2		
<b>HP Z Turbo Drive 256 GB, M.2 NVMe TLC Solid State Drive</b>	<b>Drive Weight</b>	0.02 lb (10 g)		
	<b>Capacity</b>	256 GB		
	<b>Height</b>	0.09 in (2.3 mm)		
	<b>Width</b>	0.87 in (22 mm)		
	<b>NAND Type</b>	TLC		
	<b>Form-Factor (I/O)</b>	M.2 2280		
	<b>Interface</b>	PCIe NVMe Gen3X4		
	<b>Performance</b>	<b>Maximum Sequential Read</b>	<b>Maximum Sequential Write</b>	
		Up to 2,600 MB/s	Up to 900 MB/s	
		<b>Logical Blocks</b>	500,118,192	
	<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]		
	<b>Features</b>	ATA Security (Option); TRIM; L1.2		

### Technical Specifications – Storage

<b>HP Z Turbo Drive 512 GB, M.2 NVMe Self-Encrypting TLC Solid State Drive</b>	<b>Drive Weight</b>	0.02 lb (10 g)	
	<b>Capacity</b>	512 GB	
	<b>Height</b>	0.09 in (2.3 mm)	
	<b>Width</b>	0.87 in (22 mm)	
	<b>NAND Type</b>	TLC	
	<b>Form-Factor (I/O)</b>	M.2 2280	
	<b>Interface</b>	PCIe NVMe Gen3X4	
	<b>Performance</b>	<b>Maximum Sequential Read</b>	<b>Maximum Sequential Write</b>
		Up to 2,600 MB/s	Up to 1,400 MB/s
	<b>Logical Blocks</b>	1,000,215,216	
<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]		
<b>Features</b>	ATA Security (Option); TRIM; OPAL 2; L1.2		
<b>HP Z Turbo Drive 256 GB, M.2 NVMe Self-Encrypting TLC Solid State Drive</b>	<b>Drive Weight</b>	0.02 lb (<10g)	
	<b>Capacity</b>	256 GB	
	<b>Height</b>	0.14 in (3.58mm)- 0.09 in (2.23mm)	
	<b>Width</b>	0.87 in (22mm)	
	<b>NAND Type</b>	TLC	
	<b>Form-Factor (I/O)</b>	M.2 2280	
	<b>Interface</b>	PCIe NVMe Gen3X4	
	<b>Performance</b>	<b>Maximum Sequential Read</b>	<b>Maximum Sequential Write</b>
		Up to 530 MB/s	Up to 515 MB/s
	<b>Logical Blocks</b>	500,118,192	
<b>Operating Temperature</b>	32 to 158F (0 to 70C) [ambient temp]		
<b>Features</b>	ATA Security (Option); TRIM; OPAL 2; L1.2		

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

### Technical Specifications – Security

#### SECURITY

<b>HP Fingerprint Sensor</b>	<b>Voltage</b>	3.0-3.6V
	<b>Operating temperature</b>	14° - 167°F (-10° - 75°C)
	<b>Current consumption image</b>	36mA
	<b>Low latency wait for finger</b>	950 uA
	<b>Capture rate</b>	3000 lines/sec
	<b>ESD Resistance</b>	IEC 6100-4-2 4B (+/-15KV)
	<b>Detection Matrix</b>	200*1 (plus another secondary line); 508 dpi, sensor area 12*3 mm
<b>Smart Card Reader</b>	<b>Smart card standard</b>	PC/SC 2.0 for Windows smart card standard
	<b>Dimensions (L x W x H)</b>	0.41x 0.08 x 0.32 in (10.5 x 2 x 8.2 mm)
	<b>Smart Card support</b>	ISO 7816 Class A and AB smart cards
	<b>Smart Card Interface</b>	Smart Card Interface with T = 0 and T = 1 support Support I2C memory card, SLE4418, SLE4428, SLE4432, SLE4442, SLE4436, SLE5536, SLE6636, AT88SC1608, AT45D041 card and AT45DB041 card via external EEPROM
	<b>Operating systems</b>	Normal Mode With card present, before being suspended: 40.9 mA Without card present, before being suspended: 33.16 mA After being suspended with smart card present: 380 µA After being suspended without smart card present: 380 µA
	<b>Features</b>	<b>Power Saving Mode</b> : With card present, before being suspended: 40.6 mA Without card present: 380 µA After being suspended with smart card present: 380 µA <ul style="list-style-type: none"> <li>• Support single slot</li> <li>• Support T0, T1 protocol</li> <li>• Support I2C memory card, SLE4418, SLE4428, SLE4432, SLE4442, SLE4436,</li> <li>• SLE5536, SLE6636, AT88SC1608, AT45D041 card and AT45DB041 card via external EEPROM</li> <li>• Support ISO7816 Class A, B and C (5V/3V/1.8V) card</li> <li>• Implemented as an USB full speed device with bulk transfer endpoint, Mass</li> <li>• Storage endpoint</li> <li>• Built-in PLL for USB and Smart Card clocks requirement</li> <li>• Support EEPROM for USB descriptors customization (PID/VID/iManufacturer/iProduct/Serial Number), Direct Web Page Link, and accessing memory card module.</li> <li>• EEPROM programmable via USB interface</li> <li>• Support software update for memory card module</li> <li>• Support Direct Web Page Link via configuration in external EEPROM</li> <li>• Support short APDU and extended APDU</li> <li>• Compatible with Microsoft USB-CCID driver</li> <li>• Support remote wake up through inserting card/removing card</li> <li>• Support USB selective suspend</li> <li>• Support Power Saving Mode (Using one pin to select between Normal/PWR Saving Mode)</li> <li>• Support card power over current protection mechanism</li> <li>• Built in resonator.</li> <li>• Support USB LPM (Link Power Management) features.</li> <li>• Embedded clock source.</li> </ul>

### 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 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)

**Power Management Performance Features**

Jumbo Frame 9K  
 Auto MDI/MDIX Crossover cable detection  
 ACPI compliant - multiple power modes  
 Energy Detect Low Power Mode(Green Ethernet)  
 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 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 It4132 LTE/HSPA+ 4G Mobile Broadband Module

<b>Technology/Operating bands</b>	LTE: 2100 (Band 1), 1900 (Band 2), 1800 (Band 3) MHz, 850 (Band 5), 2600 (Band 7), 900 (Band 8) MHz, 800 (Band 20), 700 (Band 28) 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
<b>Wireless protocol standards</b>	3GPP Release 10 LTE Specification CAT.4, 20MHz BW WCDMA R99, 3GPP Release 5, 6, 7 and 8 UMTS Specification E-GPRS: Class B, Multi-slot class 12, coding schemes CS1 - CS4 and MSC1 - MSC9
<b>GPS</b>	Standalone, A-GPS (MS-B and LTO)
<b>GPS bands</b>	1575.42 MHz ± 1.023 MHz, GLONASS 1596-1607MHz
<b>Maximum data rates</b>	LTE: 150 Mbps (Download), 50 Mbps (Upload) DC-HSPA+: 42 Mbps (Download), 5.76 Mbps (Upload) HSPA+: 21Mbps (Download), 5.76 Mbps (Upload) EDGE: 236.8 kbps (Download), 236.8 kbps (Upload) GPRS: 85.6 kbps(Download), 85.6 kbps (Upload)
<b>Maximum output power</b>	LTE: 23 dBm HSPA+: 23.5 dBm E-GPRS 1900/1800: 26 dBm E-GPRS 900/850: 27 dBm GPRS 1900/1800: 29.5 dBm GPRS 900/850: 32.5 dBm
<b>Maximum power consumption</b>	LTE: 1,200 mA (peak); 900 mA (average) HSPA+: 1,100 mA (peak); 800 mA (average) E-GPRS: 2,600 mA (peak); 500 mA (average)
<b>Form Factor</b>	M.2, 3042-S3 Key B
<b>Weight</b>	6 g
<b>Dimensions</b> (Length x Width x Thickness)	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.

#### Intel®XMM™ 7360 LTE-Advanced

<b>Technology/Operating bands</b>	FDD LTE: 2100 (Band 1), 1900 (Band 2), 1800 (Band 3), 1700/2100 (Band 4), 850 (Band 5), 2600 (Band 7), 900 (Band 8), 1400 (Band 11), 700 (Band 12 lower), 700 (Band 13 upper), 700 (Band 17 lower), 850 (Band 18 lower), 850 (Band 19 upper), 800 (Band 20), 1400 (Band 21), 850 (Band 26), 700 (Band 28), 700 (Band 29 RX only), 2300 (Band 30), 2100 (Band 66). TDD LTE: 2600 (Band 38), 1900 (Band 39), 2400 (Band 40), 2500 (Band 41). HSPA+: 2100 (Band 1), 1900 (Band 2), 1700/2100 (Band 4), 850 (Band 5), 900 (Band 8) MHz
<b>Wireless protocol standards</b>	3GPP Release 11 LTE Specification CAT.9, DL 60MHz BW throughput up to 450Mbps; UL 20MHz throughput up to 50Mbps WCDMA R99, 3GPP Release 5, 6, 7 and 8 UMTS Specification
<b>GPS</b>	Standalone, A-GPS (MS-A, MS-B and XTRA)
<b>GPS Bands</b>	1575.42 MHz ± 1.023 MHz, GLONASS 1596-1607MHz, Beidou 1561.098 MHz
<b>Maximum Data Rates</b>	LTE: 450 Mbps (Download), 50 Mbps (Upload) DC-HSPA+: 42 Mbps (Download), 5.76 Mbps (Upload) HSPA+: 21Mbps (Download), 5.76 Mbps (Upload)

### Technical Specifications – Networking

<b>Maximum Output Power</b>	LTE: 23 dBm HSPA+: 23.5 dBm
<b>Maximum Power Consumption</b>	LTE: 1,200 mA (peak); 900 mA (average) HSPA+: 1,100 mA (peak); 800 mA (average)
<b>Form Factor</b>	M.2, 3042-S3 Key B
<b>Weight</b>	5.8g
<b>Dimensions</b> (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.

<b>Intel® Dual Band Wireless-AC 8265 802.11 AC/a/b/g/n (2x2) WiFi + Bluetooth® 4.2 Combo Adaptor* (vPro)</b>	<b>Wireless LAN Standards</b>	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11n
	<b>Interoperability</b>	Wi-Fi certified
	<b>Frequency Band</b>	802.11b/g/n  802.11a
		2.402 - 2.482 GHz <b>Note:</b> 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 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 <b>Note:</b> Indonesia only supports 5.725 - 5.825 GHz (CH149 - CH161)
	<b>Data Rates</b>	<ul style="list-style-type: none"> <li>802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</li> <li>802.11b: 1, 2, 5.5, 11 Mbps</li> <li>802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</li> <li>802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz)</li> <li>802.11ac : MCS0 ~ MCS9, (1SS, and 2SS) (20MHz, 40MHz, and 80MHz)</li> </ul>
	<b>Modulation</b>	Direct Sequence Spread Spectrum CCK, BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM
	<b>Security<sup>1</sup></b>	<ul style="list-style-type: none"> <li>IEEE and Wi-Fi compliant 64 / 128 bit WEP encryption for a/b/g mode only</li> <li>AES-CCMP: 128 bit in hardware</li> <li>802.1x authentication</li> <li>WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.</li> <li>WPA2 certification</li> <li>IEEE 802.11i</li> <li>Cisco Certified Extensions, all versions through CCX4 and CCX Lite</li> <li>WAPI</li> </ul>

### Technical Specifications – Networking

<b>Network Architecture Models</b>	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
<b>Roaming</b>	IEEE 802.11 compliant roaming between band Access Points
<b>Output Power<sup>2</sup></b>	<ul style="list-style-type: none"> <li>• 802.11b : +16dBm minimum</li> <li>• 802.11g : +14dBm minimum</li> <li>• 802.11a : +14dBm minimum</li> <li>• 802.11n HT20(2.4GHz) : +13dBm minimum</li> <li>• 802.11n HT40(2.4GHz) : +13dBm minimum</li> <li>• 802.11n HT20(5GHz) : +12dBm minimum</li> <li>• 802.11n HT40(5GHz) : +12dBm minimum</li> </ul>
<b>Power Consumption</b>	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
<b>Power Management</b>	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
<b>Receiver Sensitivity<sup>3</sup></b>	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
<b>Antenna Type</b>	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
<b>Form Factor</b>	PCI-Express M.2 MiniCard
<b>Dimensions</b>	Type 2230 : 2.3 x 22.0 x 30.0 mm Or Type 1630 : 2.3 x 16.0 x 30.0 mm
<b>Weight</b>	Type 2230 : 2.8g Or Type 1630 : 2g
<b>Operating Voltage</b>	3.3v +/- 9%
<b>Temperature</b>	Operating                    14° to 158° F (-10° to 70° C) Non-operating                -40° to 176° F (-40° to 80° C)
<b>Humidity</b>	Operating                    10% to 90% (non-condensing) Non-operating                5% to 95% (non-condensing)
<b>Altitude</b>	Operating Non-                0 to 10,000 ft (3,048 m) operating                        0 to 50,000 ft (15,240 m)
<b>LED Activity</b>	LED Amber – Radio OFF; LED White – Radio ON

### Technical Specifications – Networking

**Intel® Dual Band  
Wireless-AC 8265 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

- 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)

**Antenna Structure**

2 transmit; 2 receive (2x2)

**Data Rates**

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: card will support rates for NSS=1 and NSS=2 for RX and TX for 20 and 40 MHz channels. Short and long guard interval shall be supported.

802.11ac: MCS0 ~ MCS9, (1SS, and 2SS) (20MHz, 40MHz, and 80MHz)

**Modulation**

**Security<sup>1</sup>**

- IEEE and Wi-Fi compliant 64 / 128 bit WEP encryption for a/b/g mode only
- AES-CCMP: 128 bit in hardware
- 802.1x authentication
- WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.
- WPA2 certification
- IEEE 802.11i
- Cisco Certified Extensions, all versions through CCX4 and CCX Lite
- WAPI

**Network Architecture  
Models**

Ad-hoc (Peer to Peer)

Infrastructure (Access Point Required)

**Roaming**

IEEE 802.11 compliant roaming between access points

**Output Power<sup>2</sup>**

- 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

### Technical Specifications – Networking

	<ul style="list-style-type: none"> <li>802.11n HT40(5GHz) : +12dBm minimum</li> </ul>
	802.11ac 80MHz(5GHz) : +11dBm minimum
<b>Power Consumption</b>	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
<b>Power Management</b>	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
<b>Receiver Sensitivity<sup>3</sup></b>	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)
<b>Antenna type</b>	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
<b>Form Factor</b>	PCI-Express Half-MiniCard
<b>Dimensions</b>	0.134 x 1.06 x 1.18 in (3.4 x 26.8 x 30 mm)
<b>Weight</b>	3.1g
<b>Operating Voltage</b>	3.3v +/- 9%
<b>Temperature</b>	Operating 14° to 158° F (-10° to 70° C) Non-operating -40° to 176° F (-40° to 80° C)
<b>Humidity</b>	Operating 10% to 90% (non-condensing) Non-operating 5% to 95% (non-condensing)
<b>Altitude</b>	Operating 0 to 10,000 ft. (3,048 m) Non-operating 0 to 50,000 ft. (15,240 m)
<b>LED Activity</b>	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).

### Technical Specifications – Networking

**Realtek RTL8822BE**  
**802.11ac 2x2 Wi-Fi +**  
**BT4.2 Combo Adapter**

**Wireless LAN Standards**

IEEE 802.11a  
 IEEE 802.11b  
 IEEE 802.11g  
 IEEE 802.11n  
 IEEE 802.11ac  
 Wi-Fi certified  
 802.11b/g/n

**Interoperability**  
**Frequency Band**

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

- 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)

**Data Rates**

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: card will support rates for NSS=1 and NSS=2 for RX and TX for 20 and 40 MHz channels. Short and long guard interval shall be supported.

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

**Security<sup>1</sup>**

- IEEE and Wi-Fi compliant 64 / 128 bit WEP encryption for a/b/g mode only
- AES-CCMP: 128 bit in hardware
- 802.1x authentication
- WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.
- WPA2 certification
- IEEE 802.11i
- Cisco Certified Extensions, all versions through CCX4 and CCX Lite
- WAPI

**Network Architecture Models**

Ad-hoc (Peer to Peer)

Infrastructure (Access Point Required)

**Roaming**

IEEE 802.11 compliant roaming between access points

**Output Power<sup>2</sup>**

<b>TX Power(dBm)</b>	<b>Min</b>	<b>Typical</b>	<b>Max</b>
802.11b	+14	+15.5	
802.11g	+12	+13.5	

### Technical Specifications – Networking

802.11a	+12	+13.5	
802.11n HT20(2.4GHz)	+12	+13.5	
802.11n HT40(2.4GHz)	+12	+13.5	
802.11n HT20(5GHz)	+10	+11.5	
802.11n HT40(5GHz)	+10	+11.5	
802.11ac VHT80(5GHz)	+10	+11.5	

**Power Consumption**

Transmit: 2.0 W (max)  
 Receive: 1.6 W (max)  
 Idle mode (PSP): 180 mW (WLAN Associated)  
 Idle mode: 50 mW (WLAN unassociated)  
 Connect Standby: 10 mW (WLAN+BT)  
 Radio disabled: 8 mW

**Power Management**

ACPI and PCI Express compliant power management  
 802.11 compliant power saving mode

**Receiver Sensitivity<sup>3</sup>**

RX Sensitivity(dBm)	Min	Typical	Max
802.11b, 1Mbps		-95	-93.5
802.11b, 11Mbps		-85.5	-84
802.11a/g, 6Mbps		-87.5	-86
802.11a/g, 54Mbps		-73.5	-72
802.11n, MCS07		-68.5	-67
802.11n, MCS15		-65.5	-64
802.11ac, MCS0		-85.5	-84
802.11ac, MCS9		-60.5	-59

**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)



### Technical Specifications – Networking

<b>Altitude</b>	Operating	0 to 10,000 ft (3,048 m)												
	Non-operating	0 to 50,000 ft (15,240 m)												
<b>LED Activity</b>	LED Amber - Radio OFF; LED White - Radio ON													
	<ol style="list-style-type: none"> <li>1. Check latest software/driver release for updates on supported security features.</li> <li>2. Maximum output power may vary by country according to local regulations.</li> <li>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).</li> </ol>													
<b>HP Integrated Module with Bluetooth® 4.2 Wireless Technology</b>	<b>Bluetooth® Specification</b>	4.2 Compliant												
	<b>Frequency Band</b>	2402 to 2480 MHz												
	<b>Number of Available Channels</b>	Legacy: 0~79 (1 MHz/CH) BLE: 0~39 (2 MHz/CH)												
	<b>Data Rates and Throughput</b>	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)												
	<b>Transmit Power</b>	The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of +4 dBm for BR and EDR												
	<b>Receiver Sensitivity</b>	<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><math>\pi/4</math>-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											
<b>Power Consumption</b>	Peak (Tx) 330 mW Peak (Rx) 230 mW Selective Suspend 17 mW													
<b>Antenna</b>	Internally integrated within module													
<b>Range</b>	Legacy Up to 33 ft (10 m) BLE Up to 99 ft (30 m)													
<b>Electrical Interface</b>	USB 2.0 compliant													
<b>Bluetooth® Software Supported</b>	Microsoft Windows Bluetooth Software													
<b>Link Topology</b>	Point to Point, Multipoint Pico Nets up to 7 slaves													
<b>Security</b>	Full support of Bluetooth Security Provisions													
<b>Power Management Certifications</b>	Microsoft Windows ACPI, and USB Bus Support  Self-configurable to optimize power conservation in all operating modes, including Standby, Hold, Park, and Sniff													
<b>Security</b>	All necessary regulatory approvals for supported countries, including: FCC (47 CFR) Part 15C, Section 15.247 & 15.249													
<b>Power management certifications</b>	ETS 300 328, ETS 300 826 Low Voltage Directive IEC950 UL, CSA, and CE Mark													

### Technical Specifications – Networking

**Certifications****Bluetooth® Profiles Supported**

Serial Port Profile (SPP)<sup>1</sup>  
Service Discovery Application Profile (SDAP)  
Dial-Up Networking (DUN)<sup>1,2</sup>  
Generic Object Exchange Profile (GOEP)<sup>1,2</sup>  
Object Push Profile (OPP)<sup>1,2</sup>  
Hard Copy Cable Replacement (HCRP)<sup>1,2</sup>  
Personal Area Networking Profile (PAN)<sup>1,2</sup>  
Human Interface Device Profile (HID)<sup>1,2</sup>  
Hands Free Profile (HFP)  
Advanced Audio Distribution Profile (A2DP)  
Audio Video Remote Control Profile (AVRCP)

**Bluetooth® V4.2 support feature**

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

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

#### Near Field Communications (NFC)

<b>Controller</b>	NFC Mirage WNC XR4V-1 (NXP NPC300 I2C 10mmx17mm)	
<b>Supports</b>	<ul style="list-style-type: none"> <li>• Windows 10</li> <li>• NFC Forum Compliant</li> <li>• Near Field Communications Controller</li> </ul>	
<b>Dimensions</b> (L x W x H)	Module 25 mm by 10 mm by 2.0 mm	
<b>Chipset</b>	NPC300	
<b>System interface</b>	I2C	
<b>NFC RF standards</b>	standards ISO/IEC 14443 A ISO/IEC 14443 B ISO/IEC 15693 ISO/IEC 18092 ECMA-340 NFCIP-1 Target and Initiator ECMA-320 NFCIP-2	
<b>NFC Forum Support Tag</b>	Type 1, Type 2, Type3 and Type 4, NFCIP-1 and NFCIP-2	
<b>Reader</b>	(PCD-VCD) Mode(1) ISO/IEC 14443 A ISO/IEC 14443 B ISO/IEC 15693 MIFARE 1K MIFARE 4K MIFARE DESFire FeliCa Jewel and Topaz cards	
<b>Card Emulation</b>	(PICC-VICC)	
<b>Mode<sup>1</sup></b>	ISO/IEC 14443 A ISO/IEC 14443 B and B' MIFARE FeliCa	
<b>Frequency</b>	13.56 MHz	
<b>NFC Modes Supported</b>	Reader/Writer, Peer-to-Peer	
<b>Raw RF Data Rates</b>	106, 212, 424, 848 kbps	
<b>Operating temperature</b>	0°C to 70°C	
<b>Storage temperature</b>	-20°C to 125°C	
<b>Humidity</b>	10-90% operating 5-95% non-operating	
<b>Supply Operating voltage</b>	2.97 to 5.5 Volts	
<b>I/O Voltage</b>	1.8V or 3.3V	
<b>Power Consumption</b>	<b>Booster enable,</b>	VBAT= 3.3V,
	<b>VCC_BOOST = 5V)</b>	Typical <sup>2</sup> Polling 7.3 mA Detected Test Tag Type 1 Total
	<b>Mode Power</b>	283.8 mA Net Module 236.8 mA Detected Test Tag Type
	<b>Consumption,</b>	2 Total 288.8 mA Net Module 241.8 mA Detected Test
		Tag Type 3 Total 287.7 mA Net Module 240.7 mA
		Detected Test Tag Type 4 Total 282.3 mA Net Module
		235.3 mA
<b>Antenna connector</b>	0.5mm pitch, 7 connector FPC. Antenna matching is external to module.	
<b>Notes</b>	<ol style="list-style-type: none"> <li>1. With application or UICC support</li> <li>2. Actual Power Consumption is dependent on NFC antenna and matching circuit and on the particular polling sequence and period configured.</li> </ol>	

### Technical Specifications – Audio

#### AUDIO/MULTIMEDIA – BANG & OLUFSEN

<b>Hardware</b>	<b>Implementation</b>	Conexant CX7750
	<b>Function Key</b>	Volume up, volume down, and mute
	<b>Volume Controls</b>	
	<b>Line In/Line Out</b>	Yes, via dock
	<b>Headphone/Microphone in</b>	Yes combo jack
	<b>Integrated Microphone</b>	Yes, dual digital microphone array when equipped with optional webcam

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<b>Audio Output Quality</b>	<b>Frequency Response</b>	20 Hz - 20 kHz
	<b>Signal to Noise Ratio</b>	>85 dB
	<b>Total Harmonic Distortion</b>	0.01%
	<b>Noise Floor</b>	-110 dB
	<b>Play/Record Sampling Rate(s)</b>	8 kHz – 48kHz
	<b>DAC</b>	16, 20 or 24-bit
	<b>ADC</b>	16,20-bit

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<b>Integrated Stereo Speakers</b>	<b>Power Rating</b>	2 Watts
	<b>Impedance</b>	4 Ohms

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### Technical Specifications – Power

#### POWER

<b>HP 65W Smart AC Adapter</b>	<b>Dimensions</b>	107.0x47.0x30.0mm	
	<b>Weight</b>	unit: 250g +/- 10g	
	<b>Input</b>	90 to 265 VAC	
		<b>Input Efficiency</b>	88.0 % at 115 Vac and 89.0 % at 230 Vac
		<b>Input frequency range</b>	47 to 63 Hz
		<b>Input AC current</b>	Max 1.7 A at 90 Vac
	<b>Output</b>	<b>Output power</b>	65W
		<b>DC output</b>	19.5V
		<b>Hold-up time</b>	5 ms at 115 Vac input
		<b>Output current limit</b>	<11.0A
	<b>AC Connector (Ac Inlet)</b>	C6 (3pin/with grounded, with Smart ID DC connector)	
	<b>AC Connector (Ac Inlet)</b>	<b>Operating temperature</b>	32° to 95° F (0° to 35° C)
	<b>Environmental Design</b>	<b>Non-operating (storage) temperature</b>	-4° to 185° F (-20° to 85° C)
		<b>Altitude</b>	0 to 16,400 ft (0 to 5,000 m)
		<b>Humidity</b>	20% to 95%
	<b>Storage Humidity</b>	10% to 95%	
<b>EMI and Safety Certifications</b>	<p>*CE Mark - full compliance with LVD and EMC directives</p> <p>* Worldwide safety standards - IEC60950, EN60950, UL60950, Class 1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE.</p> <p>* MTBF - over 200,000 hours at 25°C ambient condition.</p>		

<b>HP 65W Smart AC Adapter EM</b>	<b>Dimensions</b>	102.0x55.0x30.0mm	
	<b>Weight</b>	unit: 350g +/- 10g	
	<b>Input</b>	90 to 265 VAC	
		<b>Input Efficiency</b>	87.0% min at 115 VAC and 230Vac
		<b>Input frequency range</b>	47 to 63 Hz
		<b>Input AC current</b>	Max. 1.7 A at 90 VAC
	<b>Output</b>	<b>Output power</b>	65W
		<b>DC output</b>	19.5V
		<b>Hold-up time</b>	5 ms at 115 Vac input
		<b>Output current limit</b>	<11.0A
	<b>AC Connector (Ac Inlet)</b>	C6 (3pin/with grounded, with Smart ID DC connector)	
	<b>AC Connector (Ac Inlet)</b>	<b>Operating temperature</b>	32° to 95° F (0° to 35° C)
	<b>Environmental Design</b>		

### Technical Specifications – Power

<b>Non-operating (storage) temperature</b>	-4° to 185° F (-20° to 85° C)
<b>Altitude</b>	0 to 16,400 ft (0 to 5,000 m)
<b>Humidity</b>	20% to 95%
<b>Storage Humidity</b>	10% to 95%

**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 65W Travel AC Adapter

<b>Dimensions</b>	120.0x57.6x16.7mm
<b>Weight</b>	unit: 250g +/- 10g
<b>Input</b>	<b>Input Efficiency</b> 88.0 % at 115 Vac and 89.0 % at 230Vac
	<b>Input frequency range</b> 47 to 63 Hz
	<b>Input AC current</b> 1.7 A at 90 Vac
<b>Output</b>	<b>Output power</b> 65W
	<b>DC output</b> 19.5V/5V
	<b>Hold-up time</b> 5 ms at 115 Vac input
	<b>Output current limit</b> <11.0A
<b>DC Plug</b>	4.5mm/7.4mm tips
<b>Environmental Design</b>	<b>Operating temperature</b> 32° to 95° F (0° to 35° C)
	<b>Non-operating (storage) temperature</b> -4° to 185° F (-20° to 85° C)
	<b>Altitude</b> 0 to 16,400 ft (0 to 5,000 m)
	<b>Humidity</b> 20% to 95%
	<b>Storage Humidity</b> 10% to 95%
<b>EMI and Safety Certifications</b>	*CE Mark - full compliance with LVD and EMC directives * Worldwide safety standards - IEC60950, EN60950, UL60950, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE. * MTBF - over 200,000 hours at 25°C ambient condition.

### Technical Specifications – Power

<b>HP 45W Smart AC Right Angle Adapter Argentina</b>	<b>Dimensions</b>	3.74 x 1.57 x 1.04 in (9.5 x 4.0 x 2.65 cm)	
	<b>Weight</b>	0.386 lb (175g) max	
	<b>Input</b>	<b>Input Efficiency</b>	87.74% at 115Vac and 88.4% at 230Vac
		<b>Input frequency range</b>	47 to 63 Hz
	<b>Output</b>	<b>Input AC current</b>	Max 1.4 A at 90 VAC
		<b>Output power</b>	45W
		<b>DC output</b>	19.5V
		<b>Hold-up time</b>	5 ms at 115 Vac input
		<b>Output current limit</b>	<8.0 A
	<b>Environmental Design</b>	<b>Operating temperature</b>	32° to 95° F (0° to 35° C)
		<b>Non-operating (storage) temperature</b>	-4° to 185° F (-20° to 85° C)
		<b>Altitude</b>	0 to 16,400 ft (0 to 5,000 m)
		<b>Humidity</b>	5% to 95%
	<b>EMI and Safety Certifications</b>	<b>Storage Humidity</b>	5% to 95%
		*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.			

<b>HP 65W Smart AC Adapter Argentina</b>	<b>Dimensions</b>	107.0x47.0x30.0mm		
	<b>Weight</b>	unit: 250g +/- 10g		
	<b>Input</b>	<b>Input</b>	90 to 265 VAC	
		<b>Input Efficiency</b>	88.0 % at 115 Vac and 89.0 % at 230 Vac	
	<b>Output</b>	<b>Input frequency range</b>	47 to 63 Hz	
		<b>Input AC current</b>	Max 1.7 A at 90 Vac	
		<b>Output power</b>	65W	
		<b>DC output</b>	19.5V	
		<b>Hold-up time</b>	5 ms at 115 Vac input	
	<b>AC Connector (Ac Inlet)</b>	<b>Output current limit</b>	<11.0A	
		<b>AC Connector (Ac Inlet)</b>	C6 (3pin/with grounded, with Smart ID DC connector)	
		<b>Environmental Design</b>	<b>Operating temperature</b>	32° to 95° F (0° to 35° C)
			<b>Non-operating (storage) temperature</b>	-4° to 185° F (-20° to 85° C)
			<b>Altitude</b>	0 to 16,400 ft (0 to 5,000 m)
			<b>Humidity</b>	20% to 95%
<b>Storage Humidity</b>			10% to 95%	

### Technical Specifications – Power

	<b>EMI and Safety Certifications</b>	<p>*CE Mark - full compliance with LVD and EMC directives</p> <p>* Worldwide safety standards - IEC60950, EN60950, UL60950, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE.</p> <p>* MTBF - over 200,000 hours at 25°C ambient condition.</p>	
<b>HP 45W Smart AC Right Angle Adapter</b>	<b>Dimensions</b>	3.74 x 1.57 x 1.04 in (9.5 x 4.0 x 2.65 cm)	
	<b>Weight</b>	0.386 lb (175g) max	
	<b>Input</b>	<b>Input Efficiency</b>	87.74% at 115Vac and 88.4% at 230Vac
		<b>Input frequency range</b>	47 to 63 Hz
		<b>Input AC current</b>	Max 1.4 A at 90 VAC
	<b>Output</b>	<b>Output power</b>	45W
		<b>DC output</b>	19.5V
		<b>Hold-up time</b>	5 ms at 115 Vac input
		<b>Output current limit</b>	<8.0 A
		<b>Environmental Design</b>	<b>Operating temperature</b>
	<b>Non-operating (storage) temperature</b>		-4° to 185° F (-20° to 85° C)
	<b>Altitude</b>		0 to 16,400 ft (0 to 5,000 m)
	<b>Humidity</b>		5% to 95%
<b>Storage Humidity</b>	5% to 95%		
	<b>EMI and Safety Certifications</b>	<p>*CE Mark - full compliance with LVD and EMC directives</p> <p>* Worldwide safety standards - IEC60950, EN60950, UL60950, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE.</p> <p>* MTBF - over 200,000 hours at 25°C ambient condition.</p>	
<b>HP 45W Smart AC Adapter (2 Prong)</b>	<b>Dimensions (H x W x D)</b>	95.0x40.0x26.5mm	
	<b>Weight</b>	unit: 200g +/- 10g	
	<b>Input</b>	<b>Input</b>	90 to 265 VAC
		<b>Input Efficiency</b>	87.74% at 115Vac and 88.4% at 230Vac
		<b>Input frequency range</b>	47 to 63 Hz
	<b>Output</b>	<b>Input AC current</b>	Max. 1.4 A at 90 Vac
		<b>Output power</b>	45W
		<b>DC output</b>	19.5V
		<b>Hold-up time</b>	5 ms at 115 Vac input
		<b>Output current limit</b>	<8.0A
	<b>AC Connector (Ac Inlet)</b>	C8 (2 pin/non-grounded, with Smart ID DC connector)	
	<b>Environmental Design</b>	<b>Operating temperature</b>	32° to 95° F (0° to 35° C)
		<b>Non-operating (storage) temperature</b>	-4° to 185° F (-20° to 85° C)
<b>Altitude</b>		0 to 16,400 ft (0 to 5,000 m)	
<b>Humidity</b>		20% to 95%	
	<b>Storage Humidity</b>	10% to 95%	



### Technical Specifications – Power

<b>HP 45W Smart USB Type C Adapter</b>	<b>EMI and Safety Certifications</b>	<p>*CE Mark - full compliance with LVD and EMC directives                  * Worldwide safety standards - IEC60950, EN60950, UL60950, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE.                  * MTBF - over 200,000 hours at 25°C ambient condition.</p>	
	<b>Dimensions Weight Input</b>	<p>62.0x62.0x28.5mm                  unit: 220g +/- 10g</p>	<p><b>Input Efficiency</b>      Average Efficiency of 25%, 50%, 75%, 100%                  load condition with 115Vac/230Vac Spec:                  5V : 81.5%                  9V : 86.7%                  10V : 87.5%                  12V : 87.8%                  15V : 87.8%                  20V : 87.8%</p>
<b>Output</b>	<b>Input frequency range</b>	47 to 63 Hz	
	<b>Input AC current</b>	Max 1.4 A at 90 Vac	
	<b>Output power</b>	45W	
	<b>DC output</b>	5V/15W; 9V/27W; 10V/37.5W; 12V/45W; 15V/45W; 20V/45W	
	<b>Hold-up time</b>	5 ms at 115 Vac input	
<b>Environmental Design</b>	<b>Output current limit</b>	<5.0A	
	<b>Operating temperature</b>	32° to 95° F (0° to 35° C)	
	<b>Non-operating (storage) temperature</b>	-4° to 185° F (-20° to 85° C)	
	<b>Altitude</b>	0 to 16,400 ft (0 to 5,000 m)	
	<b>Humidity</b>	5% to 95%	
<b>EMI and Safety Certifications</b>	<b>Storage Humidity</b>	5% to 95%	
	<p>*CE Mark - full compliance with LVD and EMC directives                  * Worldwide safety standards - IEC60950, EN60950, UL60950, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE.                  * MTBF - over 200,000 hours at 25°C ambient condition.</p>		
<b>HP 65W Smart USB Type C Adapter</b>	<b>Dimensions</b>	74x74x28.5mm	
	<b>Weight</b>	unit: 245g +/- 10g	
<b>Input</b>	<b>Input Efficiency</b>	<p>81.5% min at 115 Vac/ 230Vac @ 5V/3A                  86.7% min at 115 Vac/ 230Vac @ 9V/3A                  88% min at 115 Vac/ 230Vac @ 10V/5A                  88% min at 115 Vac/ 230Vac @ 12V/5A                  89% min at 115 Vac/ 230Vac @ 15V/4.33A                  89% min at 115 Vac/ 230Vac @ 20V/3.25A</p>	
	<b>Input frequency range</b>	47 to 63 Hz	
<b>Output</b>	<b>Input AC current</b>	Max 1.7 A at 90 Vac	
	<b>Output power</b>	65W	
	<b>DC output</b>	5V/9V/10V/12V/15V/20V	

### Technical Specifications – Power

		<b>Hold-up time</b>	5 ms at 115 Vac input
		<b>Output current limit</b>	<8.0A
	<b>Environmental Design</b>	<b>Operating temperature</b>	32° to 95° F (0° to 35° C)
		<b>Non-operating (storage) temperature</b>	-4° to 185° F (-20° to 85° C)
		<b>Altitude</b>	0 to 16,400 ft (0 to 5,000 m)
		<b>Humidity</b>	5% to 95%
		<b>Storage Humidity</b>	5% to 95%
	<b>EMI and Safety Certifications</b>	*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 100,000 hours at 25°C ambient condition.	
<b>HP Long Life 3-cell Polymer Battery (51WHr)</b>	<b>Dimensions (H x W x L)</b>	6.8mm x 102.8mm x 198mm	
	<b>Weight</b>	235 g	
	<b>Cells/Type</b>	3cell Lithium-Ion Polymer cell / 506480	
	<b>Energy</b>	<b>Voltage</b>	11.55V
		<b>Amp-hour capacity</b>	4420mAh
		<b>Watt-hour capacity</b>	51wh
	<b>Temperature</b>	<b>Operating (Charging)</b>	32° to 113° F (0° to 45° C)
		<b>Operating (Discharging)</b>	14° to 140° F (-10° to 60° C)
	<b>Fuel Gauge LED</b>	No	
	<b>Warranty</b>	1000 cycles > 65% (at 23° C)	
	<b>Optional Travel Battery Available</b>	No	

### 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<sup>1</sup> Gold registered in the United States. See <http://www.epeat.net> for registration status in your country. Search keyword *generator* on HP's 3rd party option store for solar energy accessory at <http://www.hp.com/go/options>.

##### 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, 60Hz
Normal Operation (Short idle)	9.06 W	9.98 W	9.6 W
Normal Operation (Long idle)	7.31 W	7.82 W	8.0 W
Sleep	0.76 W	0.89 W	0.75 W
Off	0.44 W	0.56 W	0.43 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, 60Hz
Normal Operation (Short idle)	31 BTU/hr	34 BTU/hr	33 BTU/hr
Normal Operation (Long idle)	25 BTU/hr	27 BTU/hr	27 BTU/hr
Sleep	3 BTU/hr	3 BTU/hr	3 BTU/hr
Off	2 BTU/hr	2 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 <sub>WAd</sub> , bels)	Sound Pressure (L <sub>pAm</sub> , decibels)
Typically Configured – Idle	2.9	20
Fixed Disk – Random writes	2.9	21

##### 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:

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

##### Batteries

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

### Technical Specifications – Environmental

Batteries used in the product do not contain:  
 Mercury greater than 1ppm by weight  
 Cadmium greater than 20ppm by weight

Battery description: CR2032 (coin cell)  
 Battery type: Lithium

#### 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](http://www.epeat.net)
- Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.
- This product contains 7.8% post-consumer recycled plastic (by wt.)
- This product is 96.1% recycle-able when properly disposed of at end of life.

#### Packaging Materials

<b>External:</b>	PAPER/Cardboard & misc	360.2 g
<b>Internal:</b>	PLASTIC/EPE (Expanded Polyethylene)	29.8 g
	PLASTIC/Polyethylene low density	13.6 g
	PLASTIC/Polypropylene	6 g

The plastic packaging material contains at least 50% recycled content.

The corrugated paper packaging materials contains at least 70% 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
- 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.

### Technical Specifications – Environmental

- 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>

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#### Country of Origin

China

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

Type	Description	Part #
<b>Memory</b>	HP 4GB DDR4-2400 SODIMM (Core processors only)	Z4Y84AA
	HP 16GB DDR4-2400 SODIMM (Core processors only)	Z4Y86AA
<b>Cases</b>	HP Executive 15.6 Black Top Load	P6N18AA
	HP Business Case (up to 15.6")	H5M92AA
<b>Docking</b>	HP UltraSlim Docking Station	D9Y32AA
	HP 2013 UltraSlim Docking Station TAA (US only)	E5C22AV#ABA
	HP Executive Travel Hub	TOK29AA
	HP Travel Hub	TOK30AA
	HP 3005pr USB 3.0 Port Replicator w/ USB-C Adapter	Y4H06AA
	HP Display and Notebook Stand II	E8G00AA#xxx
	HP USB-Type C™ Elite Dock	X7W54AA
<b>Input/Output - Mice</b>	HP 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 USB Travel Mouse	G1K28AA#xxx
	HP Slim Wireless Keyboard and Mouse	T6L04AA#xxx
	HP USB Essential Keyboard and Mouse	H6L29AA#xxx
	HP Slim USB Keyboard and Mouse	T6T83AA
HP Wireless (Link-5) Keyboard	T6U20AA#xxx	
<b>Power Adapters</b>	HP 65W Slim A/C Adapter w/USB	H6Y82AA
	HP 65W Smart AC Adapter	H6Y89AA
<b>Adapters</b>	HP USB-C™ to VGA Adapter	N9K76AA
	HP USB-C to USB 3.0	N2Z63AA
	HP USB-C to USB Hub	Z6A00AA
	HP USB-C™ to DisplayPort™ Adapter	N9K78AA
	HP USB-C™ to DisplayPort™ Adapter	N9K78AA
	HP HDMI to DVI adapter	F5A28AA
	DisplayPort™ to DVI Adapter	F7W96AA
	DisplayPort™ to VGA	F7W97AA
	DisplayPort™ to HDMI 1.4 Adapter	F3W43AA
	<b>Collaboration</b>	HP UC Conferencing Keyboard
HP UC Speaker Phone		K7V16AA

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

	HP UC Wired Headset	K7V17AA
	HP UC Mono Wireless Headset	W3K08AA
	HP UC Duo Wireless Headset	W3K09AA
	HP Stereo 3.5mm Headset	T1A66AA
	HP Stereo USB Headset	T1A67AA
<b>Storage - External Storage</b>	HP External USB DVDRW Drive	F2B56AA
	HP 500GB 7200rpm HDD	F3B97AA
	HP 256GB M2 NVME PCIe SSD (2280)	V3K66AA
	HP 512GB M2 NVME PCIe SSD (2280)	V3K67AA
<b>Security</b>	HP Dual Head Cable Lock (Non-Master key)	T1A64AA
	HP Dual Head Cable Lock (Master Key)	T1A65AA
	HP Docking Station Cable Lock	AU656AA#XXX
	HP Essential Combination Lock	TOY16AA
	HP Combination Lock	TOY15AA
	HP Keyed Cable Lock	TOY14AA

**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

<b>Date of change:</b>	<b>Version History:</b>		<b>Description of change:</b>
February 15, 2018	From v1 to v2	Change	Environmental data updated
February 23, 2018	From v2 to v3	Added	Dock, case, mouse, adapter, display and care packs added to options section
March 1, 2018	From v3 to v4	Added	Battery note on power supply section
May 21, 2018	From V4 to V5	Update	



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