

### Overview

#### HP ProBook 645 G3 Notebook PC

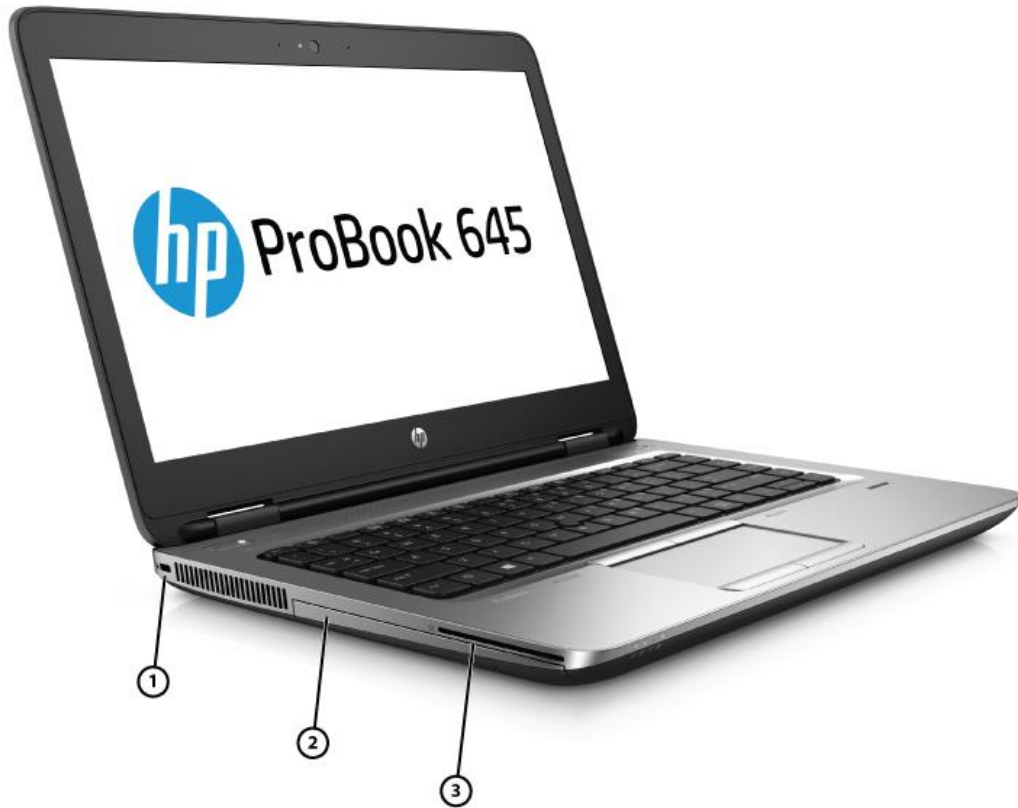


#### Front/Right

- |                                      |                                                                                                |
|--------------------------------------|------------------------------------------------------------------------------------------------|
| 1. WLAN antennas (2)                 | 13. SD card slot                                                                               |
| 2. WWAN antennas (2) (select models) | 14. DisplayPort™                                                                               |
| 3. Internal microphones (2)          | 15. USB-C™ port                                                                                |
| 4. Webcam LED (select models)        | 16. Microphone/ headphones combo jack                                                          |
| 5. Webcam (select models)            | 17. Fingerprint reader (select models)                                                         |
| 6. Wireless on/off button            | 18. Touchpad                                                                                   |
| 7. Speaker mute button               | 19. Touchpad buttons                                                                           |
| 8. Power connector                   | 20. Indicator LEDs: Wireless Light, Power Light, AC Adapter/Battery Light, Storage Usage Light |
| 9. SIM card slot                     | 21. NFC (select models)                                                                        |
| 10. Docking connector                | 22. Pointstick (select models)                                                                 |
| 11. Ethernet port                    | 23. Power button                                                                               |
| 12. USB 3.0 ports (2)                |                                                                                                |



## Overview



### Left side

1. Security lock slot
2. Optical drive (select models)
3. Smart Card Reader



## Overview



### Back

1. VGA port



### Overview

#### HP ProBook 655 G3 Notebook PC

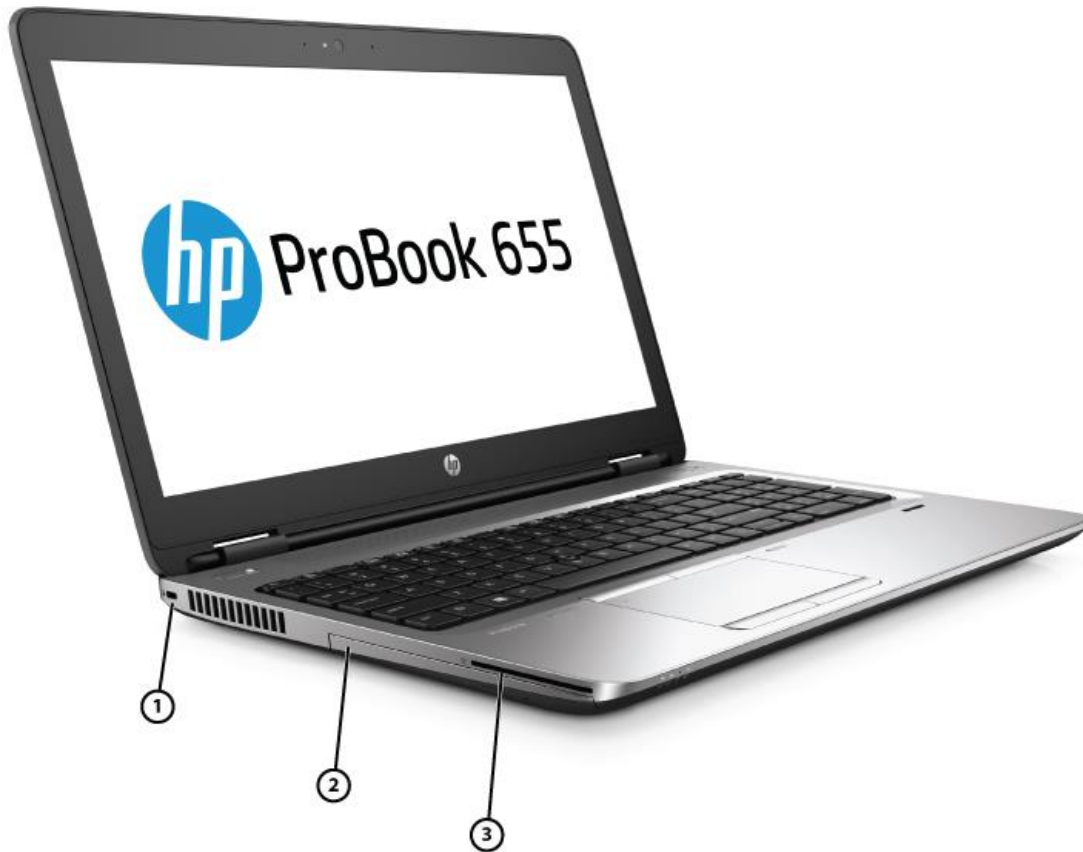


#### Front/Right

- |                                      |                                                                                                |
|--------------------------------------|------------------------------------------------------------------------------------------------|
| 1. WLAN antennas (2)                 | 13. SD card slot                                                                               |
| 2. WWAN antennas (2) (select models) | 14. DisplayPort™                                                                               |
| 3. Internal microphones (2)          | 15. USB-C™ port                                                                                |
| 4. Webcam LED (select models)        | 16. Microphone/ headphones combo jack                                                          |
| 5. Webcam (select models)            | 17. Fingerprint reader (select models)                                                         |
| 6. Wireless on/off button            | 18. Touchpad                                                                                   |
| 7. Speaker mute button               | 19. Touchpad buttons                                                                           |
| 8. Power connector                   | 20. Indicator LEDs: Wireless Light, Power Light, AC Adapter/Battery Light, Storage Usage Light |
| 9. SIM card slot                     | 21. NFC (select models)                                                                        |
| 10. Docking connector                | 22. Pointstick (select models)                                                                 |
| 11. Ethernet port                    | 23. Power button                                                                               |
| 12. USB 3.0 ports (2)                |                                                                                                |



## Overview



### Left side

1. Security lock slot
2. Optical drive (select models)
3. Smart Card Reader



## Overview



### Back

1. VGA port

2. Serial port (select models)



### Overview

#### AT A GLANCE

- Windows 10 versions, Windows 7 through downgrade rights or FreeDOS 2.0
- Protect existing IT investment with optional optical drive and optional serial port (HP ProBook 655 G3 only)
- Choice of up to 7<sup>th</sup> generation AMD A6, A8 and A10 Accelerated Processing Unit and graphics
- The HP Premium keyboard is spill-resistant and offered with optional backlit design
- Large Touchpad with gestures support, on/off button with LED indicator
- Enhanced security features including TPM 2.0, SmartCard Reader and optional Fingerprint reader
- LED-backlit display
  - HP ProBook 645: 35.56 cm (14") diagonal HD and FHD or Touch FHD with camera and with WWAN
  - HP ProBook 655: 39.6 cm (15.6") diagonal HD and FHD or Touch FHD with camera and with WWAN
- Optional HD webcam with dual-microphone array for video conferencing
- DisplayPort™ 1.2 with integrated graphics
- Three USB ports for fast data transfer from devices: one standard, one charging, and one USB-C™ charging port
- Wireless and speaker mute button to conveniently manage the connectivity and speaker.
- Flexible wireless connectivity options:
  - - Broadband Wireless (WWAN)
  - - Wireless LAN (WLAN)
  - - Personal area network (WPAN Bluetooth®)
  - - Near Field Communication (NFC)
- Choice of hard drives up to 1 TB or solid state drives up to 512 GB
- Pending MIL STD testing<sup>1</sup>

1. MIL STD 810G testing 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.

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



### Technical Specifications

#### PRODUCT NAMES

HP ProBook 645 G3 Notebook PC

HP ProBook 655 G3 Notebook PC

#### OPERATING SYSTEM

##### Preinstalled

Windows 10 Pro 64<sup>1</sup>  
Windows 10 Home 64<sup>1</sup>  
Windows 10 Home Single Language 64<sup>1</sup>  
Windows 10 Pro 64 (National Academic only)<sup>2</sup>  
NeoKylin Linux 64  
FreeDOS 2.0

##### Web-only Support

Windows 10 Enterprise<sup>1</sup>

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.windows.com>.
2. Some devices for academic use will automatically be updated to Windows 10 Pro Education with the Windows 10 Anniversary Update. Features vary; see <https://aka.ms/ProEducation> for Windows 10 Pro Education feature information.
3. This system is preinstalled with Windows 7 Professional software and also comes with a license and media for Windows 10 Pro software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.

#### PROCESSORS

AMD A10-8730B APU with Radeon™ R5 Graphics (2.4 GHz, up to 3.3 GHz, 2 MB cache, 4 cores)<sup>1</sup>

AMD A8-9600B APU with Radeon™ R5 Graphics (2.4 GHz, up to 3.3 GHz, 2 MB cache, 4 cores)<sup>1</sup>

AMD A6-8530B APU with Radeon™ R5 Graphics (2.3 GHz, up to 3.2 GHz, 2 MB cache, 2 cores)<sup>1</sup>

##### Processors Family

7th Generation AMD A8 APU processor (9600B model)

6th Generation AMD A6 APU processor (8530B model)

6th Generation AMD A10 APU processor (8730B model)

**NOTE:** 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 7<sup>th</sup> generation and forward processors or provide any Windows 8 or Windows 7 drivers on <http://www.support.hp.com>

1. Multicore is designed to improve performance of certain software products. Not all customers or software applications will





### Technical Specifications

necessarily benefit from use of this technology. Performance and clock frequency will vary depending on application workload and your hardware and software configurations. AMD's numbering is not a measurement of clock speed.

#### CHIPSET

Integrated with processor

#### GRAPHICS

Radeon™ R5 Graphics

**NOTE:** Integrated with processors.

#### DISPLAY

##### HP ProBook 645

###### Internal Non-Touch

35.56 cm (14") diagonal LED-backlit HD<sup>1</sup> SVA eDP Anti-glare Slim 45% CG 220 nits (1366x768)

35.56 cm (14") diagonal LED-backlit HD<sup>1</sup> SVA eDP Anti-glare Slim 45% CG 220 nits (1366x768) with camera

35.56 cm (14") diagonal LED-backlit HD<sup>1</sup> SVA eDP Anti-glare Slim 45% CG 220 nits (1366x768) with WWAN

35.56 cm (14") diagonal LED-backlit HD<sup>1</sup> SVA eDP Anti-glare Slim 45% CG 220 nits (1366x768) with camera and with WWAN

35.56 cm (14") diagonal LED-backlit FHD SVA eDP Anti-glare Slim 60% CG 300 nits (1920x1080)

35.56 cm (14") diagonal LED-backlit FHD SVA eDP Anti-glare Slim 60% CG 300 nits (1920x1080) with camera

35.56 cm (14") diagonal LED-backlit FHD SVA eDP Anti-glare Slim 60% CG 300 nits (1920x1080) with WWAN

35.56 cm (14") diagonal LED-backlit FHD SVA eDP Anti-glare Slim 60% CG 300 nits (1920x1080) with camera & WWAN

###### Touch

35.56 cm (14") diagonal LED-backlit FHD SVA eDP 60% CG 300 nits (1920x1080) with camera and with WWAN

###### External

Up to 32-bit per pixel color depth

###### VGA

Port supports resolutions up to 1920 x 1200 external resolution @60 Hz

###### DisplayPort 1.2

Supports resolutions up to 2560 x 1600, 30-bit color depth at 60 Hz, and full HD (1920 x 1080) monitors, 24-bit color depth at 120 Hz

###### Number of Displays Supported

Supports 3 independent displays if used with optional HP Ultralim Docking Station<sup>2</sup>

##### HP ProBook 655

###### Internal Non-Touch

39.6 cm (15.6") diagonal LED-backlit HD<sup>1</sup> SVA eDP Anti-glare Slim 45% CG 220 nits (1366 x 768)



### Technical Specifications

39.6 cm (15.6") diagonal LED-backlit HD<sup>1</sup> SVA eDP Anti-glare Slim 45% CG 220 nits (1366 x 768) with camera  
39.6 cm (15.6") diagonal LED-backlit HD<sup>1</sup> SVA eDP Anti-glare Slim 45% CG 220 nits (1366 x 768) with WWAN  
39.6 cm (15.6") diagonal LED-backlit HD<sup>1</sup> SVA eDP Anti-glare Slim 45% CG 220 nits (1366 x 768) with camera and with WWAN  
39.6 cm (15.6") diagonal LED-backlit FHD SVA eDP Anti-glare Slim 60% CG 300 nits (1920 x 1080)  
39.6 cm (15.6") diagonal LED-backlit FHD SVA eDP Anti-glare Slim 60% CG 300 nits (1920 x 1080) with camera  
39.6 cm (15.6") diagonal LED-backlit FHD SVA eDP Anti-glare Slim 60% CG 300 nits (1920 x 1080) with WWAN  
39.6 cm (15.6") diagonal LED-backlit FHD SVA eDP Anti-glare Slim 60% CG 300 nits (1920 x 1080) with camera & WWAN

#### Touch

39.6 cm (15.6") diagonal LED-backlit FHD SVA eDP 60% CG 300 nits (1920 x 1080) with camera with WWAN

#### External

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

1. HD content required to view HD images.
2. Sold separately or as an optional feature.

### STORAGE AND DRIVES

#### Primary Storage Bay

##### SATA, 2.5" Hard Drives<sup>1</sup>

500 GB 7200 rpm  
500 GB 7200 rpm Self-Encrypting Drive (Opal 2)  
500 GB 7200 rpm Self Encrypting Drive (FIPS-140-2)  
1 TB 5400 rpm

##### M.2 (NGFF) Solid State Drive<sup>1</sup>

128 GB SATA-3 SS Value  
256 GB-PCIe NVMe SSD TLC  
256 GB-SATA TLC (Opal 2)  
512 GB-PCIe NVMe TLC  
360 GB PCIe Gen3x4 NVMe SS TLC  
256 GB PCIe Gen3x4 NVMe SS Value  
512 GB PCIe Gen3x4 NVMe SS Value

1. For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 30 GB of system disk is reserved for system recovery software.

### OPTICAL DRIVES

#### Fixed 9.5 mm SATA



## Technical Specifications

DVD-ROM Drive  
DVD+/-RW SuperMulti DL<sup>1</sup>  
BD Writer

1. Intended for your original content and other lawful uses. Don't copy copyright-protected materials.
2. Not available on with Touch panel.

## MEMORY

DDR4-2133 SDRAM (Transfer rates up to 1866 MT/s)  
Two SODIMM slots supporting dual-channel memory

### Configurations

4096 MB Total System Memory (4096 MB x 1)  
8192 MB Total System Memory (4096 MB x 2)  
8192 MB Total System Memory (8192 MB x 1)  
12288 MB Total System Memory (8192 MB + 4096 MB)  
16384 MB Total System Memory (8192 MB x 2)

### Maximum

Up to 16384 MB

### Dual-channel

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

**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

### Broadband Wireless (WWAN)<sup>2,3</sup>

HP It4120 Qualcomm® Snapdragon™ X5 LTE Mobile Broadband Module  
HP It4132 LTE/HSPA+ 4G Mobile Broadband Module  
HP hs3210 HSPA+ Mobile Broadband Module

### Wireless LAN (WLAN)<sup>1,2</sup>

Options via Minicard

Intel® Dual Band Wireless-AC 3168 802.11 a/b/g/n/ac (1x1) Wi-Fi® and Bluetooth® 4.2 Combo (non-vPro)  
Realtek 802.11b/g/n (1x1) and Bluetooth® 4.0 Combo (non-vPro)  
Intel® Dual Band Wireless-AC 7265 802.11a/b/g/n/ac (2x2) WiFi and Bluetooth® 4.2 Combo (non-vPro)

### Personal area network (WPAN Bluetooth)<sup>1,2</sup>

Bluetooth® 4.0 supported via Broadcom Realtek  
Bluetooth® 4.2 supported via all supported Intel® WLAN modules

### Near Field Communication (NFC) Optional<sup>2</sup>



## Technical Specifications

HP Module with NXP NFC Controller NPC100

1. Wireless access point and Internet service is required and is not included. Availability of public wireless access points limited.
2. Sold separately or as an optional feature.
3. WWAN module is optional and 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, in all regions.

### Support for Miracast (Windows 10)

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>.

### Communications

Realtek RTL8111HSH Gigabit Ethernet NIC with DASH Support

## AUDIO/MULTIMEDIA

### Audio

(2) Integrated stereo speakers  
Dual Array Microphone

### Webcam

Optional 720p HD webcam<sup>1,2</sup>

1. Sold separately or as an optional feature.
2. HD content required to view HD images.

## KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS

### HP Premium Keyboard

The HP spill-resistant keyboard is designed using a thin layer of Mylar film under the keyboard. The 101/102-key compatible keyboard features a full-pitch key layout with desktop keyboard features, such as editing keys, both left and right control and alt keys, and function keys. DuraKeys only available with Backlit option.

### Three Keyboard Options

Touchpad, Spill-resistant with drain  
Touchpad, Spill-resistant with drain, DuraKeys & Backlit  
Dual Point, Spill-resistant with drain, DuraKeys & Backlit

### Touchpad

On/Off button  
Enabled by default  
2F Scrolling – On  
2F Zoom ( Pinch ) – On  
OSD ( enable / disable ) – On



## Technical Specifications

### Buttons and Function Keys

- F1 – Sleep
- F2 – Blank
- F3 – Backlit
- F4 - Display Switch
- F5 - Brightness down
- F6 - Brightness up
- F7 – Blank
- F8 - Volume down
- F9 - Volume up
- F10 - Mic Mute
- F11 – Bank
- F12 - Num lock

## SOFTWARE AND SECURITY

### Preinstalled Software with Windows Operating System

#### BIOS

- HP BIOSphere<sup>1</sup>
- HP DriveLock | HP Automatic DriveLock
- BIOS Update via Network
- Master Boot Record Security
- Power On Authentication
- Secure Erase<sup>2</sup>
- Absolute Persistence Module<sup>3</sup>
- Pre-boot Authentication

#### Multi Media

- CyberLink Power Media Player - CMIT
- CyberLink Power2Go

#### Communication / Connectivity

- HP Mobile Connect Pro (Windows 10 only)<sup>5</sup>
- Native Miracast Support<sup>6</sup>
- HP LAN-WLAN Protection
- HP MAC Address Manager
- HP SureConnect

#### HP Value Add Software

- HP 3D DriveGuard 6
- HP ePrint Driver + JetAdvantage<sup>7</sup>
- HP Hotkey Support - CMIT



## Technical Specifications

HP Recovery Manager  
HP Recovery Disc Creator (Windows 7 only)  
HP Jumpstart  
HP Support Assistant  
HP Noise Cancellation Software

### 3<sup>rd</sup> Party

Foxit PhantomPDF Express for HP (Windows 7 only)

### Microsoft Products

Buy Office  
Bing Search  
Skype<sup>8</sup>

### Manageability

HP Driver Packs<sup>9</sup>  
HP SoftPaq Download Manager (SDM)<sup>9</sup>  
HP System Software Manager (SSM)<sup>9</sup>HP BIOS Config Utility (BCU)<sup>9</sup>HP Client Catalog<sup>9</sup>HP MIK for Microsoft SCCM<sup>9</sup>  
LANDESK Management<sup>10</sup>  
For more information on HP Client Management Solutions refer to: <http://www.hp.com/go/clientmanagement>.

### Client Security Software

HP Client Security Suite Gen3

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

Microsoft Security Essentials<sup>11</sup> (Windows 7 only)

Microsoft Defender (Windows 10 only)

### Security

Trusted Platform Module (TPM) 1.2 (Infineon SLB9670). Common Criteria EAL4+ Certified.  
Upgradable to TPM 2.0. Convertible to FIPS 140-2 Certified mode. (TPM 2.0 is not available for Win 7 32-bit.)  
HP Fingerprint reader (On select models)  
Security lock slot (Cable not included)  
Integrated Smart Card Reader

1 Available only on business PCs with HP BIOS.

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

3. Absolute agent is shipped turned off, and will be activated when customers activate a purchased



## Technical Specifications

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.

4. This product ships with TPM 1.2 with option to upgrade to TPM 2.0. Upgrade utility is expected to be available by the end of 2016 via HP Customer Support
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>).
8. Skype is not offered in China.
9. Not preinstalled, however available for download at <http://www.hp.com/go/clientmanagement>
10. Subscription required.
11. Opt in and internet connection required for updates.

## POWER

### Power Supply<sup>1</sup>

HP 45W Smart AC Adapter  
HP 45W Smart AC Adapter (2 prong)  
HP 65W Smart AC Adapter  
HP 65W Smart EM Adapter

1. Availability may vary by country.

### Power cord

Power cord included is 1.8 m (+/- 0.1 m) or 1.0 m (+/- 0.1 m).

### Primary Battery

HP 3-cell Long Life Prismatic (48 WHr)

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

### Battery Life<sup>1</sup>

Platform	Other HW Details	Battery	UMA Graphics
HP ProBook 645 G3	HDD	3-cell (48WHr)	Up to 8 hrs
HP ProBook 645 G3	SSD	3-cell (48WHr)	Up to 9 hrs 15 mins
HP ProBook 655 G3	HDD	3-cell (48WHr)	Up to 7 hrs 45 mins



### Technical Specifications

HP ProBook 655 G3	SSD	3-cell (48WHr)	Up to 9 hrs 30 mins
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#### System Standby Time<sup>2</sup>

TBD

1. 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 [www.bapco.com](http://www.bapco.com) for additional details.
2. 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.

## WEIGHTS & DIMENSIONS

### HP ProBook 645 Notebook PC

#### Weight

Starting at 4.30 lbs (1.95 kg)<sup>1</sup>

(3-cell battery, ODD weight saver, UMA, no FPR, 1 SODIMM, WLAN only, SSD, touchpad only, no camera, no WWAN)

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

13.39 x 9.33 x 1.06 in (Front and rear)<sup>2</sup>

34.0 x 23.7 x 2.70 cm (Front and rear)<sup>2</sup>

### HP ProBook 655 Notebook PC

#### Weight

Starting at 5.10 lbs (2.31 kg)<sup>1</sup>

(3-cell battery, ODD weight saver, UMA, no FPR, 1 SODIMM, WLAN only, SSD, touchpad only, no camera, no WWAN)

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

14.88 x 10.11 x 1.08 in (Front and rear)<sup>2</sup>

37.8 x 25.70 x 2.74 cm (Front and rear)<sup>2</sup>

1. Weight varies by configuration and components.
2. Height varies depending upon where on the notebook the measurement is made.

## PORTS/SLOTS

### Ports

1 USB Type-C™

1 USB 3.0 port

1 USB 3.0 port charging





### Technical Specifications

- 1 RJ-45 / Ethernet
- 1 Docking connector
- 1 Headphone / Microphone (Combo jack )
- 1 AC port ( 4.5mm )
- 1 DisplayPort™ 1.2
- 1 VGA port
- 1 Optional Serial port (Only available on HP ProBook 655) <sup>1</sup>

1. Sold separately or as an optional feature.

#### **SD Media Reader Slot**

Supports SD, SDHC, SDXC

### SERVICE AND SUPPORT

HP Services offers 3-year and 1-year limited warranties and 90 day software support options 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. On-site service<sup>1,2</sup> and extended coverage is also available. HP Care Pack Services are optional extended service contracts that go beyond the 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.
2. 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. 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>

### DISPLAYS

**Note:** All specifications represent the typical specifications provided by HP's component manufacturers; actual performance may vary either higher or lower.

#### **14.0" diagonal FHD AG WLED SVA 60%cg 300nits eDP Slim Touch**

<b>Active Area (W x H)</b>	309.40 x 173.95 (mm)
<b>Dimensions (W x H)</b>	320.9 x 205.6 (mm) max
<b>Diagonal Size</b>	14 (inch)
<b>Thickness</b>	3.0 (mm) max
<b>Weight</b>	430 g max



## Technical Specifications

<b>Interface</b>	eDP 1.2
<b>Surface Treatment</b>	BV
<b>Contrast Ratio</b>	300:1 (typical)
<b>Refresh Rate</b>	60 Hz
<b>Brightness</b>	300 nits
<b>Pixel Resolution - Format</b>	1920 x 1080 (FHD)
<b>PPI</b>	157
<b>Pixel Resolution - Configuration</b>	RGB
<b>Backlight</b>	LED
<b>Color Gamut Coverage</b>	60%
<b>Color Depth</b>	6 bits + Hi FRC
<b>Viewing Angle</b>	SVA 45/45/25/35
<b>Touch Enabled</b>	Optional
<b>Other Features</b>	AS
<b>Pen Enabled</b>	No

### 14.0" FHD AG WLED SVA 60%cg 300nits eDP Slim

<b>Active Area (W x H)</b>	309.40 x 173.95 (mm)
<b>Dimensions (W x H)</b>	320.9 x 205.6 (mm) max
<b>Diagonal Size</b>	14 (inch)
<b>Thickness</b>	3.0 (mm) max
<b>Weight</b>	270 g max
<b>Interface</b>	eDP 1.2
<b>Surface Treatment</b>	Anti-Glare (AG)
<b>Contrast Ratio</b>	300:1 (typical)
<b>Refresh Rate</b>	60 Hz
<b>Brightness</b>	300 nits
<b>Pixel Resolution - Format</b>	112
<b>PPI</b>	1920 x 1080 (FHD)
<b>Pixel Resolution - Configuration</b>	RGB
<b>Backlight</b>	LED
<b>Color Gamut Coverage</b>	60%
<b>Color Depth</b>	6 bits + Hi FRC
<b>Viewing Angle</b>	SVA 45/45/25/35
<b>Touch Enabled</b>	Optional
<b>Other Features</b>	AS
<b>Pen Enabled</b>	No

### 14.0" diagonal HD AG WLED SVA 45%cg 220nits eDP Slim

<b>Active Area (W x H)</b>	309.40 x 173.95 (mm)
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## Technical Specifications

<b>Dimensions (W x H)</b>	320.9 x 205.6 (mm) max
<b>Diagonal Size</b>	14 (inch)
<b>Thickness</b>	3.0 (mm) max
<b>Weight</b>	290 g max
<b>Interface</b>	eDP 1.2
<b>Surface Treatment</b>	Anti-Glare (AG)
<b>Contrast Ratio</b>	300:1 (typical)
<b>Refresh Rate</b>	60 Hz
<b>Brightness</b>	220 nits
<b>Pixel Resolution - Format</b>	112
<b>PPI</b>	1366 x 768 (HD)
<b>Pixel Resolution - Configuration</b>	RGB
<b>Backlight</b>	LED
<b>Color Gamut Coverage</b>	45%
<b>Color Depth</b>	6 bits + Hi FRC
<b>Viewing Angle</b>	SVA 45/45/25/35
<b>Touch Enabled</b>	Optional
<b>Other Features</b>	AS
<b>Pen Enabled</b>	No

### **15.6" diagonal FHD AG WLED SVA 60%cg 300nits eDP Slim 3.2mm Touch**

<b>Active Area (W x H)</b>	344.2 x 193.5 (mm)
<b>Dimensions (W x H)</b>	360 x 224.3 (mm) max
<b>Diagonal Size</b>	15.6 (inch)
<b>Thickness</b>	3.2 (mm) max
<b>Weight</b>	550 g max
<b>Interface</b>	eDP 1.2
<b>Surface Treatment</b>	BV
<b>Contrast Ratio</b>	400:1 (typical)
<b>Refresh Rate</b>	60 Hz
<b>Brightness</b>	300 nits
<b>Pixel Resolution - Format</b>	142
<b>PPI</b>	1920 x 1080 (FHD)
<b>Pixel Resolution - Configuration</b>	RGB
<b>Backlight</b>	LED
<b>Color Gamut Coverage</b>	60%
<b>Color Depth</b>	6 bits
<b>Viewing Angle</b>	SVA 45/45/25/35
<b>Other Features</b>	10-point multi-touch
<b>Pen Enabled</b>	AS



### Technical Specifications

#### 15.6" FHD AG WLED SVA 60%cg 300nits eDP Slim 3.2mm

<b>Active Area (W x H)</b>	344.2 x 193.5 (mm)
<b>Dimensions (W x H)</b>	360 x 224.3 (mm) max
<b>Diagonal Size</b>	15.6 (inch)
<b>Thickness</b>	3.2 (mm) max
<b>Weight</b>	360 g max
<b>Interface</b>	eDP 1.2
<b>Surface Treatment</b>	Anti-Glare (AG)
<b>Contrast Ratio</b>	400:1 (typical)
<b>Refresh Rate</b>	60 Hz
<b>Brightness</b>	300 nits
<b>Pixel Resolution - Format</b>	101
<b>PPI</b>	1920 x 1080 (FHD)
<b>Pixel Resolution - Configuration</b>	RGB
<b>Backlight</b>	LED
<b>Color Gamut Coverage</b>	60%
<b>Color Depth</b>	6 bits
<b>Viewing Angle</b>	SVA 45/45/25/35
<b>Other Features</b>	AS
<b>Pen Enabled</b>	No

#### 15.6" diagonal HD AG WLED SVA 45%cg 220nits eDP Slim

<b>Active Area (W x H)</b>	344.2 x 193.5 (mm)
<b>Dimensions (W x H)</b>	360 x 224.3 (mm) max
<b>Diagonal Size</b>	15.6 (inch)
<b>Thickness</b>	3.2 (mm) max
<b>Weight</b>	370 g max
<b>Interface</b>	eDP 1.2
<b>Surface Treatment</b>	Anti-Glare (AG)
<b>Contrast Ratio</b>	300:1 (typical)
<b>Refresh Rate</b>	60 Hz
<b>Brightness</b>	220 nits
<b>Pixel Resolution - Format</b>	101
<b>PPI</b>	1366 x 768 (HD)
<b>Pixel Resolution - Configuration</b>	RGB
<b>Backlight</b>	LED
<b>Color Gamut Coverage</b>	45%
<b>Color Depth</b>	6 bits + Hi FRC
<b>Viewing Angle</b>	SVA 45/45/25/35



### Technical Specifications

#### STORAGE

##### HDD 500 GB 7200RPM 7mm SATA

<b>Capacity</b>	<b>500GB</b>
<b>Drive Weight</b>	0.20-0.21 lbs (92-95 g)
<b>Rotation Speed</b>	7200 rpm
<b>Cache Buffer</b>	Up to 32MB
<b>NAND Type/Size</b>	N/A
<b>Height</b>	7mm
<b>Width</b>	69.85mm
<b>Interface</b>	ATA-8, SATA 3.0
<b>Interface Transfer Rate</b>	600 MB/s
	<b>Single Track</b> 1.5-2 ms
<b>Seek Time</b>	<b>Average</b> 11-13 ms
	<b>Maximum</b> 18-22 ms
<b>Logical Blocks</b>	976,773,168
<b>Operating Temperature</b>	32° to 140° F (0° to 60° C) [top cover temp]
<b>Security Features</b>	ATA Security
<b>Other Features</b>	S.M.A.R.T., NCQ, Ultra DMA

##### HDD 500GB 7200RPM 7mm FIPS SATA Opal2

<b>Capacity</b>	500 GB
<b>Drive Weight</b>	0.21 lbs (95 g)
<b>Rotation Speed</b>	7200 rpm
<b>Cache Buffer</b>	32 MB
<b>NAND Type/Size</b>	N/A
<b>Height</b>	0.28 in (7 mm)
<b>Width</b>	2.75 in (69.85 mm)
<b>Interface</b>	ATA-8, SATA 3.0
<b>Interface Transfer Rate</b>	600 MB/s



## Technical Specifications

<b>Seek Time</b>	<b>Single Track</b>	1.5 ms
	<b>Average</b>	12 ms
	<b>Maximum</b>	21 ms
<b>Logical Blocks</b>		976,773,168
<b>Operating Temperature</b>		32° to 140° F (0° to 60° C) [top cover temp]
<b>Security Features</b>		ATA Security; TCG Opal 2.x, FIPS
<b>Other Features</b>		S.M.A.R.T., NCQ, Ultra DMA

### HDD 500GB 7200RPM 7mm SED SATA Opal2

<b>Capacity</b>		500 GB
<b>Drive Weight</b>		0.21 lbs (95 g)
<b>Rotation Speed</b>		7200 rpm
<b>Cache Buffer</b>		32 MB
<b>NAND Type/Size</b>		N/A
<b>Height</b>		0.28 in (7 mm)
<b>Width</b>		2.75 in (69.85 mm)
<b>Interface</b>		ATA-8, SATA 3.0
<b>Interface Transfer Rate</b>		600 MB/s
<b>Seek Time</b>	<b>Single Track</b>	1.5 ms
	<b>Average</b>	12 ms
	<b>Maximum</b>	21 ms
<b>Logical Blocks</b>		976,773,168
<b>Operating Temperature</b>		32° to 140° F (0° to 60° C) [top cover temp]
<b>Security Features</b>		ATA Security; TCG Opal 2.x
<b>Other Features</b>		S.M.A.R.T., NCQ, Ultra DMA

### SSD 128GB 2280 M2 SATA-3 Value

<b>Form-Factor (I/O)</b>	M.2 2280
<b>Capacity</b>	128 GB
<b>NAND Type</b>	MLC/TLC
<b>Weight</b>	0.01-0.02 lb (6-10 g)
<b>Height</b>	0.09 in (2.3 mm)
<b>Width</b>	0.87 in (22 mm)
<b>Interface</b>	ATA-8, SATA 3.0
<b>Sequential Read</b>	520 ~ 535 MB/s



## Technical Specifications

<b>Sequential Write</b>	185 ~ 515 MB/s
<b>Logical Blocks</b>	250,069,680
<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]
<b>Security Features</b>	ATA Security (Option)
<b>Other Features</b>	DIPM; TRIM; DEVSLP

### SSD 256GB 2280 M2 PCIe-3x4 SS NVMe TLC

<b>Form-Factor (I/O)</b>	M.2 2280
<b>Capacity</b>	256 GB
<b>NAND Type</b>	TLC
<b>Weight</b>	0.02 lb (10 g)
<b>Height</b>	0.09 in (2.3 mm)
<b>Width</b>	0.87 in (22 mm)
<b>Interface</b>	PCIe NVMe Gen3X4
<b>Sequential Read</b>	1,800 ~2,600 MB/s
<b>Sequential Write</b>	600 900 MB/s
<b>Logical Blocks</b>	500,118,192
<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]
<b>Security Features</b>	ATA Security (Option)
<b>Other Features</b>	TRIM; L1.2

### SSD 512GB 2280 M2 PCIe-3x4 SS NVMe TLC

<b>Form-Factor (I/O)</b>	M.2 2280
<b>Capacity</b>	512 GB
<b>NAND Type</b>	TLC
<b>Weight</b>	0.02 lb (10 g)
<b>Height</b>	0.09 in (2.3 mm)
<b>Width</b>	0.87 in (22 mm)
<b>Interface</b>	PCIe NVMe Gen3X4
<b>Sequential Read</b>	1,580 ~ 2,600 MB/s
<b>Sequential Write</b>	300 ~ 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>Security Features</b>	ATA Security (Option)
<b>Other Features</b>	TRIM; L1.2

### SSD 256GB 2280 M2 SATA-3 Self Encrypted OPAL2 Three Layer Cell

<b>Form-Factor (I/O)</b>	M.2 2280
<b>Capacity</b>	256 GB



## Technical Specifications

<b>NAND Type</b>	TLC
<b>Weight</b>	0.02 lb (10 g)
<b>Height</b>	0.09 in (2.3 mm)
<b>Width</b>	0.87 in (22 mm)
<b>Interface</b>	ATA-8, SATA 3.0
<b>Sequential Read</b>	515 ~ 530 MB/s
<b>Sequential Write</b>	490 ~ 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>Security Features</b>	ATA Security; TCG Opal 2.0
<b>Other Features</b>	DIPM; TRIM; DEVSLP

### SSD 360GB 2280 PCIe-3x4 SS NVMe TLC

<b>Form-Factor (I/O)</b>	M.2 2280
<b>Capacity</b>	360 GB
<b>NAND Type</b>	TLC
<b>Weight</b>	0.02 lb (10 g)
<b>Height</b>	0.09 in (2.3 mm)
<b>Width</b>	0.87 in (22 mm)
<b>Interface</b>	PCIe NVMe Gen3X4
<b>Sequential Read</b>	1,700 MB/s (Compressible Performance)
<b>Sequential Write</b>	600 MB/s (Compressible Performance)
<b>Logical Blocks</b>	703,282,608
<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]
<b>Security Features</b>	ATA Security (Option)
<b>Other Features</b>	TRIM; L1.2

### 256 GB PCIe Gen3x4 NVMe SS Value Solid State Drive

<b>Form-Factor (I/O)</b>	M.2 2280
<b>Capacity</b>	256 GB
<b>NAND Type</b>	TLC
<b>Weight</b>	0.02 lb (10 g)
<b>Height</b>	0.09 in (2.3 mm)
<b>Width</b>	0.87 in (22 mm)
<b>Interface</b>	PCIe NVMe Gen3X4
<b>Sequential Read</b>	1,700 MB/s (Compressible Performance)
<b>Sequential Write</b>	600 MB/s (Compressible Performance)
<b>Logical Blocks</b>	500,118,192





## Technical Specifications

<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]
<b>Security Features</b>	ATA Security (Option)
<b>Other Features</b>	TRIM; L1.2

### 512 GB PCIe Gen3x4 NVMe Value Solid State Drive

<b>Form-Factor (I/O)</b>	M.2 2280
<b>Capacity</b>	512 GB
<b>NAND Type</b>	TLC
<b>Weight</b>	0.02 lb (10 g)
<b>Height</b>	0.09 in (2.3 mm)
<b>Width</b>	0.87 in (22 mm)
<b>Interface</b>	PCIe NVMe Gen3X4
<b>Sequential Read</b>	1,700 MB/s (Compressible Performance)
<b>Sequential Write</b>	600 MB/s (Compressible Performance)
<b>Logical Blocks</b>	1,000,215,216
<b>Operating Temperature</b>	32° to 158°F (0° to 70°C) [ambient temp]
<b>Security Features</b>	ATA Security (Option)
<b>Other Features</b>	TRIM; L1.2

## OPTICAL DRIVES

	<b>Access Times</b>	<b>Random</b>	<140ms CD (typical) < 160ms DVD (typical)
	<b>Weight</b>		150g max. 24X CD-ROM
	<b>Max Data Transfer Rate</b>		8X DVD-ROM 5X DVD-RAM UDMA Mode 5
<b>DVDROM Drive</b>	<b>Interface</b>		Gen 1 SATA CD-DA, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW, DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW, DVD-RAM
	<b>Supported Media (read)</b>		
	<b>Max Media Capacity (read)</b>		8.5 GB
	<b>Transport</b>		Tray Loading
<b>DVD+/-RW SuperMulti DL Drive</b>	<b>Access Times</b>	<b>Random</b>	<140ms CD (typical)



## Technical Specifications

< 160ms DVD (typical)

<b>Weight</b>	150g max. 24X CD-ROM 8X DVD-ROM 24X CD-R 10X CD-RW 8X DVD+R
<b>Max Data Transfer Rate</b>	8X DVD+RW 8X DVD-R 6X DVD-RW 6X - DVD+R Dual Layer 6X - DVD-R Dual Layer 5X DVD-RAM
<b>Transfer Mode</b>	UDMA Mode 5
<b>Interface</b>	Gen 1 SATA
<b>Supported Media (read)</b>	CD-DA, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW, DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW, DVD-RAM
<b>Supported Media (write)</b>	CD-R, CD-RW, DVD+R, DVD+RW, DVD-R, DVD-RW, DVD-RAM, DVD+R DL, DVD-R DL
<b>Max Media Capacity (read)</b>	8.5 GB
<b>Max Media Capacity (write)</b>	8.5 GB
<b>Transport</b>	Tray Loading
<b>Access Times</b>	<b>Random</b> <200ms CD (typical) <200ms DVD (typical) <250ms BD (typical)
<b>Weight</b>	150g max. 24X CD-ROM 8X DVD-ROM 6X BD-ROM
<b>Max Data Transfer Rate</b>	24X CD-R 10X CD-RW 8X DVD+R 8X DVD+RW

### BD Drive



## Technical Specifications

	8X DVD-R
	6X DVD-RW
	6X - DVD+R Dual Layer
	6X - DVD-R Dual Layer
	5X DVD-RAM
	4X BD-R
	2X BD-RE
<b>Transfer Mode</b>	UDMA Mode 5
<b>Interface</b>	Gen 1 SATA
<b>Supported Media (read)</b>	CD-DA, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW, DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW, DVD-RAM, BD-ROM, BD-R, BD-RE
<b>Supported Media (write)</b>	CD-R, CD-RW, DVD+R, DVD+RW, DVD-R, DVD-RW, DVD-RAM, DVD+R DL, DVD-R DL, BD-R, BD-RE
<b>Max Media Capacity (read)</b>	128 GB
<b>Max Media Capacity (write)</b>	128 GB
<b>Transport</b>	Tray Loading

## NETWORKING

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

<b>Technology/Operating bands</b>	LTE: 2100 (Band 1), 1900 (Band 2), 1800 (Band 3), 1700/2100 (Band 4), 850 (Band 5), 2600 (Band 7), 900 (Band 8), 700 (Band 12 lower), 700 (Band 13 upper), 700 (Band 17 lower), 800 (Band 20), 700 (Band 28). HSPA+: 2100 (Band 1), 1900 (Band 2), 1700/2100 (Band 4), 850 (Band 5), 900 (Band 8) MHz EV-DO: 850 (BC0), 1900 (BC1) MHz (Only work with Verizon network) E-GPRS: 1900 (Band 2), 1800 (Band 3), 850 (Band 5), 900 (Band 8)
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## Technical Specifications

MHz

**Wireless protocol standards** 3GPP Release 10 LTE Specification CAT.4, 20MHz BW  
WCDMA R99, 3GPP Release 5, 6, 7 and 8 UMTS Specification  
  
1xEVDO Release 0, A and B.  
  
E-GPRS: Class B, Multi-slot class 12, coding schemes CS1 - CS4  
and MSC1 - MSC9

**GPS** Standalone, A-GPS (MS-A, MS-B and XTRA)

**GPS bands** 1575.42 MHz  $\pm$  1.023 MHz, GLONASS 1596-1607MHz

**Maximum data rates** LTE: 150 Mbps (Download), 50 Mbps (Upload)  
  
DC-HSPA+: 42 Mbps (Download), 5.76 Mbps (Upload)  
  
HSPA+: 21Mbps (Download), 5.76 Mbps (Upload)  
  
CDMA 1xRTT: 153.6 kbps (Download), 153.6 kbps (Upload)  
  
EVDO Rel.A: 3.1 Mbps (Download), 1.8 Mbps (Upload)  
  
EVDO Rel.B: 14.7 Mbps (Download), 5.4Mbps (Upload)  
  
EDGE: 236.8 kbps (Download), 236.8 kbps (Upload)  
  
GPRS: 85.6 kbps(Download), 85.6 kbps (Upload)

**Maximum output power** LTE: 23 dBm  
  
HSPA+: 23.5 dBm  
  
1xRTT/EVDO: 24dBm  
  
E-GPRS 1900/1800: 26 dBm  
  
E-GPRS 900/850: 27 dBm  
  
GPRS 1900/1800: 29.5 dBm  
  
GPRS 900/850: 32.5 dBm

**Maximum power consumption** LTE: 1,200 mA (peak); 900 mA (average)  
  
HSPA+: 1,100 mA (peak); 800 mA (average)  
  
1xRTT/EVDO: 1,000 mA (peak); 700 mA (average)



### Technical Specifications

E-GPRS: 2,800 mA (peak); 500 mA (average)

**Form Factor** M.2, 3042-S3 Key B

**Weight** 6.2 g

**Dimensions** 42 x 30 x 2.3 mm  
(Length x Width x Thickness)

\* Mobile Broadband is an optional feature. Connection requires wireless data service contract, network support, and is not available in all areas. Please contact your service provider to determine the coverage area and availability. Connection speeds will vary due to location, environment, network conditions, and are not available on all products or in all countries.

#### 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)



### Technical Specifications

<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. Please contact your service provider to determine the coverage area and availability. Connection speeds will vary due to location, environment, network conditions, and other factors. Not available on all products or in all countries.

#### HP hs3210 HSPA+ Mobile Broadband Module\*

<b>Technology/Operating bands</b>	HSPA+: 2100 (Band 1), 1900 (Band 2), 850 (Band 5), 900 (Band 8) MHz E-GPRS: 1900 (Band 2), 1800 (Band 3), 850 MHz (Band 5), 900 (Band 8) MHz
<b>Wireless protocol standards</b>	WCDMA R99, 3GPP Release 5, 6 and 7 UMTS Specification E-GPRS: Class B, Multi-slot class 33, coding schemes CS1 - CS4 and MSC1 - MSC9
<b>Maximum data rates</b>	HSPA+: 21.6 Mbps (Download), 5.76 Mbps (Upload) E-GPRS: 296 kbps (Download), 236.8 kbps (Upload) GPRS: 107 kbps (Download), 85.6 kbps (Upload)



### Technical Specifications

<b>Maximum output power</b>	HSPA+: 24 dBm E-GPRS 1800/1900: 26 dBm E-GPRS 850/900: 27 dBm GPRS 1800/1900: 30 dBm GPRS 850/900: 33 dBm
<b>Maximum power consumption</b>	HSPA+: 1,100 mA (peak); 800 mA (average)  E-GPRS: 2,800 mA (peak); 700 mA (average)
<b>Form Factor</b>	M.2, 2242-S3 Key B
<b>Weight</b>	6 g
<b>Dimensions</b> (Length x Width x Thickness)	1.65 x 8.66 x 0.09 in (42 x 22 x 2.38 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.

### Intel® Dual Band Wireless-AC 3168 802.11 a/b/g/n/ac (1x1) Wi-Fi® and Bluetooth® 4.2 Combo

<b>Wireless LAN Standards</b>	IEEE 802.11a  IEEE 802.11b IEEE 802.11g  IEEE 802.11n  IEEE 802.11ac
<b>Interoperability</b>	Wi-Fi certified
<b>Frequency Band</b>	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



### Technical Specifications

- 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

- 802.11b: 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) (20MHz, 40MHz, and 80MHz)

#### Modulation

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

#### Security<sup>1</sup>

- 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 access points

#### Output Power<sup>2</sup>

- 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

<b>Power Consumption</b>	<ul style="list-style-type: none"><li>802.11ac 80MHz(5GHz) : +11dBm minimum</li></ul> 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: 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 communications 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



## Technical Specifications

	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	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).

### HP Integrated Module with Bluetooth 4.0/4.1/4.2 Wireless Technology

<b>Bluetooth Specification</b>	4.0/4.1/4.2 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.



## Technical Specifications

<b>Receiver Sensitivity</b>													
<b>Legacy</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>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>													
<b>Electrical Interface</b>	Point to Point, Multipoint Pico Nets up to 7 slaves												
<b>Bluetooth Software Supported</b>	Full support of Bluetooth Security Provisions												
<b>Security</b>													
<b>Power Management</b>	Microsoft Windows ACPI, and USB Bus Support												
<b>Certifications</b>	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:												
<b>Certifications</b>	FCC (47 CFR) Part 15C, Section 15.247 & 15.249												
<b>Bluetooth Profiles Supported</b>													
<b>Power Management</b>	ETS 300 328, ETS 300 826												
<b>Certifications</b>	Low Voltage Directive IEC950												
<b>Certifications</b>	UL, CSA, and CE Mark												
<b>Certifications</b>	Serial Port Profile (SPP) <sup>1,2</sup>												



## Technical Specifications

### Bluetooth Profiles Supported

Service Discovery Application Profile (SDAP)  
 Dial-Up Networking (DUN)<sup>1.1</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>1.0</sup>  
 Human Interface Device Profile (HID)<sup>1.0</sup>  
 Hands Free Profile (HFP)<sup>1.5/1.6</sup>  
 Advanced Audio Distribution Profile (A2DP)<sup>1.3</sup>  
  
 Audio Video Remote Control Profile (AVRCP)<sup>1.3/1.4</sup>

### Bluetooth V4.1/V4.2 support feature

V4.1: ESR5/6/7 compliant

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

### Realtek 802.11b/g/n (1x1) and Bluetooth® 4.0 Combo

#### 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



### Technical Specifications

- 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

- 802.11b: 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) (20MHz, 40MHz, and 80MHz)

#### Modulation

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

#### Security<sup>1</sup>

- 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 access points

#### Output Power<sup>2</sup>

- 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

<b>Power Consumption</b>	<ul style="list-style-type: none"><li>802.11ac 80MHz(5GHz) : +11dBm minimum</li></ul> 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: 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 communications 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



## Technical Specifications

	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 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

4. [Check latest software/driver release for updates on supported security features.](#)
5. [Maximum output power may vary by country according to local regulations.](#)
6. [Receiver sensitivity is measured at a packet error rate of 8% for 802.11b \(CKK modulation\) and a packet error rate of 10% for 802.11a/g \(OFDM modulation\).](#)

### HP Integrated Module with Bluetooth 4.0/4.1/4.2 Wireless Technology

<b>Bluetooth Specification</b>	4.0/4.1/4.2 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.



## Technical Specifications

<b>Receiver Sensitivity</b>													
<b>Legacy</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
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GFSK	-80 dBm	-70 dBm											
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8DPSK	-80 dBm	-70 dBm											
<b>Power Consumption</b>	Peak (Tx) 330 mW Peak (Rx) 230 mW Selective Suspend 17 mW												
<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>													
<b>Electrical Interface</b>	Point to Point, Multipoint Pico Nets up to 7 slaves												
<b>Bluetooth Software Supported</b>	Full support of Bluetooth Security Provisions												
<b>Security</b>													
<b>Power Management</b>	Microsoft Windows ACPI, and USB Bus Support												
<b>Certifications</b>	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:												
<b>Certifications</b>	FCC (47 CFR) Part 15C, Section 15.247 & 15.249												
<b>Bluetooth Profiles Supported</b>													
<b>Power Management</b>	ETS 300 328, ETS 300 826												
<b>Certifications</b>	Low Voltage Directive IEC950												
<b>Certifications</b>	UL, CSA, and CE Mark												
<b>Certifications</b>	Serial Port Profile (SPP) <sup>1,2</sup>												





## Technical Specifications

### Bluetooth Profiles Supported

Service Discovery Application Profile (SDAP)  
 Dial-Up Networking (DUN)<sup>1.1</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>1.0</sup>  
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 Hands Free Profile (HFP)<sup>1.5/1.6</sup>  
 Advanced Audio Distribution Profile (A2DP)<sup>1.3</sup>  
  
 Audio Video Remote Control Profile (AVRCP)<sup>1.3/1.4</sup>

### Bluetooth V4.1/V4.2 support feature

V4.1: ESR5/6/7 compliant

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

## Intel® Dual Band Wireless-AC 7265 802.11a/b/g/n/ac (2x2) WiFi and Bluetooth® 4.2 Combo

### 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



### Technical Specifications

	<ul style="list-style-type: none"><li>• 4.9 – 4.95 GHz (Japan)</li><li>• 5.15 – 5.25 GHz</li><li>• 5.25 – 5.35 GHz</li><li>• 5.47 – 5.725 GHz</li><li>• 5.825 – 5.850 GHz</li></ul> <p>Note: Indonesia no support this band)</p>
<b>Data Rates</b>	<ul style="list-style-type: none"><li>• 802.11b: 1, 2, 5.5, 11 Mbps</li><li>• 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</li><li>• 802.11a: 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 BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM
<b>Security<sup>1</sup></b>	<ul style="list-style-type: none"><li>• IEEE and WiFi 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>
<b>Network Architecture Models</b>	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
<b>Roaming</b>	IEEE 802.11 compliant roaming between 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) : +14dBm minimum</li><li>• 802.11n HT40(2.4GHz) : +12dBm minimum</li><li>• 802.11n HT20(5GHz) : +14dBm minimum</li><li>• 802.11n HT40(5GHz) : +12dBm minimum</li></ul>
<b>Power Consumption</b>	Transmit: 2.0 W (max)



## Technical Specifications

	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: 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 communications 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



## Technical Specifications

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	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	

7. [Check latest software/driver release for updates on supported security features.](#)
8. [Maximum output power may vary by country according to local regulations.](#)
9. [Receiver sensitivity is measured at a packet error rate of 8% for 802.11b \(CKK modulation\) and a packet error rate of 10% for 802.11a/g \(OFDM modulation\).](#)

### HP Integrated Module with Bluetooth 4.0/4.1/4.2 Wireless Technology

<b>Bluetooth Specification</b>	4.0/4.1/4.2 Compliant
<b>Frequency Band</b>	2402 to 2480 MHz
<b>Number of Available Channels</b>	Legacy : 0~79 (1 MHz/CH)
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<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.

### Receiver Sensitivity

Modulation	0.01% BER	0.001% BER



## Technical Specifications

<b>Legacy</b>	<table border="1"> <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> </table>	GFSK	-80 dBm	-70 dBm	$\pi/4$ -DQPSK	-80 dBm	-70 dBm	8DPSK	-80 dBm	-70 dBm
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$\pi/4$ -DQPSK	-80 dBm	-70 dBm								
8DPSK	-80 dBm	-70 dBm								
<b>Power Consumption</b>	<p>Peak (Tx) 330 mW          Peak (Rx) 230 mW          Selective Suspend 17 mW</p>									
<b>Range</b>	<p>Legacy Up to 33 ft (10 m)          BLE Up to 99 ft (30 m)</p>									
<b>Electrical Interface</b>	USB 2.0 compliant									
<b>Bluetooth Software Supported</b>	Microsoft Windows Bluetooth Software									
<b>Link Topology</b>										
<b>Electrical Interface</b>	Point to Point, Multipoint Pico Nets up to 7 slaves									
<b>Bluetooth Software Supported</b>	Full support of Bluetooth Security Provisions									
<b>Security</b>										
<b>Power Management</b>	Microsoft Windows ACPI, and USB Bus Support									
<b>Certifications</b>	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:									
<b>Certifications</b>	FCC (47 CFR) Part 15C, Section 15.247 & 15.249									
<b>Bluetooth Profiles Supported</b>										
<b>Power Management</b>	ETS 300 328, ETS 300 826									
<b>Certifications</b>	Low Voltage Directive IEC950									
	UL, CSA, and CE Mark									
<b>Certifications</b>	Serial Port Profile (SPP) <sup>1,2</sup>									
<b>Bluetooth Profiles Supported</b>	<p>Service Discovery Application Profile (SDAP)          Dial-Up Networking (DUN)<sup>1,1</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></p>									



### Technical Specifications

Personal Area Networking Profile (PAN)<sup>1.0</sup>  
 Human Interface Device Profile (HID)<sup>1.0</sup>  
 Hands Free Profile (HFP) <sup>1.5/1.6</sup>  
 Advanced Audio Distribution Profile (A2DP) <sup>1.3</sup>  
 Audio Video Remote Control Profile (AVRCP) <sup>1.3/1.4</sup>

**Bluetooth V4.1/V4.2 support feature**

V4.1: ESR5/6/7 compliant

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

### POWER

**45 W AC Adaptor**

**Dimensions**

95.0x40.0x26.5mm

**Weight**

unit: 200g +/- 10g

**Input**

**Input Efficiency**

87.74 % at 115 Vac and 88.4 % at 230Vac

**Input Frequency Range**

47 ~ 63 Hz

**Input AC current**

Max. 1.4 A at 90 Vac

**Output Power**

45W

**Output**

**DC Output**

19.5V

**Hold-up Time**

5ms at 115 Vac input

**Output Over Current Protection**

<8.0A

**DC Plug**

4.5mm Barrel Type

**Operating Temperature**

32°F to 95°F (0°to 35°C)

**Non-operating (storage) Temperature**

-4°F to 185°F (-20°to 85°C)

**Environmental Design**

**Altitude**

0 to 16,400 ft (0 to 5000m)

**Humidity**

20% to 95%

**Storage Humidity**

10% to 95%



### Technical Specifications

#### 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.

#### 45 W 2 Prong AC Adaptor

<b>Dimensions</b>		95.0x40.0x26.5mm
<b>Weight</b>		unit: 200g +/- 10g
<b>Input</b>	<b>Input Efficiency</b>	87.74 % at 115 Vac and 88.4 % at 230Vac
	<b>Input Frequency Range</b>	47 ~ 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>	5ms at 115 Vac input
	<b>Output Over Current Protection</b>	<8.0A
<b>DC Plug</b>		4.5mm Barrel Type
	<b>Operating Temperature</b>	32°F to 95°F (0°to 35°C)
	<b>Non-operating (storage) Temperature</b>	-4°F to 185°F (-20°to 85°C)
<b>Environmental Design</b>	<b>Altitude</b>	0 to 16,400 ft (0 to 5000m)
	<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, Class2, SELV; Agency approvals - C-UL-US, PSE  
 \* MTBF - over 200,000 hours at 25°C ambient condition.

#### 65 W AC Adaptor

<b>Dimensions</b>		107.0x47.0x30.0mm
<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 ~ 63 Hz
	<b>Input AC current</b>	Max. 1.7 A at 90 Vac
<b>Output</b>	<b>Output Power</b>	65W



### Technical Specifications

<b>DC Plug</b>	<b>DC Output</b>	19.5V
	<b>Hold-up Time</b>	5ms at 115 Vac input
	<b>Output Over Current Protection</b>	<11.0A
<b>Environmental Design</b>	<b>Operating Temperature</b>	32°F to 95°F (0°to 35°C)
	<b>Non-operating (storage) Temperature</b>	-4°F to 185°F (-20°to 85°C)
	<b>Altitude</b>	0 to 16,400 ft (0 to 5000m)
	<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.

### 65 W EM AC Adaptor

<b>Dimensions</b>	102.0x55.0x30.0mm	
<b>Weight</b>	unit: 350g +/- 10g	
<b>Input</b>	<b>Input Efficiency</b>	87.0 % at 115 Vac and 230Vac
	<b>Input Frequency Range</b>	47 ~ 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>	5ms at 115 Vac input
<b>DC Plug</b>	<b>Output Over Current Protection</b>	<11.0A
	<b>Operating Temperature</b>	32°F to 95°F (0°to 35°C)
	<b>Non-operating (storage) Temperature</b>	-4°F to 185°F (-20°to 85°C)
<b>Environmental Design</b>	<b>Altitude</b>	0 to 16,400 ft (0 to 5000m)
	<b>Humidity</b>	20% to 95%
	<b>Storage Humidity</b>	10% to 95%





### Technical Specifications

<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>90 W AC Adaptor</b>		
<b>Dimensions</b>		127.0x51.0x30.0mm
<b>Weight</b>		unit: 350g +/- 10g
<b>Input</b>	<b>Input Efficiency</b>	88% min at 115V and 89% min at 230V
	<b>Input Frequency Range</b>	47 ~ 63 Hz
	<b>Input AC current</b>	1.5 A at 90 VAC and maximum load
<b>Output</b>	<b>Output Power</b>	90W
	<b>DC Output</b>	19.5V
	<b>Hold-up Time</b>	5ms at 115 Vac input
<b>DC Plug</b>	<b>Output Over Current Protection</b>	<11.0A
		4.5mm Barrel Type
	<b>Operating Temperature</b>	32°F to 95°F (0°C to 35°C)
<b>Environmental Design</b>	<b>Non-operating (storage) Temperature</b>	-4°F to 185°F (-20°C to 85°C)
	<b>Altitude</b>	0 to 16,400 ft (0 to 5000m)
	<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 100,000 hours at 25°C ambient condition.</p>



## Technical Specifications

<b>HP 3-cell, Long Life 48 WHr Li-ion</b>	<b>Dimensions (H x W x L)</b>	15.05. x177.55x94.55 mm	
	<b>Weight</b>	0.25 kg (0.55lb)	
	<b>Cells/Type</b>	3cell Lithium-Ion	
	<b>Energy</b>	Voltage	11.4V/ 10.95V
		Amp-hour capacity	4.212Ah /4.385Ah
		Watt-hour capacity	48Wh
	<b>Temperature</b>	Operating (Charging)	32° to 113° F (0° to 45° C)
		Operating (Discharging)	14° to 122° F(-10° to 60° C)
		Non-operating	-4° to 122° F (-20° to 60° C)
	<b>Battery Re-Charge Time</b>	<b>System in OFF or Standby Mode</b>	<3 hours
<b>Fuel Gauge LED</b>		No	
<b>Warranty</b>		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.	
<b>Optional Travel Battery Available</b>		No	

## SECURITY

<b>HP Fingerprint Reader (optional)</b>	<b>Mobile Voltage Operation</b>	3.0V-3.6V
	<b>Operating Temperature</b>	14° – 167°F (-10° – 75°C)
	<b>Current consumption</b>	Imaging: 36 mA (typical)
		Low latency wakeup: 950 µA (typical)
		USB Suspend: 220 µA (max)
	<b>ESD Resistance</b>	IEC 61000-4-2 Level 4B (±15KV)
<b>Detection Matrix</b>	508 DPI resolution, 256 levels of grayscale 200 pixel wide fingerprint image (10mm) 16.5mm x 3 mm (sensor area)	



### Technical Specifications

<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>	0.41 x 0.08 x 0.32 in (10.5 x 2 x 8.2 mm)
	<b>Smart Card support</b>	ISO 7816 Class A, B, and C (5V/3V/1.8V) card
	<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>	No driver is required for this device. Native support is provided by the operating system.
<b>Power</b>	<b>Normal Mode</b>	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>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
<b>Features</b>	<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

### ENVIRONMENTAL

#### HP ProBook 645 G3 Notebook PC

<b>Eco-Label Certifications &amp; declarations</b>	<p>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:</p> <ul style="list-style-type: none"> <li>• IT ECO declaration</li> <li>• US ENERGY STAR®</li> <li>• EPEAT &lt;Gold&gt; registered in the United States. See <a href="http://www.epeat.net">http://www.epeat.net</a> for registration status in your country.</li> </ul>																						
<b>System Configuration</b>  <b>Energy Consumption (in accordance with US ENERGY STAR® test method)</b>	<p>The configuration used for the Energy Consumption and Declared Noise Emissions data for the Notebook model is based on a “Typically Configured Notebook”.</p> <table border="1" data-bbox="394 1037 1521 1205"> <thead> <tr> <th></th> <th>115VAC, 60Hz</th> <th>230VAC, 50Hz</th> <th>100VAC, 50Hz</th> </tr> </thead> <tbody> <tr> <td>Normal Operation (Short idle)</td> <td>8.24 W</td> <td>8.70 W</td> <td>8.77 W</td> </tr> <tr> <td>Normal Operation (Long idle)</td> <td>6.84 W</td> <td>7.60 W</td> <td>6.70 W</td> </tr> <tr> <td>Sleep</td> <td>0.48 W</td> <td>0.59 W</td> <td>0.48 W</td> </tr> <tr> <td>Off</td> <td>0.29 W</td> <td>0.38 W</td> <td>0.29 W</td> </tr> </tbody> </table>				115VAC, 60Hz	230VAC, 50Hz	100VAC, 50Hz	Normal Operation (Short idle)	8.24 W	8.70 W	8.77 W	Normal Operation (Long idle)	6.84 W	7.60 W	6.70 W	Sleep	0.48 W	0.59 W	0.48 W	Off	0.29 W	0.38 W	0.29 W
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## Technical Specifications

<b>Heat Dissipation*</b>	<b>115VAC, 60Hz</b>	<b>230VAC, 50Hz</b>	<b>100VAC, 50Hz</b>
Normal Operation (Short idle)	28 BTU/hr	30 BTU/hr	30 BTU/hr
Normal Operation (Long idle)	23 BTU/hr	26 BTU/hr	23 BTU/hr
Sleep	2 BTU/hr	2 BTU/hr	2 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.			
<b>Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)</b>	<b>Sound Power (L<sub>WAd</sub>, bels)</b>		<b>Sound Pressure (L<sub>pAm</sub>, decibels)</b>
Typically Configured – Idle	2.8		20
Fixed Disk – Random writes	3.2		20
<b>Batteries</b>	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		



### Technical Specifications

<b>Additional Information</b>	<ul style="list-style-type: none"> <li>• This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC.</li> <li>• This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.</li> <li>• This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).</li> <li>• This product is in compliance with the IEEE 1680 (EPEAT) standard at the &lt;Gold&gt; level, see <a href="http://www.epeat.net">www.epeat.net</a></li> <li>• Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.</li> <li>• This product contains 0% post-consumer recycled plastic (by wt.)</li> <li>• This product is 94.4% recycle-able when properly disposed of at end of life.</li> </ul>		
<b>Packaging Materials</b>	<b>External:</b>	PAPER/Corrugated	326 g
	<b>Internal:</b>	PLASTIC/Polyethylene Expanded - EPE	42 g
		PLASTIC/Polyethylene low density - LDPE	15 g
		PLASTIC/Polypropylene - PP	4 g
	The plastic packaging material contains at least 50% recycled content.		
	The corrugated paper packaging materials contains at least 70% recycled content.		
<b>Material Usage</b>	<p>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 <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/gse.pdf">http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/gse.pdf</a>):</p> <ul style="list-style-type: none"> <li>• Asbestos</li> <li>• Certain Azo Colorants</li> <li>• Certain Brominated Flame Retardants – may not be used as flame retardants in plastics</li> <li>• Cadmium</li> <li>• Chlorinated Hydrocarbons</li> <li>• Chlorinated Paraffins</li> <li>• Formaldehyde</li> <li>• Halogenated Diphenyl Methanes</li> <li>• Lead carbonates and sulfates</li> <li>• Lead and Lead compounds</li> <li>• Mercuric Oxide Batteries</li> <li>• Nickel – finishes must not be used on the external surface designed to be frequently handled or carried by the user.</li> <li>• Ozone Depleting Substances</li> <li>• Polybrominated Biphenyls (PBBs)</li> <li>• Polybrominated Biphenyl Ethers (PBBEs)</li> <li>• Polybrominated Biphenyl Oxides (PBBOs)</li> <li>• Polychlorinated Biphenyl (PCB)</li> <li>• Polychlorinated Terphenyls (PCT)</li> <li>• Polyvinyl Chloride (PVC) – except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.</li> <li>• Radioactive Substances</li> <li>• Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)</li> </ul>		



## Technical Specifications

<p><b>Packaging Usage</b></p>	<p>HP follows these guidelines to decrease the environmental impact of product packaging:</p> <ul style="list-style-type: none"> <li>• Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.</li> <li>• Eliminate the use of ozone-depleting substances (ODS) in packaging materials.</li> <li>• Design packaging materials for ease of disassembly.</li> <li>• Maximize the use of post-consumer recycled content materials in packaging materials.</li> <li>• Use readily recyclable packaging materials such as paper and corrugated materials.</li> <li>• Reduce size and weight of packages to improve transportation fuel efficiency.</li> <li>• Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.</li> </ul>
<p><b>End-of-life Management and Recycling</b></p>	<p>Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: <a href="http://www.hp.com/go/reuse-recycle">http://www.hp.com/go/reuse-recycle</a> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.</p> <p>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: <a href="http://www.hp.com/go/recyclers">http://www.hp.com/go/recyclers</a>. 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.</p>
<p><b>HP, Inc. Corporate Environmental Information</b></p>	<p>For more information about HP's commitment to the environment:</p> <p>Global Citizenship Report  <a href="http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html">http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html</a>  Eco-label certifications  <a href="http://www8.hp.com/us/en/hp-information/environment/ecolabels.html">http://www8.hp.com/us/en/hp-information/environment/ecolabels.html</a>  ISO 14001 certificates:    <a href="http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842">http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842</a>    and    <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf">http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf</a></p>



## Technical Specifications

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	<table border="1" data-bbox="393 1841 1523 1898"> <tbody> <tr> <td>Normal Operation (Short idle)</td> <td style="text-align: center;">31 BTU/hr</td> <td style="text-align: center;">33 BTU/hr</td> <td style="text-align: center;">28 BTU/hr</td> </tr> <tr> <td>Normal Operation (Long idle)</td> <td style="text-align: center;">18 BTU/hr</td> <td style="text-align: center;">19 BTU/hr</td> <td style="text-align: center;">18 BTU/hr</td> </tr> <tr> <td>Sleep</td> <td style="text-align: center;">2 BTU/hr</td> <td style="text-align: center;">2 BTU/hr</td> <td style="text-align: center;">2 BTU/hr</td> </tr> </tbody> </table>			Normal Operation (Short idle)	31 BTU/hr	33 BTU/hr	28 BTU/hr	Normal Operation (Long idle)	18 BTU/hr	19 BTU/hr	18 BTU/hr	Sleep	2 BTU/hr	2 BTU/hr	2 BTU/hr								
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## Technical Specifications

Off	1 BTU/hr	2 BTU/hr	1 BTU/hr
<p>*NOTE: Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.</p>			
<b>Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)</b>	Sound Power (L <sub>WAd</sub> , bels)	Sound Pressure (L <sub>pAm</sub> , decibels)	
Typically Configured – Idle	3.3	25	
Fixed Disk – Random writes	3.7	30	
<b>Batteries</b>	<p>This battery(s) in this product comply with EU Directive 2006/66/EC</p> <p>Batteries used in the product do not contain:            Mercury greater the 1ppm by weight            Cadmium greater than 20ppm by weight</p> <p>Battery size: CR2032 (coin cell)            Battery type: Lithium</p>		
<b>Additional Information</b>	<ul style="list-style-type: none"> <li>• This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC.</li> <li>• This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.</li> <li>• This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).</li> <li>• This product is in compliance with the IEEE 1680 (EPEAT) standard at the gold level, see <a href="http://www.epeat.net">www.epeat.net</a></li> <li>• Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.</li> <li>• This product contains 0% post-consumer recycled plastic (by wt.)</li> <li>• This product is 94.9% recycle-able when properly disposed of at end of life.</li> </ul>		
<b>Packaging Materials</b>	<b>External:</b>	PAPER/Corrugated	329 g
	<b>Internal:</b>	PLASTIC/Expanded Polyethylene - EPE	47 g
		PLASTIC/Polyethylene low density - LDPE	13 g
		PLASTIC/Polypropylene - PP	5 g
	The plastic packaging material contains at least 50% recycled content.		
The corrugated paper packaging materials contains at least 70% recycled content.			
<b>Material Usage</b>	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		



## Technical Specifications

	<p><a href="http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/gse.pdf">http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/gse.pdf</a>:</p> <ul style="list-style-type: none"> <li>• Asbestos</li> <li>• Certain Azo Colorants</li> <li>• Certain Brominated Flame Retardants – may not be used as flame retardants in plastics</li> <li>• Cadmium</li> <li>• Chlorinated Hydrocarbons</li> <li>• Chlorinated Paraffins</li> <li>• Formaldehyde</li> <li>• Halogenated Diphenyl Methanes</li> <li>• Lead carbonates and sulfates</li> <li>• Lead and Lead compounds</li> <li>• Mercuric Oxide Batteries</li> <li>• Nickel – finishes must not be used on the external surface designed to be frequently handled or carried by the user.</li> <li>• Ozone Depleting Substances</li> <li>• Polybrominated Biphenyls (PBBs)</li> <li>• Polybrominated Biphenyl Ethers (PBBEs)</li> <li>• Polybrominated Biphenyl Oxides (PBBOs)</li> <li>• Polychlorinated Biphenyl (PCB)</li> <li>• Polychlorinated Terphenyls (PCT)</li> <li>• Polyvinyl Chloride (PVC) – except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.</li> <li>• Radioactive Substances</li> <li>• Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)</li> </ul>
<p><b>Packaging Usage</b></p>	<p>HP follows these guidelines to decrease the environmental impact of product packaging:</p> <ul style="list-style-type: none"> <li>• Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.</li> <li>• Eliminate the use of ozone-depleting substances (ODS) in packaging materials.</li> <li>• Design packaging materials for ease of disassembly.</li> <li>• Maximize the use of post-consumer recycled content materials in packaging materials.</li> <li>• Use readily recyclable packaging materials such as paper and corrugated materials.</li> <li>• Reduce size and weight of packages to improve transportation fuel efficiency.</li> <li>• Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.</li> </ul>
<p><b>End-of-life Management and Recycling</b></p>	<p>Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: <a href="http://www.hp.com/go/reuse-recycle">http://www.hp.com/go/reuse-recycle</a> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.</p> <p>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: <a href="http://www.hp.com/go/recyclers">http://www.hp.com/go/recyclers</a>. These</p>



## Technical Specifications

	instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.
<b>HP, Inc. Corporate Environmental Information</b>	<p>For more information about HP's commitment to the environment:</p> <p>Global Citizenship Report <a href="http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html">http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html</a></p> <p>Eco-label certifications <a href="http://www8.hp.com/us/en/hp-information/environment/ecolabels.html">http://www8.hp.com/us/en/hp-information/environment/ecolabels.html</a></p> <p>ISO 14001 certificates:  <a href="http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842">http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842</a></p> <p>and  <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf">http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf</a></p>

### Country of Origin

TBD



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

<b>Category</b>	<b>Description</b>	<b>Part Number</b>
<b>Cases</b>	HP Business Backpack	H5M90AA
	HP Business 4 Wheel Roller Case	H5M93AA
<b>Docking</b>	HP 3001pr USB 3.0 Port Replicator	F3S42AA
	HP USB-C Travel Dock	T0K29AA#ABA
	HP USB Travel Dock	T0K30AA#ABA
	HP Ultralim Docking Station	D9Y32AA#xxx
<b>Input Device</b>	HP Comfort Grip Wireless Mouse	H2L63AA
	HP 3-Button USB Laser Mouse	H4B81AA
	HP Ultra Mobile Wireless Mouse	H6F25AA#xxx
	HP Slim Bluetooth Mouse	F3J92AA#xxx
	HP Ultrathin Wireless Mouse	L9V78AA
	HP Stereo USB Headset	T1A67AA
<b>Adapters</b>	DisplayPort to HDMI Adapter	F3W43AA
	DisplayPort to DVI Adapter	F7W96AA
<b>Power</b>	HP 45W Smart AC Adapter (4.5mm)	H6Y88AA#xxx
	45W 2 Prong Power Adapter, 4.5mm	L6F60AA#ABJ
	HP 65W Smart AC Adapter	H6Y89AA#xxx
	HP Notebook Power Bank	N9F71AA
	HP USB External DVDRW Drive	F2B56AA
<b>Security</b>	HP Keyed Cable Lock 10mm	T1A62AA
	HP Docking Station Cable Lock	AU656AA#XXX
<b>Monitors</b>	HP ProDisplay P240va 23.8-inch Monitor	N3H14AA
	HP ProDisplay P232 23-inch Monitor	K7X31AA



### Summary of changes

Date of change	Version History		Description of change
December 5, 2016	V1 to V2	Launch	Quickspecs launched
January 3, 2017	V2 to V3	Update	Environmental info updated
January 13, 2017	V3 to V4	Update	Operating System and Processors Section updated (Win 7 disclaimer)
January 30, 2017	V4	Update	Battery Life Section updated
March 16, 2017	V4 to V5	Update	Memory and Display section updated
April 4, 2017	V5 to V6	Update	Battery Warranty updated and Processor Family added
October 2, 2017	V6 to V7	Update	Touchpoint manager removed
September 12, 2018	V7 to V8	Removed	Operating system section Windows 7

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