

Overview

HP ProBook 645 G3 Notebook PC

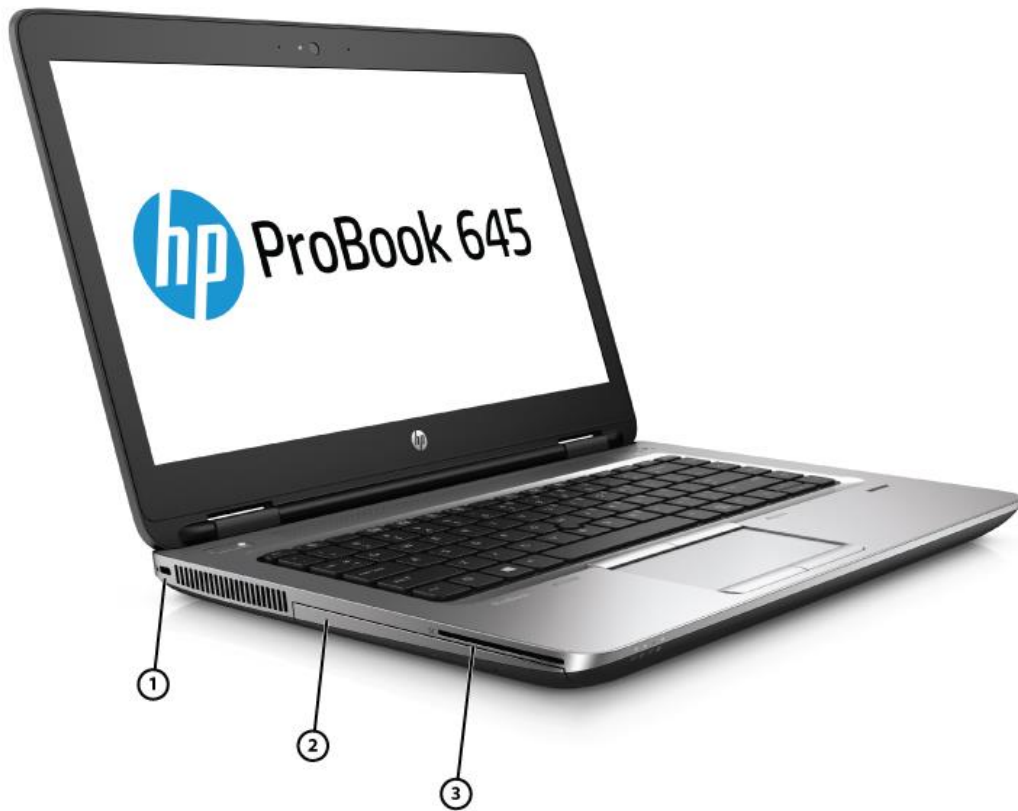


Front/Right

- | | |
|--------------------------------------|--|
| 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

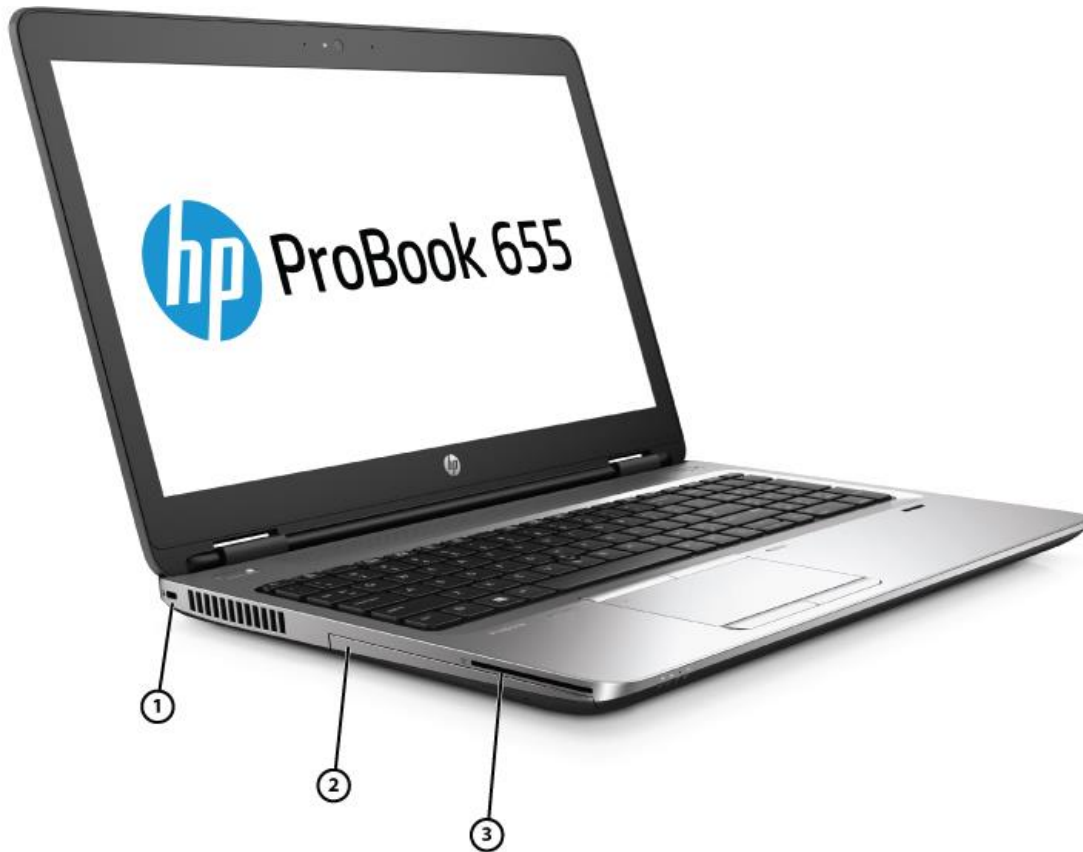


Front/Right

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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 7th 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 testing¹

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 64¹

Windows 10 Home 64¹

Windows 10 Home Single Language 64¹

Windows 10 Pro 64 (National Academic only)²

Windows 7 Professional 64 (Available through downgrade rights from Windows 10 Pro 64)³

NeoKylin Linux 64

FreeDOS 2.0

Web-only Support

Windows 10 Enterprise¹

Windows 7 Enterprise 64^{1,3}

Windows 7 Professional 64¹

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)¹

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

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

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



Technical Specifications

1. Multicore 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. 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 HD¹ SVA eDP Anti-glare Slim 45% CG 220 nits (1366x768)

35.56 cm (14") diagonal LED-backlit HD¹ SVA eDP Anti-glare Slim 45% CG 220 nits (1366x768) with camera

35.56 cm (14") diagonal LED-backlit HD¹ SVA eDP Anti-glare Slim 45% CG 220 nits (1366x768) with WWAN

35.56 cm (14") diagonal LED-backlit HD¹ 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 Station²

HP ProBook 655



Technical Specifications

Internal

Non-Touch

39.6 cm (15.6") diagonal LED-backlit HD¹ SVA eDP Anti-glare Slim 45% CG 220 nits (1366 x 768)
39.6 cm (15.6") diagonal LED-backlit HD¹ SVA eDP Anti-glare Slim 45% CG 220 nits (1366 x 768) with camera
39.6 cm (15.6") diagonal LED-backlit HD¹ SVA eDP Anti-glare Slim 45% CG 220 nits (1366 x 768) with WWAN
39.6 cm (15.6") diagonal LED-backlit HD¹ 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

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 Station²

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 Drives¹

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 Drive¹

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.



Technical Specifications

OPTICAL DRIVES

Fixed 9.5 mm SATA

DVD-ROM Drive
DVD+/-RW SuperMulti DL¹
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)^{2,3}

HP lt4120 Qualcomm® Snapdragon™ X5 LTE Mobile Broadband Module
HP lt4132 LTE/HSPA+ 4G Mobile Broadband Module
HP hs3210 HSPA+ Mobile Broadband Module

Wireless LAN (WLAN)^{1,2}

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)^{1,2}



Technical Specifications

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

Near Field Communication (NFC) Optional²

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^{1,2}

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



Technical Specifications

2F Scrolling – On
2F Zoom (Pinch) – On
OSD (enable / disable) – On

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 BIOSphere¹
HP DriveLock | HP Automatic DriveLock
BIOS Update via Network
Master Boot Record Security
Power On Authentication
Secure Erase²
Absolute Persistence Module³
Pre-boot Authentication

Multi Media

CyberLink Power Media Player - CMIT
CyberLink Power2Go

Communication / Connectivity

HP Mobile Connect Pro (Windows 10 only)⁵
Native Miracast Support⁶
HP LAN-WLAN Protection
HP MAC Address Manager
HP SureConnect

HP Value Add Software

HP 3D DriveGuard 6



Technical Specifications

HP ePrint Driver + JetAdvantage⁷
HP Hotkey Support - CMIT
HP Recovery Manager
HP Recovery Disc Creator (Windows 7 only)
HP Jumpstart
HP Support Assistant
HP Noise Cancellation Software

3rd Party

Foxit PhantomPDF Express for HP (Windows 7 only)

Microsoft Products

Buy Office
Bing Search
Skype⁸

Manageability

HP Driver Packs⁹
HP SoftPaq Download Manager (SDM)⁹
HP System Software Manager (SSM)⁹HP BIOS Config Utility (BCU)⁹HP Client Catalog⁹HP MIK for Microsoft SCCM⁹
LANDESK Management¹⁰
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 Essentials¹¹ (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.



Technical Specifications

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 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 Supply¹

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 Life¹

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



Technical Specifications

HP ProBook 655 G3	HDD	3-cell (48WHr)	Up to 7 hrs 45 mins
HP ProBook 655 G3	SSD	3-cell (48WHr)	Up to 9 hrs 30 mins

System Standby Time²

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 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)¹

(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)²

34.0 x 23.7 x 2.70 cm (Front and rear)²

HP ProBook 655 Notebook PC

Weight

Starting at 5.10 lbs (2.31 kg)¹

(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)²

37.8 x 25.70 x 2.74 cm (Front and rear)²

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)¹

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^{1,2} 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

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



Technical Specifications

Interface	eDP 1.2
Surface Treatment	BV
Contrast Ratio	300:1 (typical)
Refresh Rate	60 Hz
Brightness	300 nits
Pixel Resolution - Format	1920 x 1080 (FHD)
PPI	157
Pixel Resolution - Configuration	RGB
Backlight	LED
Color Gamut Coverage	60%
Color Depth	6 bits + Hi FRC
Viewing Angle	SVA 45/45/25/35
Touch Enabled	Optional
Touch Point Supported	10-point multi-touch
Other Features	AS
Pen Enabled	No

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

Active Area (W x H)	309.40 x 173.95 (mm)
Dimensions (W x H)	320.9 x 205.6 (mm) max
Diagonal Size	14 (inch)
Thickness	3.0 (mm) max
Weight	270 g max
Interface	eDP 1.2
Surface Treatment	Anti-Glare (AG)
Contrast Ratio	300:1 (typical)
Refresh Rate	60 Hz
Brightness	300 nits
Pixel Resolution - Format	112
PPI	1920 x 1080 (FHD)
Pixel Resolution - Configuration	RGB
Backlight	LED
Color Gamut Coverage	60%
Color Depth	6 bits + Hi FRC
Viewing Angle	SVA 45/45/25/35
Touch Enabled	Optional
Touch Point Supported	10-point multi-touch
Other Features	AS
Pen Enabled	No



Technical Specifications

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

Active Area (W x H)	309.40 x 173.95 (mm)
Dimensions (W x H)	320.9 x 205.6 (mm) max
Diagonal Size	14 (inch)
Thickness	3.0 (mm) max
Weight	290 g max
Interface	eDP 1.2
Surface Treatment	Anti-Glare (AG)
Contrast Ratio	300:1 (typical)
Refresh Rate	60 Hz
Brightness	220 nits
Pixel Resolution - Format	112
PPI	1366 x 768 (HD)
Pixel Resolution - Configuration	RGB
Backlight	LED
Color Gamut Coverage	45%
Color Depth	6 bits + Hi FRC
Viewing Angle	SVA 45/45/25/35
Touch Enabled	Optional
Touch Point Supported	10-point multi-touch
Other Features	AS
Pen Enabled	No

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

Active Area (W x H)	344.2 x 193.5 (mm)
Dimensions (W x H)	360 x 224.3 (mm) max
Diagonal Size	15.6 (inch)
Thickness	3.2 (mm) max
Weight	550 g max
Interface	eDP 1.2
Surface Treatment	BV
Contrast Ratio	400:1 (typical)
Refresh Rate	60 Hz
Brightness	300 nits
Pixel Resolution - Format	142
PPI	1920 x 1080 (FHD)
Pixel Resolution - Configuration	RGB
Backlight	LED
Color Gamut Coverage	60%
Color Depth	6 bits



Technical Specifications

Viewing Angle	SVA 45/45/25/35
Touch Point Supported	Optional
Other Features	10-point multi-touch
Pen Enabled	AS

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

Active Area (W x H)	344.2 x 193.5 (mm)
Dimensions (W x H)	360 x 224.3 (mm) max
Diagonal Size	15.6 (inch)
Thickness	3.2 (mm) max
Weight	360 g max
Interface	eDP 1.2
Surface Treatment	Anti-Glare (AG)
Contrast Ratio	400:1 (typical)
Refresh Rate	60 Hz
Brightness	300 nits
Pixel Resolution - Format	101
PPI	1920 x 1080 (FHD)
Pixel Resolution - Configuration	RGB
Backlight	LED
Color Gamut Coverage	60%
Color Depth	6 bits
Viewing Angle	SVA 45/45/25/35
Touch Point Supported	10-point multi-touch
Other Features	AS
Pen Enabled	No

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

Active Area (W x H)	344.2 x 193.5 (mm)
Dimensions (W x H)	360 x 224.3 (mm) max
Diagonal Size	15.6 (inch)
Thickness	3.2 (mm) max
Weight	370 g max
Interface	eDP 1.2
Surface Treatment	Anti-Glare (AG)
Contrast Ratio	300:1 (typical)
Refresh Rate	60 Hz
Brightness	220 nits
Pixel Resolution - Format	101
PPI	1366 x 768 (HD)
Pixel Resolution - Configuration	RGB



Technical Specifications

Backlight	LED
Color Gamut Coverage	45%
Color Depth	6 bits + Hi FRC
Viewing Angle	SVA 45/45/25/35

STORAGE

HDD 500 GB 7200RPM 7mm SATA

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

HDD 500GB 7200RPM 7mm FIPS SATA Opal2

Capacity	500 GB
Drive Weight	0.21 lbs (95 g)
Rotation Speed	7200 rpm
Cache Buffer	32 MB



Technical Specifications

NAND Type/Size		N/A
Height		0.28 in (7 mm)
Width		2.75 in (69.85 mm)
Interface		ATA-8, SATA 3.0
Interface Transfer Rate		600 MB/s
	Single Track	1.5 ms
Seek Time	Average	12 ms
	Maximum	21 ms
Logical Blocks		976,773,168
Operating Temperature		32° to 140° F (0° to 60° C) [top cover temp]
Security Features		ATA Security; TCG Opal 2.x, FIPS
Other Features		S.M.A.R.T., NCQ, Ultra DMA

HDD 500GB 7200RPM 7mm SED SATA Opal2

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

SSD 128GB 2280 M2 SATA-3 Value

Form-Factor (I/O)	M.2 2280
Capacity	128 GB
NAND Type	MLC/TLC



Technical Specifications

Weight	0.01-0.02 lb (6-10 g)
Height	0.09 in (2.3 mm)
Width	0.87 in (22 mm)
Interface	ATA-8, SATA 3.0
Sequential Read	520 ~ 535 MB/s
Sequential Write	185 ~ 515 MB/s
Logical Blocks	250,069,680
Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
Security Features	ATA Security (Option)
Other Features	DIPM; TRIM; DEVSLP

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

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

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

Form-Factor (I/O)	M.2 2280
Capacity	512 GB
NAND Type	TLC
Weight	0.02 lb (10 g)
Height	0.09 in (2.3 mm)
Width	0.87 in (22 mm)
Interface	PCIe NVMe Gen3X4
Sequential Read	1,580 ~ 2,600 MB/s
Sequential Write	300 ~ 1,400 MB/s
Logical Blocks	1,000,215,216
Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
Security Features	ATA Security (Option)



Technical Specifications

Other Features	TRIM; L1.2
SSD 256GB 2280 M2 SATA-3 Self Encrypted OPAL2 Three Layer Cell	
Form-Factor (I/O)	M.2 2280
Capacity	256 GB
NAND Type	TLC
Weight	0.02 lb (10 g)
Height	0.09 in (2.3 mm)
Width	0.87 in (22 mm)
Interface	ATA-8, SATA 3.0
Sequential Read	515 ~ 530 MB/s
Sequential Write	490 ~ 515 MB/s
Logical Blocks	500,118,192
Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
Security Features	ATA Security; TCG Opal 2.0
Other Features	DIPM; TRIM; DEVSLP

SSD 360GB 2280 PCIe-3x4 SS NVMe TLC	
Form-Factor (I/O)	M.2 2280
Capacity	360 GB
NAND Type	TLC
Weight	0.02 lb (10 g)
Height	0.09 in (2.3 mm)
Width	0.87 in (22 mm)
Interface	PCIe NVMe Gen3X4
Sequential Read	1,700 MB/s (Compressible Performance)
Sequential Write	600 MB/s (Compressible Performance)
Logical Blocks	703,282,608
Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
Security Features	ATA Security (Option)
Other Features	TRIM; L1.2

256 GB PCIe Gen3x4 NVMe SS Value Solid State Drive	
Form-Factor (I/O)	M.2 2280
Capacity	256 GB
NAND Type	TLC
Weight	0.02 lb (10 g)
Height	0.09 in (2.3 mm)



Technical Specifications

Width	0.87 in (22 mm)
Interface	PCIe NVMe Gen3X4
Sequential Read	1,700 MB/s (Compressible Performance)
Sequential Write	600 MB/s (Compressible Performance)
Logical Blocks	500,118,192
Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
Security Features	ATA Security (Option)
Other Features	TRIM; L1.2

512 GB PCIe Gen3x4 NVMe Value Solid State Drive

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

OPTICAL DRIVES

DVDROM Drive	Access Times	Random <140ms CD (typical) < 160ms DVD (typical)
	Weight	150g max. 24X CD-ROM
	Max Data Transfer Rate	8X DVD-ROM 5X DVD-RAM UDMA Mode 5
	Interface	Gen 1 SATA CD-DA, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video CD),
	Supported Media (read)	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,



Technical Specifications

DVD+RW, DVD-RAM

Max Media Capacity (read)	8.5 GB
Transport	Tray Loading
Access Times	Random <140ms CD (typical) < 160ms DVD (typical)

Weight	150g max. 24X CD-ROM 8X DVD-ROM 24X CD-R 10X CD-RW 8X DVD+R
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Max Data Transfer Rate	8X DVD+RW 8X DVD-R 6X DVD-RW 6X - DVD+R Dual Layer 6X - DVD-R Dual Layer 5X DVD-RAM
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DVD+/-RW SuperMulti DL Drive

Transfer Mode	UDMA Mode 5
Interface	Gen 1 SATA
Supported Media (read)	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
Supported Media (write)	CD-R, CD-RW, DVD+R, DVD+RW, DVD-R, DVD-RW, DVD-RAM, DVD+R DL, DVD-R DL

Max Media Capacity (read)	8.5 GB
Max Media Capacity (write)	8.5 GB
Transport	Tray Loading
Access Times	Random <200ms CD (typical) <200ms DVD (typical) <250ms BD (typical)

BD Drive

Weight	150g max. 24X CD-ROM 8X DVD-ROM
Max Data Transfer Rate	



Technical Specifications

	6X BD-ROM
	24X CD-R
	10X CD-RW
	8X DVD+R
	8X DVD+RW
	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
Transfer Mode	UDMA Mode 5
Interface	Gen 1 SATA
Supported Media (read)	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
Supported Media (write)	CD-R, CD-RW, DVD+R, DVD+RW, DVD-R, DVD-RW, DVD-RAM, DVD+R DL, DVD-R DL, BD-R, BD-RE
Max Media Capacity (read)	128 GB
Max Media Capacity (write)	128 GB
Transport	Tray Loading

NETWORKING

HP lt4120 Qualcomm® Snapdragon™ X5 LTE Mobile Broadband Module*

Technology/Operating bands	LTE: 2100 (Band 1), 1900 (Band 2), 1800 (Band 3), 1700/2100 (Band 4), 850 (Band 5), 2600 (Band 7), 900 (Band 8), 700 (Band 12 lower), 700 (Band 13 upper), 700 (Band 17 lower), 800 (Band 20), 700 (Band 28).
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Technical Specifications

HSPA+: 2100 (Band 1), 1900 (Band 2), 1700/2100 (Band 4),
850 (Band 5), 900 (Band 8) MHz
EV-DO: 850 (BC0), 1900 (BC1) MHz (Only work with Verizon network)
E-GPRS: 1900 (Band 2), 1800 (Band 3), 850 (Band 5), 900 (Band 8)
MHz

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

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

GPS bands 1575.42 MHz \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



Technical Specifications

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)
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

Technology/Operating bands 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

Wireless protocol standards 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

GPS Standalone, A-GPS (MS-B and LTO)

GPS bands 1575.42 MHz ± 1.023 MHz, GLONASS 1596-1607MHz

Maximum data rates LTE: 150 Mbps (Download), 50 Mbps (Upload)



Technical Specifications

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)

Maximum output power

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

Maximum power consumption

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)

Form Factor

M.2, 3042-S3 Key B

Weight

6 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. Contact your service provider to determine the coverage area and availability. Connection speeds will vary due to location, environment, network conditions, and device capabilities. Not available on all products or in all countries.

HP hs3210 HSPA+ Mobile Broadband Module*

Technology/Operating bands

HSPA+: 2100 (Band1), 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

Wireless protocol standards

WCDMA R99, 3GPP Release 5, 6 and 7 UMTS Specification



Technical Specifications

	E-GPRS: Class B, Multi-slot class 33, coding schemes CS1 - CS4 and MSC1 - MSC9
Maximum data rates	HSPA+: 21.6 Mbps (Download), 5.76 Mbps (Upload)
	E-GPRS: 296 kbps (Download), 236.8 kbps (Upload) GPRS: 107 kbps (Download), 85.6 kbps (Upload)
Maximum output power	HSPA+: 24 dBm E-GPRS 1800/1900: 26 dBm E-GPRS 850/900: 27 dBm GPRS 1800/1900: 30 dBm GPRS 850/900: 33 dBm
Maximum power consumption	HSPA+: 1,100 mA (peak); 800 mA (average) E-GPRS: 2,800 mA (peak); 700 mA (average)
Form Factor	M.2, 2242-S3 Key B
Weight	6 g
Dimensions (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

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 <ul style="list-style-type: none">2.402 – 2.482 GHz



Technical Specifications

Note:

The FCC has declared as of January 1, 2015 products that utilize passive scanning on channel 12/13 and are capable of transmitting must fully comply with requirements of 15.247 or otherwise disable those channels.

802.11a/n

- 4.9 – 4.95 GHz (Japan)
- 5.15 – 5.25 GHz
- 5.25 – 5.35 GHz
- 5.47 – 5.725 GHz
- 5.825 – 5.850 GHz

Note:

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

Security¹

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

Network Architecture Models

Ad-hoc (Peer to Peer)
Infrastructure (Access Point Required)

Roaming

IEEE 802.11 compliant roaming between access points

Output Power²

- 802.11b : +16dBm minimum
- 802.11g : +14dBm minimum



Technical Specifications

	<ul style="list-style-type: none">• 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• 802.11ac 80MHz(5GHz) : +11dBm minimum
Power Consumption	Transmit: 2.0 W (max) Receive: 1.6 W (max) Idle mode (PSP): 180 mW (WLAN Associated) Idle mode: 50 mW (WLAN unassociated) Connect Standby: 10 mW (WLAN+BT) Radio disabled: 5 mW
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity³	802.11b, 1Mbps : -94dBm maximum 802.11b, 11Mbps : -86dBm maximum 802.11g, 6Mbps : -88dBm maximum 802.11g, 54Mbps : -74dBm maximum 802.11a, 6Mbps : -88dBm maximum 802.11a, 54Mbps : -74dBm maximum 802.11n, MCS07 : -69dBm maximum 802.11n, MCS15 : -66dBm maximum 802.11ac, 1SS, MCS-0 : -86dBm maximum 802.11ac, 1SS, MCS-9 : -61 dBm maximum 802.11ac, 2SS, MCS-0 : -83dBm maximum 802.11ac, 2SS, MCS-9 : -58dBm maximum
Antenna type	High efficiency antenna with spatial diversity, mounted in the display



Technical Specifications

	enclosure	
	Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications	
Form Factor	PCI-Express M.2 MiniCard	
Dimensions	Type 2230 : 2.3 x 22.0 x 30.0 mm	
	Or	
	Type 1630 : 2.3 x 16.0 x 30.0 mm	
Weight	Type 2230 : 2.8g	
	Or	
	Type 1630 : 2g	
Operating Voltage	3.3v +/- 9%	
Temperature	Operating	14° to 158° F (–10° to 70° C)
	Non-operating	–40° to 176° F (–40° to 80° C)
Humidity	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 95% (non-condensing)
Altitude	Operating	0 to 10,000 ft (3,048 m)
	Non-operating	0 to 50,000 ft (15,240 m)
LED Activity	LED Amber – Radio OFF; LED White – Radio ON	

1. Check latest software/driver release for updates on supported security features.
2. Maximum output power may vary by country according to local regulations.
3. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (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

Bluetooth Specification	4.0/4.1/4.2 Compliant
Frequency Band	2402 to 2480 MHz
Number of Available Channels	Legacy : 0~79 (1 MHz/CH) BLE : 0~39 (2 MHz/CH)
Data Rates and Throughput	Legacy : 3 Mbps data rate; throughput up to 2.17 Mbps BLE : 1 Mbps data rate; throughput up to 0.2 Mbps



Technical Specifications

Legacy : Synchronous Connection Oriented links up to 3, 64 kbps, voice channels

Legacy : Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)

Transmit Power

The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 4 dBm for BR and EDR.

Receiver Sensitivity

Legacy

Modulation	0.01% BER	0.001% BER
GFSK	-80 dBm	-70 dBm
$\pi/4$ -DQPSK	-80 dBm	-70 dBm
8DPSK	-80 dBm	-70 dBm

Power Consumption

Peak (Tx) 330 mW
Peak (Rx) 230 mW
Selective Suspend 17 mW

Range

Legacy Up to 33 ft (10 m)
BLE Up to 99 ft (30 m)

Electrical Interface

USB 2.0 compliant

Bluetooth Software Supported

Microsoft Windows Bluetooth Software

Link Topology

Electrical Interface

Point to Point, Multipoint Pico Nets up to 7 slaves

Bluetooth Software Supported

Full support of Bluetooth Security Provisions

Security

Power Management

Microsoft Windows ACPI, and USB Bus Support

Certifications

Self-configurable to optimize power conservation in all operating modes, including Standby, Hold, Park, and Sniff

Security

All necessary regulatory approvals for supported countries, including:

Certifications

FCC (47 CFR) Part 15C, Section 15.247 & 15.249



Technical Specifications

Bluetooth Profiles Supported

Power Management ETS 300 328, ETS 300 826

Certifications Low Voltage Directive IEC950
 UL, CSA, and CE Mark

Certifications Serial Port Profile (SPP)^{1.2}
 Service Discovery Application Profile (SDAP)
 Dial-Up Networking (DUN)^{1.1}
 Generic Object Exchange Profile (GOEP)^{1.2}
 Object Push Profile (OPP)^{1.2}
 Hard Copy Cable Replacement (HCRP)^{1.2}
Bluetooth Profiles Supported Personal Area Networking Profile (PAN)^{1.0}
 Human Interface Device Profile (HID)^{1.0}
 Hands Free Profile (HFP) ^{1.5/1.6}
 Advanced Audio Distribution Profile (A2DP) ^{1.3}
 Audio Video Remote Control Profile (AVRCP) ^{1.3/1.4}

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



Technical Specifications

Note:

The FCC has declared as of January 1, 2015 products that utilize passive scanning on channel 12/13 and are capable of transmitting must fully comply with requirements of 15.247 or otherwise disable those channels.

802.11a/n

- 4.9 – 4.95 GHz (Japan)
- 5.15 – 5.25 GHz
- 5.25 – 5.35 GHz
- 5.47 – 5.725 GHz
- 5.825 – 5.850 GHz

Note:

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

Security¹

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

Network Architecture Models

Ad-hoc (Peer to Peer)
Infrastructure (Access Point Required)

Roaming

IEEE 802.11 compliant roaming between access points

Output Power²

- 802.11b : +16dBm minimum
- 802.11g : +14dBm minimum



Technical Specifications

	<ul style="list-style-type: none">• 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• 802.11ac 80MHz(5GHz) : +11dBm minimum
Power Consumption	Transmit: 2.0 W (max) Receive: 1.6 W (max) Idle mode (PSP): 180 mW (WLAN Associated) Idle mode: 50 mW (WLAN unassociated) Connect Standby: 10 mW (WLAN+BT) Radio disabled: 5 mW
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity³	802.11b, 1Mbps : -94dBm maximum 802.11b, 11Mbps : -86dBm maximum 802.11g, 6Mbps : -88dBm maximum 802.11g, 54Mbps : -74dBm maximum 802.11a, 6Mbps : -88dBm maximum 802.11a, 54Mbps : -74dBm maximum 802.11n, MCS07 : -69dBm maximum 802.11n, MCS15 : -66dBm maximum 802.11ac, 1SS, MCS-0 : -86dBm maximum 802.11ac, 1SS, MCS-9 : -61 dBm maximum 802.11ac, 2SS, MCS-0 : -83dBm maximum 802.11ac, 2SS, MCS-9 : -58dBm maximum
Antenna type	High efficiency antenna with spatial diversity, mounted in the display



Technical Specifications

	enclosure	
	Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications	
Form Factor	PCI-Express M.2 MiniCard	
Dimensions	Type 2230 : 2.3 x 22.0 x 30.0 mm	
	Or	
	Type 1630 : 2.3 x 16.0 x 30.0 mm	
Weight	Type 2230 : 2.8g	
	Or	
	Type 1630 : 2g	
Operating Voltage	3.3v +/- 9%	
Temperature	Operating	14° to 158° F (–10° to 70° C)
	Non-operating	–40° to 176° F (–40° to 80° C)
Humidity	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 95% (non-condensing)
Altitude	Operating	0 to 10,000 ft (3,048 m)
	Non-operating	0 to 50,000 ft (15,240 m)
LED Activity	LED Amber – Radio OFF; LED White – Radio ON	

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

Bluetooth Specification	4.0/4.1/4.2 Compliant
Frequency Band	2402 to 2480 MHz
Number of Available Channels	Legacy : 0~79 (1 MHz/CH) BLE : 0~39 (2 MHz/CH)
Data Rates and Throughput	Legacy : 3 Mbps data rate; throughput up to 2.17 Mbps BLE : 1 Mbps data rate; throughput up to 0.2 Mbps



Technical Specifications

Legacy : Synchronous Connection Oriented links up to 3, 64 kbps, voice channels

Legacy : Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)

Transmit Power

The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 4 dBm for BR and EDR.

Receiver Sensitivity

Legacy

Modulation	0.01% BER	0.001% BER
GFSK	-80 dBm	-70 dBm
$\pi/4$ -DQPSK	-80 dBm	-70 dBm
8DPSK	-80 dBm	-70 dBm

Power Consumption

Peak (Tx) 330 mW
Peak (Rx) 230 mW
Selective Suspend 17 mW

Range

Legacy Up to 33 ft (10 m)
BLE Up to 99 ft (30 m)

Electrical Interface

USB 2.0 compliant

Bluetooth Software Supported

Microsoft Windows Bluetooth Software

Link Topology

Electrical Interface

Point to Point, Multipoint Pico Nets up to 7 slaves

Bluetooth Software Supported

Full support of Bluetooth Security Provisions

Security

Power Management

Microsoft Windows ACPI, and USB Bus Support

Certifications

Self-configurable to optimize power conservation in all operating modes, including Standby, Hold, Park, and Sniff

Security

All necessary regulatory approvals for supported countries, including:

Certifications

FCC (47 CFR) Part 15C, Section 15.247 & 15.249



Technical Specifications

Bluetooth Profiles Supported

Power Management ETS 300 328, ETS 300 826

Certifications Low Voltage Directive IEC950
 UL, CSA, and CE Mark

Certifications Serial Port Profile (SPP)^{1.2}
 Service Discovery Application Profile (SDAP)
 Dial-Up Networking (DUN)^{1.1}
 Generic Object Exchange Profile (GOEP)^{1.2}
 Object Push Profile (OPP)^{1.2}
 Hard Copy Cable Replacement (HCRP)^{1.2}
Bluetooth Profiles Supported Personal Area Networking Profile (PAN)^{1.0}
 Human Interface Device Profile (HID)^{1.0}
 Hands Free Profile (HFP) ^{1.5/1.6}
 Advanced Audio Distribution Profile (A2DP) ^{1.3}
 Audio Video Remote Control Profile (AVRCP) ^{1.3/1.4}

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



Technical Specifications

- 2.402 – 2.482 GHz

Note:

The FCC has declared as of January 1, 2015 products that utilize passive scanning on channel 12/13 and are capable of transmitting must fully comply with requirements of 15.247 or otherwise disable those channels.

802.11a/n

- 4.9 – 4.95 GHz (Japan)
- 5.15 – 5.25 GHz
- 5.25 – 5.35 GHz
- 5.47 – 5.725 GHz
- 5.825 – 5.850 GHz

Note: Indonesia no support this band)

Data Rates

- 802.11b: 1, 2, 5.5, 11 Mbps
- 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
- 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
- 802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz)
- 802.11ac: MCS0 ~ MCS9, (1SS, and 2SS) (20MHz, 40MHz, and 80MHz)

Modulation

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

Security¹

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

Network Architecture Models

Ad-hoc (Peer to Peer)
Infrastructure (Access Point Required)

Roaming

IEEE 802.11 compliant roaming between access points

Output Power²

- 802.11b: +16dBm minimum
- 802.11g: +14dBm minimum



Technical Specifications

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

Power Consumption

Transmit: 2.0 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

Power Management

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

Receiver Sensitivity³

802.11b, 1Mbps : -94dBm maximum

802.11b, 11Mbps : -86dBm maximum

802.11g, 6Mbps : -88dBm maximum

802.11g, 54Mbps : -74dBm maximum

802.11a, 6Mbps : -88dBm maximum

802.11a, 54Mbps : -74dBm maximum

802.11n, MCS07 : -69dBm maximum

802.11n, MCS15 : -66dBm maximum

802.11ac, 1SS, MCS-0 : -86dBm maximum

802.11ac, 1SS, MCS-9 : -61dBm maximum

802.11ac, 2SS, MCS-0 : -83dBm maximum

802.11ac, 2SS, MCS-9 : -58dBm maximum

Antenna type

High efficiency antenna with spatial diversity, mounted in the display enclosure



Technical Specifications

	Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications	
Form Factor	PCI-Express M.2 MiniCard	
Dimensions	Type 2230 : 2.3 x 22.0 x 30.0 mm	
	Or	
	Type 1630 : 2.3 x 16.0 x 30.0 mm	
Weight	Type 2230 : 2.8g	
	Or	
	Type 1630 : 2g	
Operating Voltage	3.3v +/- 9%	
Temperature	Operating	14° to 158° F (–10° to 70° C)
	Non-operating	–40° to 176° F (–40° to 80° C)
Humidity	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 95% (non-condensing)
Altitude	Operating	0 to 10,000 ft (3,048 m)
	Non-operating	0 to 50,000 ft (15,240 m)
LED Activity	LED Amber – Radio OFF; LED White – Radio ON	

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).

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	Legacy : Synchronous Connection Oriented links up to 3, 64 kbps, voice



Technical Specifications

channels

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Legacy Up to 33 ft (10 m)
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Electrical Interface

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Bluetooth Software Supported

Microsoft Windows Bluetooth Software

Link Topology

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Security

Power Management

Microsoft Windows ACPI, and USB Bus Support

Certifications

Self-configurable to optimize power conservation in all operating modes, including Standby, Hold, Park, and Sniff

Security

All necessary regulatory approvals for supported countries, including:

Certifications

FCC (47 CFR) Part 15C, Section 15.247 & 15.249

Bluetooth Profiles Supported



Technical Specifications

Power Management	ETS 300 328, ETS 300 826
Certifications	Low Voltage Directive IEC950 UL, CSA, and CE Mark
Certifications	Serial Port Profile (SPP) ^{1.2} Service Discovery Application Profile (SDAP) Dial-Up Networking (DUN) ^{1.1} Generic Object Exchange Profile (GOEP) ^{1.2} Object Push Profile (OPP) ^{1.2} Hard Copy Cable Replacement (HCRP) ^{1.2} Personal Area Networking Profile (PAN) ^{1.0} Human Interface Device Profile (HID) ^{1.0} Hands Free Profile (HFP) ^{1.5/1.6} Advanced Audio Distribution Profile (A2DP) ^{1.3} Audio Video Remote Control Profile (AVRCP) ^{1.3/1.4}
Bluetooth Profiles Supported	
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	Output Power 45W DC Output 19.5V Hold-up Time 5ms at 115 Vac input Output Over Current Protection <8.0A
DC Plug	4.5mm Barrel Type



Technical Specifications

Environmental Design	Operating Temperature	32°F to 95°F (0°to 35°C)
	Non-operating (storage) Temperature	-4°F to 185°F (-20°to 85°C)
	Altitude	0 to 16,400 ft (0 to 5000m)
	Humidity	20% to 95%
	Storage Humidity	10% to 95%
EMI and Safety Certifications		<p>*CE Mark - full compliance with LVD and EMC directives</p> <p>* Worldwide safety standards - IEC60950, EN60950, UL60950, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE.</p> <p>* MTBF - over 200,000 hours at 25°C ambient condition.</p>
45 W 2 Prong 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	Output Power	45W
	DC Output	19.5V
	Hold-up Time	5ms at 115 Vac input
	Output Over Current Protection	<8.0A
DC Plug		4.5mm Barrel Type
Environmental Design	Operating Temperature	32°F to 95°F (0°to 35°C)
	Non-operating (storage) Temperature	-4°F to 185°F (-20°to 85°C)
	Altitude	0 to 16,400 ft (0 to 5000m)
	Humidity	20% to 95%
	Storage Humidity	10% to 95%
EMI and Safety Certifications		<p>*CE Mark - full compliance with LVD and EMC directives</p> <p>* Worldwide safety standards - IEC60950, EN60950, UL60950, Class2, SELV; Agency approvals - C-UL-US, PSE</p> <p>* MTBF - over 200,000 hours at 25°C ambient condition.</p>



Technical Specifications

65 W AC Adaptor

Dimensions		107.0x47.0x30.0mm
Weight		unit: 250g +/- 10g
Input	Input Efficiency	88.0 % at 115 Vac and 89.0 % at 230Vac
	Input Frequency Range	47 ~ 63 Hz
	Input AC current	Max. 1.7 A at 90 Vac
	Output Power	65W
Output	DC Output	19.5V
	Hold-up Time	5ms at 115 Vac input
	Output Over Current Protection	<11.0A
DC Plug		4.5mm Barrel Type
	Operating Temperature	32°F to 95°F (0°to 35°C)
Environmental Design	Non-operating (storage) Temperature	-4°F to 185°F (-20°to 85°C)
	Altitude	0 to 16,400 ft (0 to 5000m)
	Humidity	20% to 95%
	Storage Humidity	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.

65 W EM AC Adaptor

Dimensions		102.0x55.0x30.0mm
Weight		unit: 350g +/- 10g
Input	Input Efficiency	87.0 % at 115 Vac and 230Vac
	Input Frequency Range	47 ~ 63 Hz
	Input AC current	Max. 1.7 A at 90 Vac
	Output Power	65W
Output	DC Output	19.5V
	Hold-up Time	5ms at 115 Vac input
	Output Over Current Protection	<11.0A
DC Plug		4.5mm Barrel Type
	Operating Temperature	32°F to 95°F (0°to 35°C)
Environmental Design	Non-operating (storage) Temperature	-4°F to 185°F (-20°to 85°C)



Technical Specifications

Altitude	0 to 16,400 ft (0 to 5000m)
Humidity	20% to 95%
Storage Humidity	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.

90 W AC Adaptor

Dimensions

127.0x51.0x30.0mm

Weight

unit: 350g +/- 10g

Input

Input Efficiency

88% min at 115V and 89% min at 230V

Input Frequency Range

47 ~ 63 Hz

Input AC current

1.5 A at 90 VAC and maximum load

Output Power

90W

Output

DC Output

19.5V

Hold-up Time

5ms at 115 Vac input

Output Over Current Protection

<11.0A

DC Plug

4.5mm Barrel Type

Operating Temperature

32°F to 95°F (0° to 35°C)

Environmental Design

Non-operating (storage) Temperature

-4°F to 185°F (-20° to 85°C)

Altitude

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

Humidity

5% to 95%

Storage Humidity

5% 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 100,000 hours at 25°C ambient condition.



Technical Specifications

HP 3-cell, Long Life 48 WHr Li-ion	Dimensions (H x W x L)	15.05. x177.55x94.55 mm	
	Weight	0.25 kg (0.55lb)	
	Cells/Type	3cell Lithium-Ion	
	Energy	Voltage	11.4V/ 10.95V
		Amp-hour capacity	4.212Ah /4.385Ah
		Watt-hour capacity	48Wh
	Temperature	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)
	Battery Re-Charge Time	System in OFF or Standby Mode	<3 hours
Fuel Gauge LED		No	
Warranty		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.	
Optional Travel Battery Available		No	

SECURITY

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



Technical Specifications

16.5mm x 3 mm (sensor area)

Smart Card Reader	<p>Smart card standard PC/SC 2.0 for Windows smart card standard</p> <p>Dimensions (L x W x H) 0.41x 0.08 x 0.32 in (10.5 x 2 x 8.2 mm)</p> <p>Smart Card support ISO 7816 Class A, B, and C (5V/3V/1.8V) card</p> <p>Smart Card Interface 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</p> <p>Operating systems No driver is required for this device. Native support is provided by the operating system.</p> <p>Power</p> <p>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</p> <p>Power Saving Mode With card present, before being suspended: 40.6 mA Without card present: 380 µA After being suspended with smart card present: 380 µA</p> <p>Features</p> <ul style="list-style-type: none"> • Support single slot • Support T0, T1 protocol • Support I2C memory card, SLE4418, SLE4428, SLE4432, SLE4442, SLE4436, • SLE5536, SLE6636, AT88SC1608, AT45D041 card and AT45DB041 card via external EEPROM • Support ISO7816 Class A, B and C (5V/3V/1.8V) card • Implemented as an USB full speed device with bulk transfer endpoint, Mass • Storage endpoint • Built-in PLL for USB and Smart Card clocks requirement • Support EEPROM for USB descriptors customization (PID/VID/iManufacturer/iProduct/Serial Number), Direct Web Page Link, and accessing memory card module. • EEPROM programmable via USB interface • Support software update for memory card module • Support Direct Web Page Link via configuration in external EEPROM • Support short APDU and extended APDU • Compatible with Microsoft USB-CCID driver • Support remote wake up through inserting card/removing card • Support USB selective suspend • Support Power Saving Mode (Using one pin to select between Normal/PWR Saving Mode)
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Technical Specifications

- Support card power over current protection mechanism
- Built in resonator.
- Support USB LPM (Link Power Management) features.
- Embedded clock source.

ENVIRONMENTAL

HP ProBook 645 G3 Notebook PC

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: <ul style="list-style-type: none"> • IT ECO declaration • US ENERGY STAR® • EPEAT <Gold> registered in the United States. See http://www.epeat.net for registration status in your country. 		
System Configuration Energy Consumption (in accordance with US ENERGY STAR® test method)	The configuration used for the Energy Consumption and Declared Noise Emissions data for the Notebook model is based on a “Typically Configured Notebook”.		
	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
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.			



Technical Specifications

	Environmental Protection Agency (EPA) ENERGY STAR® specifications for computers. If a model family does not offer ENERGY STAR® compliant configurations, then energy efficiency data listed is for a typically configured PC featuring a hard disk drive, a high efficiency power supply, and a Microsoft Windows® operating system.		
Heat Dissipation*	115VAC, 60Hz	230VAC, 50Hz	100VAC, 50Hz
Normal Operation (Short idle)	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.		
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)	Sound Power (L_{WAd}, bels)	Sound Pressure (L_{pAm}, decibels)	
Typically Configured – Idle	2.8	20	
Fixed Disk – Random writes	3.2	20	
Batteries	<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>		



Technical Specifications

Additional Information	<ul style="list-style-type: none"> • This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC. • This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC. • This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986). • This product is in compliance with the IEEE 1680 (EPEAT) standard at the <Gold> level, see www.epeat.net • Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043. • This product contains 0% post-consumer recycled plastic (by wt.) • This product is 94.4% recycle-able when properly disposed of at end of life. 		
Packaging Materials	External:	PAPER/Corrugated	326 g
	Internal:	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.		
Material Usage	<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 http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/gse.pdf):</p> <ul style="list-style-type: none"> • 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, and certain retail packaging has been voluntarily removed from most applications. • Radioactive Substances • Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO) 		



Technical Specifications

<p>Packaging Usage</p>	<p>HP follows these guidelines to decrease the environmental impact of product packaging:</p> <ul style="list-style-type: none"> • 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.
<p>End-of-life Management and Recycling</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: 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.</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: 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.</p>
<p>HP, Inc. Corporate Environmental Information</p>	<p>For more information about HP's commitment to the environment:</p> <p>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</p>



Technical Specifications

Eco-Label Certifications & declarations	<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"> • IT ECO declaration • US ENERGY STAR® • EPEAT[®] Gold registered in the United States. See http://www.epeat.net for registration status in your country. 																						
System Configuration Energy Consumption (in accordance with US ENERGY STAR® test method)	<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="394 661 1521 835"> <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>8.93 W</td> <td>9.59 W</td> <td>8.32 W</td> </tr> <tr> <td>Normal Operation (Long idle)</td> <td>5.18 W</td> <td>5.65 W</td> <td>5.22 W</td> </tr> <tr> <td>Sleep</td> <td>0.50 W</td> <td>0.62 W</td> <td>0.50 W</td> </tr> <tr> <td>Off</td> <td>0.34 W</td> <td>0.44 W</td> <td>0.34 W</td> </tr> </tbody> </table>				115VAC, 60Hz	230VAC, 50Hz	100VAC, 50Hz	Normal Operation (Short idle)	8.93 W	9.59 W	8.32 W	Normal Operation (Long idle)	5.18 W	5.65 W	5.22 W	Sleep	0.50 W	0.62 W	0.50 W	Off	0.34 W	0.44 W	0.34 W
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	<p>Note:</p> <p>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.</p>																						
Heat Dissipation*	<table border="1" data-bbox="394 1581 1521 1900"> <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>31 BTU/hr</td> <td>33 BTU/hr</td> <td>28 BTU/hr</td> </tr> <tr> <td>Normal Operation (Long idle)</td> <td>18 BTU/hr</td> <td>19 BTU/hr</td> <td>18 BTU/hr</td> </tr> <tr> <td>Sleep</td> <td>2 BTU/hr</td> <td>2 BTU/hr</td> <td>2 BTU/hr</td> </tr> </tbody> </table>				115VAC, 60Hz	230VAC, 50Hz	100VAC, 50Hz	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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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>			
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)	Sound Power (L _{WA} d, bels)	Sound Pressure (L _{pAm} , decibels)	
Typically Configured – Idle	3.3	25	
Fixed Disk – Random writes	3.7	30	
Batteries	<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>		
Additional Information	<ul style="list-style-type: none"> • This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC. • This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC. • This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986). • This product is in compliance with the IEEE 1680 (EPEAT) standard at the gold level, see www.epeat.net • Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043. • This product contains 0% post-consumer recycled plastic (by wt.) • This product is 94.9% recycle-able when properly disposed of at end of life. 		
Packaging Materials	External:	PAPER/Corrugated	329 g
	Internal:	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.			
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		



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	<p>http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/gse.pdf:</p> <ul style="list-style-type: none"> • 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, and certain retail packaging has been voluntarily removed from most applications. • Radioactive Substances • Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)
<p>Packaging Usage</p>	<p>HP follows these guidelines to decrease the environmental impact of product packaging:</p> <ul style="list-style-type: none"> • 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.
<p>End-of-life Management and Recycling</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: 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.</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: http://www.hp.com/go/recyclers. These</p>



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	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	<p>For more information about HP's commitment to the environment:</p> <p>Global Citizenship Report http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html</p> <p>Eco-label certifications http://www8.hp.com/us/en/hp-information/environment/ecolabels.html</p> <p>ISO 14001 certificates: http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842</p> <p>and</p> <p>http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf</p>

Country of Origin

TBD



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

Category	Description	Part Number
Cases	HP Business Backpack	H5M90AA
	HP Business 4 Wheel Roller Case	H5M93AA
Docking	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
Input Device	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
Adapters	DisplayPort to HDMI Adapter	F3W43AA
	DisplayPort to DVI Adapter	F7W96AA
Power	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
Security	HP Keyed Cable Lock 10mm	T1A62AA
	HP Docking Station Cable Lock	AU656AA#XXX
Monitors	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

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