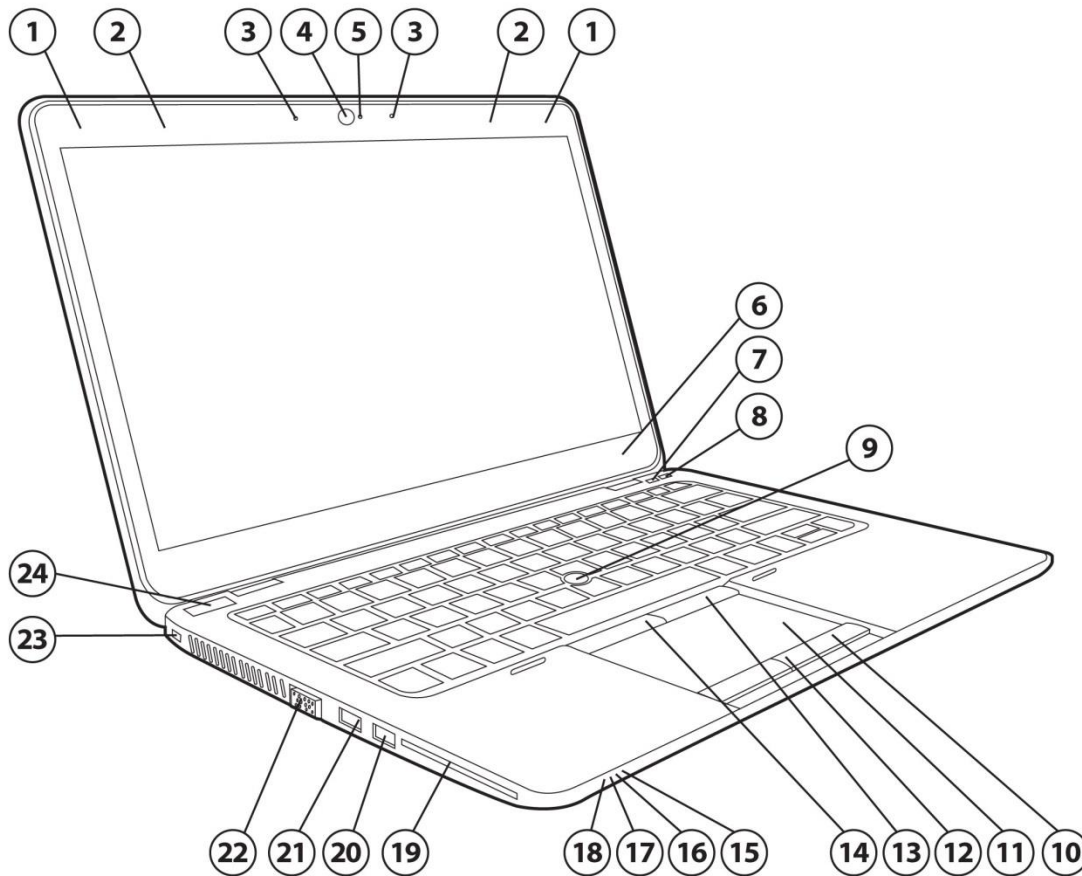


### Overview

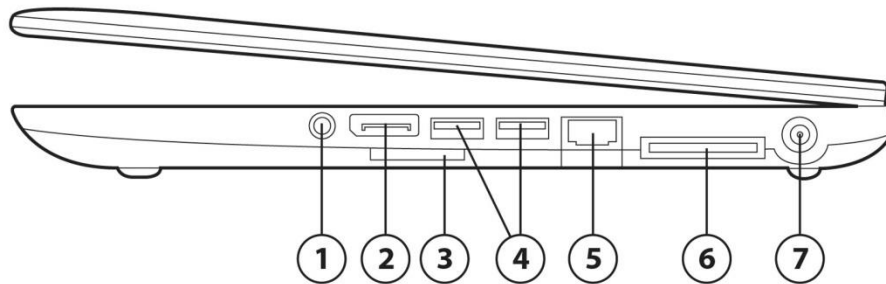
### HP EliteBook 745 G2 Notebook PC (Windows Embedded Standard 7E, 32-bit)



#### Front/Left

- |                                      |                                 |
|--------------------------------------|---------------------------------|
| 1. WLAN antennas (2)                 | 13. Right pointing stick button |
| 2. WWAN antennas (2)                 | 14. Left pointing stick button  |
| 3. Internal microphones (2)          | 15. Hard drive light            |
| 4. Webcam (select models only)       | 16. AC adapter/Battery light    |
| 5. Webcam light (select models only) | 17. Power light                 |
| 6. Internal display switch           | 18. Wireless light              |
| 7. Wireless button                   | 19. Smart card reader           |
| 8. Volume mute button                | 20. USB 3.0 port                |
| 9. Pointstick                        | 21. USB 3.0 charging port       |
| 10. Right TouchPad button            | 22. External VGA monitor port   |
| 11. TouchPad zone                    | 23. Security cable slot         |
| 12. Left TouchPad button             | 24. Power button                |

### Overview

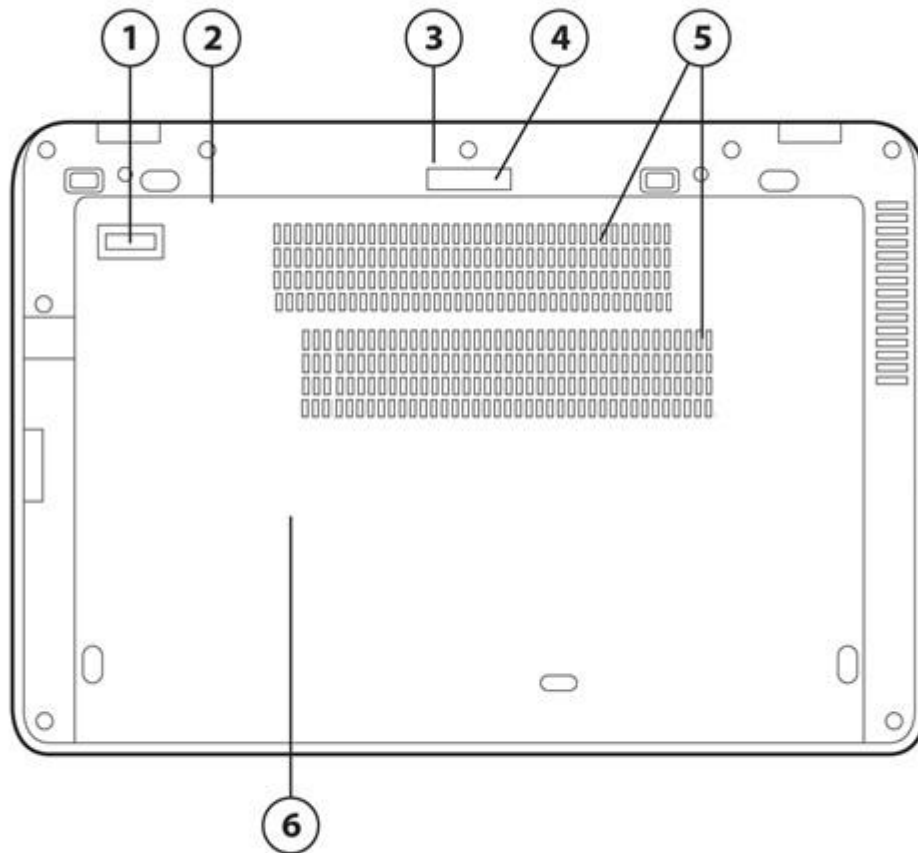


- 1. Audio-out (headphone) jack/Audio-in(microphone) jack
- 2. DisplayPort
- 3. Memory card reader
- 4. USB 3.0 ports (2)

#### Right

- 5. Drop-jaw Ethernet port (RJ-45)
- 6. Docking port
- 7. Power connector

## Overview



### Bottom View

- |                                   |                              |
|-----------------------------------|------------------------------|
| 1. Slice battery connector        | 4. Service door release lock |
| 2. EasyAccess panel               | 5. Vents (2)                 |
| 3. EasyAccess panel release latch | 6. SIM slot                  |

## Models

HP EliteBook 745 G2 Notebook PC (Windows Embedded Standard 7E, 32-bit)

K5H80AA

### Overview

#### At A Glance

- Windows Embedded Standard 7E (32-bit)
- Magnesium and aluminum chassis, HP DuraFinish, HP DisplaySafe frame, HP DuraKeys, precision aluminum drop hinge, aluminum palm rest
- 4-step Soft-touch paint process
- Drop-jaw Ethernet port
- EasyAccess door to quickly access most components for easy serviceability
- Full-sized spill-resistant keyboard
- Ensured durability through MIL-STD 810G testing, plus an additional 115,000 hours of reliability testing through HP's Total Test Process
- High-quality graphics from AMD
- 14.0-inch diagonal HD (1366 x 768) LED-backlit display
- Easily hot dock with the 2013 HP UltraSlim Docking Station
- DisplayPort for high resolution support
- Touchpad with scroll zone, on/off button with LED indicator
- HD webcam with dual-microphone array for video conferencing
- HD Audio with DTS Studio Sound optimized for high fidelity audio
- Wireless and speaker mute buttons
- Antenna attached; optional WWAN module support with AMO configuration
- 4 GB DDR3-1600 SODIMM SDRAM RAM
- 16 GB MLC Solid State Drive
- HP Device Manager
- HP Velocity
- HP Remote Graphics Software v6.0
- (3) SuperSpeed USB 3.0, (1) SuperSpeed USB 3.0 charging, (1) DisplayPort 1.2, (1) VGA, RJ-45 network connection, combo stereo, line in/line out audio jack, side docking connector, power connector

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

### Features

#### PRODUCT NAME

HP EliteBook 745 G2 Notebook PC (Windows Embedded Standard 7E, 32-bit)

#### OPERATING SYSTEM

Windows Embedded Standard 7E (32-bit)

#### CORE PROCESSING TECHNOLOGY

AMD A6 Pro-7050B 3.0 GHz dual core SOC

\*This system requires a 64-bit operating system and 64-bit software products to take advantage of the 64-bit processing capabilities of AMD technology. Multi-core processing with AMD technology is designed to improve performance of this system. Given the wide range of software applications available, performance will vary. AMD's numbering is not a measurement of clock speed.

**NOTE:** Processor speed denotes maximum performance mode; processors will run at lower speeds in battery optimization mode.

#### GRAPHICS

##### Integrated Graphics:

AMD Radeon™ R4 Graphics

#### DISPLAY

##### Internal

14.0-inch diagonal HD anti-glare SVA flat, LED backlit (1366 x 768)

##### External

Up to 32-bit per pixel color depth

##### VGA

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

##### DisplayPort

Supports resolutions up to 3200 x 2000 @ 60Hz

| Number of Displays supported with 2013 UltraSlim Docking Station* | UMA |
|-------------------------------------------------------------------|-----|
| HP EliteBook 745 G2 Notebook PC                                   | 3   |

**NOTE:** HD content required to view HD images. Resolutions are dependent upon monitor capability, and resolution and color depth settings.

**NOTE:** Can support up to three monitors simultaneously when docked and if docking station has VGA and DisplayPort v.1.2.

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

#### STORAGE

##### Solid State Drive\*

16 GB MLC Solid State Drive

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

#### NETWORKING

##### Antenna

Standard and attached

### Features

#### **Broadband Wireless (WWAN) \*, \*\*, \*\*\***

Optional WWAN module support with AMO configurations available in select countries.

#### **HP hs3110/3114 HSPA+ Mobile Broadband Module (US only)\*, \*\*, \*\*\***

HP It4211 LTE/EV-DO/HSPA+ Mobile Broadband Module (US, APJ) \*, \*\*, \*\*\*

HP It4112 LTE/HSPA+ Mobile Broadband Module (EMEA) \*, \*\*, \*\*\*

#### **Wireless LAN (WLAN)\*\***

#### **Broadcom 802.11a/b/g/n (2x2) and Bluetooth® 4.0**

\* WWAN is an optional feature sold separately or as an add-on feature. WWAN 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.

\*\* Wireless access point and Internet service is required and is not included. Availability of public wireless access points limited.

\*\*\* 4G LTE not available on all products, or in all regions.

#### **Communications**

Realtek RTL8111EP 10/100/1000\* Ethernet NIC with DASH Support

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

## AUDIO/MULTIMEDIA

#### **Audio**

HD Audio with DTS Studio Sound

2 Integrated stereo speakers

Integrated dual-microphone array; located in the display

Function keys for microphone mute, volume up, volume down

Stereo headphone/line out

Stereo microphone/line in

#### **Webcam**

Standard 720p HD\* webcam

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

\* HD content required to view HD images.

\*\*Internet access required.

## KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS

#### **Keyboard**

The HP spill-resistant keyboard is designed using a thin layer of Mylar film under the keyboard and includes an all-metal

### Features

keyboard deck for greater rigidity. 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. US and International key layouts are available. Backlit keyboard available as an option.

#### Pointing Devices

Touchpad with scroll zone, on/off button with LED indicator, two-way scroll, center point stick, left-pointing stick button, right-pointing stick button

#### Buttons and Function Keys

Separate discrete buttons provide easy access to WLAN on/off and speaker mute. Function keys provide control of features including: standby mode, display brightness, external display, microphone mute, volume down, and volume up.

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## SOFTWARE AND SECURITY

### Supported and Standard Software with Windows Embedded Standard 7E (32-bit)

#### HP Velocity

HP Velocity, a software solution exclusive to HP Thin Clients, reduces bandwidth latency and Wi-Fi congestion over poor networks. End-users get faster data transfers, smoother video playback and clearer audio – an ideal feature for remote offices, teleworkers and 3G/4G LTE environments. HP Velocity monitors network conditions and automatically tunes the user experience by addressing common network bottlenecks such as packet loss, latency and Wi-Fi congestion

- For details visit: <http://www.hp.com/go/velocity>

#### HP Device Manager

HP Device Manager (HPDM), a software solution exclusive to HP thin clients, gives IT managers a smart, hassle-free approach to centralized, remote management. Intuitive and user-friendly, HPDM provides a broad range of deployment and discovery functions from one interface. Add-ons, drivers, and service pack updates across entire install bases can take place within just a few clicks.

- For details visit: <http://www8.hp.com/us/en/thin-clients/software-and-os.html>

#### HP Remote Graphics Software

HP Remote Graphics Software (RGS) gives you total remote access to the full power of your high-end graphics applications when connected to your network. Share your desktop screen with multiple thin client users simultaneously. Grant “view only” or full control to all participants. Enjoy cross-platform access with support for both Windows and Linux-based environments. Advanced performance compression enables real-time visualization for impressive, fast workflow.

- For details visit: <http://www8.hp.com/us/en/campaigns/workstations/remote-graphics-software.html>

#### Standard Security Features

TPM Embedded Security Chip 1.2 (EAL4+ Certified)  
Security lock slot  
Integrated Smart Card Reader  
Preboot Authentication

#### Optional Security Features

HP UltraSlim Keyed Cable Lock  
HP Notebook Combo Lock

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## POWER

### Power Supply

HP 45W Smart AC adapter  
45W 2-prong 7.4mm DC jack AC Adapter (Only for Japan)  
HP 65W EM Smart AC adapter (China and India only)  
Power cord is configurable; either 3.2 feet or 6 feet (1.0 or 1.8 meter)  
Total length including external AC adapter is 9.2 feet or 12 feet (2.86 or 3.66 meter).

### Primary Battery

### Features

3-cell HP Long Life 50 WHr

**NOTE:** Battery warranty is 1 year or three years, depending on the platform warranty.

#### Battery Life\*

3-cell (50 WHr) battery  
with 2.5" solid state drive

Up to 6 hours 28 minutes

System Standby Time\*\*  
Up to 156 hours UMA

\* 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.

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

#### Power Conservation

Hibernation  
Standby  
ACPI compliance

### WEIGHTS & DIMENSIONS

#### Dimensions

Depth: 237.0mm (9.33")  
Width: 339.0mm (13.34")  
Height: 21.0mm (.826")

Specs are in mm. Inches shown for reference.

#### Weight

3.90lb / 1.77kg

Separate discrete buttons provide easy access to WLAN on/off and speaker mute. Function keys provide control of features including: standby mode, display brightness, external display, microphone mute, volume down, and volume up.

### PORTS/SLOTS

#### Ports

- (3) USB 3.0
- (1) USB 3.0 (charging)
- (1) DisplayPort 1.2
- (1) VGA
- (1) Headphone/Microphone combo port
- (1) RJ-45 (Ethernet)
- (1) Power connector
- (1) Side docking connector

### SERVICE AND SUPPORT

#### Ports

#### Standard

Supported by a 1-year standard limited warranty.

#### Standard

Select optional HP Care Pack Services to extend your protection. Optional HP Care Pack Services\* are extended service

### Features

contracts which go beyond your standard warranties. For more details visit: <http://www.hp.com/go/lookuptool>.

\*HP Care Pack Services are sold separately. 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. Consult the HP Customer Support Center for details. <http://h20000.www2.hp.com/bizsupport/TechSupport/ProductRoot.jsp>

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### Technical Specifications

#### SYSTEM UNIT

|                                                  |                                         |                                                |
|--------------------------------------------------|-----------------------------------------|------------------------------------------------|
| <b>Stand-Alone Power Requirements (AC Power)</b> | <b>Nominal Operating Voltage</b>        | 19.5 V                                         |
|                                                  | <b>Average Operating Power</b>          | 4.8 W                                          |
|                                                  | <b>Max Operating Power</b>              | < 65W                                          |
| <b>Temperature</b>                               | <b>Operating</b>                        | 32° to 95° F (0° to 35° C)                     |
|                                                  | <b>Non-operating</b>                    | -4° to 140° F (-20° to 60° C)                  |
| <b>Relative Humidity</b>                         | <b>Operating</b>                        | 10% to 90%, non-condensing                     |
|                                                  | <b>Non-operating</b>                    | 5% to 95%, 101.6° F (38.7° C) maximum wet bulb |
| <b>Shock</b>                                     | <b>Operating</b>                        | 40 G, 2 ms, half-sine                          |
|                                                  | <b>Non-operating</b>                    | 200 G, 2 ms, half-sine                         |
| <b>Random Vibration</b>                          | <b>Operating</b>                        | 0.75 grms                                      |
|                                                  | <b>Non-operating</b>                    | 1.50 grms                                      |
| <b>Altitude (unpressurized)</b>                  | <b>Operating</b>                        | -50 to 10,000 ft (-15.24 to 3,048 m)           |
|                                                  | <b>Non-operating</b>                    | -50 to 40,000 ft (-15.24 to 12,192 m)          |
| <b>Planned Industry Standard Certifications</b>  | <b>UL</b>                               | Yes                                            |
|                                                  | <b>CSA</b>                              | Yes                                            |
|                                                  | <b>FCC Compliance</b>                   | Yes                                            |
|                                                  | <b>ENERGY STAR®</b>                     | Yes                                            |
|                                                  | <b>EPEAT®</b>                           | Registered Gold in United States**             |
|                                                  | <b>ICES</b>                             | Yes                                            |
|                                                  | <b>Australia / NZ A-Tick Compliance</b> | Yes                                            |
|                                                  | <b>CCC</b>                              | Yes                                            |
|                                                  | <b>Japan VCCI Compliance</b>            | Yes                                            |
|                                                  | <b>KC</b>                               | Yes                                            |
|                                                  | <b>BSMI</b>                             | Yes                                            |
|                                                  | <b>CE Marking Compliance</b>            | Yes                                            |
|                                                  | <b>BNCI or BELUS</b>                    | Yes                                            |
|                                                  | <b>CIT</b>                              | Yes                                            |
|                                                  | <b>GOST</b>                             | Yes                                            |
|                                                  | <b>Saudi Arabian Compliance (ICCP)</b>  | Yes                                            |
|                                                  | <b>SABS</b>                             | Yes                                            |
|                                                  | <b>UKRSERTCOMPUTER</b>                  | Yes                                            |

\* ENERGY STAR® is a registered mark owned by the U.S. government. Configurations that are ENERGY STAR® qualified are identified on HP websites and on energystar.gov.

\*\* EPEAT® registration varies by country. See [www.epeat.net](http://www.epeat.net) for registration status by country. EPEAT status listed above applies to U.S.

For accessibility information on HP products, please visit: <http://www.hp.com/accessibility>.

#### DISPLAY

|                                                                            |                                       |                                                 |
|----------------------------------------------------------------------------|---------------------------------------|-------------------------------------------------|
| <b>14.00-inch diagonal LED-backlit HD anti-glare SVA flat (1366 x 768)</b> | <b>Outline Dimensions (W x H x D)</b> | 12.6 x 8.09 x 0.14 in (32.09 x 20.56 x 0.36 cm) |
|                                                                            | <b>Active Area</b>                    | 12.18 x 6.85 in (30.94 x 17.395 cm)             |
|                                                                            | <b>Weight</b>                         | 0.71 lb (320g) (max)                            |
|                                                                            | <b>Diagonal Size</b>                  | 14.0 in (35.6cm)                                |
|                                                                            | <b>Surface Treatment</b>              | Anti-glare                                      |
|                                                                            | <b>Contrast Ratio</b>                 | 300:1 (min)                                     |

### Technical Specifications

|                         |                                      |
|-------------------------|--------------------------------------|
| <b>Refresh Rate</b>     | 60 Hz                                |
| <b>Brightness</b>       | 200 nit (typical)                    |
| <b>Pixel Resolution</b> | <b>Format</b> 1366 x 768 (HD)        |
|                         | <b>Configuration</b> RGB Stripe      |
| <b>Interface</b>        | eDP 1.2 (1 lane)                     |
| <b>LCD Mode</b>         | TN                                   |
| <b>PPI</b>              | 125 ppi                              |
| <b>Viewing Angle</b>    | SVA 40/40/15/30 (Left/Right/Down/Up) |

### STORAGE

#### Internal Storage

|                                      |                              |                                                                                                                                                                                                                                                                                                          |
|--------------------------------------|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>16 GB Solid State Drive (SSD)</b> | <b>Drive Weight</b>          | 3.4 grams                                                                                                                                                                                                                                                                                                |
|                                      | <b>Capacity</b>              | 16 GB (unformatted)                                                                                                                                                                                                                                                                                      |
|                                      | <b>Height</b>                | 100.5 mm                                                                                                                                                                                                                                                                                                 |
|                                      | <b>Width</b>                 | 70 mm                                                                                                                                                                                                                                                                                                    |
|                                      | <b>Interface</b>             | SATA 6 GB/s                                                                                                                                                                                                                                                                                              |
|                                      | <b>Performance</b>           | <b>Maximum Sequential Read</b> Up to 450 MB/s                                                                                                                                                                                                                                                            |
|                                      |                              | <b>Maximum Sequential Read</b> Up to 450 MB/s                                                                                                                                                                                                                                                            |
|                                      | <b>Logical Blocks</b>        | 31, 277, 232                                                                                                                                                                                                                                                                                             |
|                                      | <b>Operating Temperature</b> | 32° to 158° F (0° to 70° C) – case temperature                                                                                                                                                                                                                                                           |
|                                      | <b>Features</b>              | ATA Command Set ACS-2:<br>NCQ support up to queue depth = 32<br>Advanced Flash Management:<br>nCache™, Non-volatile Write Cache<br>Support for TRIM<br>Dynamic and Static Wear-leveling<br>Bad Block Management<br>Background Garbage Collection<br>Support for Performance throttling and Power Classes |

\* For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less.

### SECURITY

|                          |                               |                                                                                                                                                                                                                                                   |
|--------------------------|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Smart Card Reader</b> | <b>Smart card standard</b>    | PC/SC 2.0 for Windows smart card standard                                                                                                                                                                                                         |
|                          | <b>Dimensions (L x W x H)</b> | 0.41x 0.08 x 0.32 in (10.5 x 2 x 8.2 mm)                                                                                                                                                                                                          |
|                          | <b>Smart Card support</b>     | ISO 7816 Class A and AB smart cards                                                                                                                                                                                                               |
|                          | <b>Smart Card Interface</b>   | Smart Card Interface with T = 0 and T = 1 support<br>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<br>Without card present, before being suspended: 33.16 mA<br>After being suspended with smart card present: 380 µA<br>After being suspended without smart card present: 380 |

### Technical Specifications

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                             |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | µA                                                                                                                                          |
|                 | <b>Power Saving Mode</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | With card present, before being suspended: 40.6 mA<br>Without card present: 380 µA<br>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> |                                                                                                                                             |

### NETWORKING/COMMUNICATIONS

|                                           |                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Integrated Realtek 10/100/1000 NIC</b> | <b>Ethernet Features</b> | <p>10 Mbit/s operation (10BASE-T; IEEE 802.3i; IEEE 802.3 clauses 13-14)</p> <p>100 Mbit/s operation (100BASE-TX; IEEE 802.3u; IEEE 802.3 clauses 21-30)</p> <p>1000 Mbit/s operation (1000BASE-T; IEEE 802.3ab; IEEE 8023 clauses 40)</p> <p>Auto-Negotiation (Automatic Speed Selection)</p> <p>Full Duplex Operation at all Speeds, Half Duplex operation at 10 and 100 Mbit/s</p> <p>IEEE 802.1p QoS (Quality of Service) Support</p> <p>IEEE 802.1q VLAN support</p> <p>IEEE 802.3x Flow Control (IEEE 802.3 clauses 31-32; configurable)</p> <p>IEEE 802.3az EEE (Energy Efficient Ethernet)</p> <p>Jumbo Frame 9K</p> <p>Auto MDI/MDIX Crossover cable detection</p> |
|                                           | <b>Power Management</b>  | <p>ACPI compliant - multiple power modes</p> <p>Situation-sensitive features reduce power consumption</p> <p>Advanced link down power saving for reducing link down power consumption</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                           | <b>Performance</b>       | TCP/IP/UDP Checksum Offload (configurable)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

### Technical Specifications

|                                                                                                              |                                                   |                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                              | <b>Features</b>                                   | Protocol Offload (ARP & NS)<br>Large send offload and Giant send offload<br>Receiving Side Scaling                                                                                                                                                                                                                                                             |
|                                                                                                              | <b>Manageability</b>                              | Wake-on-LAN from standby and hibernation (Magic Packet and Microsoft Wake-Up Frame); Wake-on-LAN from off (Magic Packet only)<br>PXE 2.1 Remote Boot<br>Statistics Gathering (SNMP MIB II, Ethernet-like MIB, Ethernet MIB (802.3x, clause 30))<br>Comprehensive diagnostic and configuration software suite<br>Virtual Cable Doctor for Ethernet cable status |
|                                                                                                              | <b>Interface</b>                                  | PCI Express 1.1 x1 to fully support ASPM L0s/L1 and CLKREQ                                                                                                                                                                                                                                                                                                     |
|                                                                                                              | <b>NIC Device Driver Name</b>                     | Realtek PCIe GBE Ethernet Family Controller                                                                                                                                                                                                                                                                                                                    |
| <b>HP hs3110/3114 HSPA+ Mobile Broadband Module*</b><br><b>HP hs3110/3114 HSPA+ Mobile Broadband Module*</b> | <b>Technology/Operating bands</b>                 | HSPA+: 2100 (Band 1)/1900 (Band 2)/1700 (Band 4)/850 (Band 5)/900 (Band 8) MHz<br>E-GPRS: 1900 (Band 2)/1800 (Band 3)/850 MHz (Band 5)/900 (Band 8) MHz                                                                                                                                                                                                        |
|                                                                                                              | <b>Wireless protocol standards</b>                | E-GPRS: Class B, Multi-slot class 33, coding schemes CS1 - CS4 and MSC1 - MSC9.<br>UMTS/WCDMA: Release 99 and Release 7                                                                                                                                                                                                                                        |
|                                                                                                              | <b>GPS</b>                                        | Standalone, A-GPS                                                                                                                                                                                                                                                                                                                                              |
|                                                                                                              | <b>GPS Bands</b>                                  | 1575.42 MHz ± 1.023 MHz, GLONASS 1596-1607MHz                                                                                                                                                                                                                                                                                                                  |
|                                                                                                              | <b>Maximum data rates</b>                         | HSPA+: UL 5.76 Mbps / DL 21.6 Mbps<br>HSPA: UL 5.76 Mbps / DL 7.2 Mbps<br>WCDMA PS: UL 384 kbps / DL 384 kbps<br>WCDMA CS: UL 64 kbps / DL 64 kbps<br>E-GPRS: UL 236.8 kbps/DL 296 kbps<br>GPRS: UL 85.6 kbps / DL 107 kbps                                                                                                                                    |
|                                                                                                              | <b>Maximum output power</b>                       | HSPA+ MHz: 24 dBm<br>E-GPRS 1800/1900: 26 dBm<br>E-GPRS 850/900: 27 dBm<br>GPRS 1800/1900: 30 dBm<br>GPRS 850/900: 33 dBm                                                                                                                                                                                                                                      |
|                                                                                                              | <b>Maximum power consumption</b>                  | 2500 mA (peak); 600 mA (average)                                                                                                                                                                                                                                                                                                                               |
|                                                                                                              | <b>Form Factor</b>                                | M.2, 3042-S3 Key B                                                                                                                                                                                                                                                                                                                                             |
|                                                                                                              | <b>Weight</b>                                     | 6 g                                                                                                                                                                                                                                                                                                                                                            |
|                                                                                                              | <b>Dimensions</b><br>(Length x Width x Thickness) | 1.65 x 1.18 x 0.09 in (42 x 30 x 2.3 mm)                                                                                                                                                                                                                                                                                                                       |

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

|                                                                                                |                                   |                                                                                                                                                                                                                                                                                           |
|------------------------------------------------------------------------------------------------|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>HP lt4211 LTE/EVDO/HSPA+ Qualcomm® Gobi™ 4G Module*</b> (Planned to be available July 2014) | <b>Technology/Operating bands</b> | LTE: 1900 (Band 2)/1700 (Band 4)/850 (Band 5)/700 (Band 13), 700 (Band 17), 1900 (Band 25) MHz<br>HSPA+: 2100 (Band 1)/1900 (Band 2)/1700 (Band 4)/850 (Band 5), 800 (Band 8) MHz<br>E-GPRS: 1900 (Band 2)/1800 (Band 3)/850 (Band 5)/900 (Band 8) MHz<br>EV-DO: 800 (BC0)/1900 (BC1) MHz |
|------------------------------------------------------------------------------------------------|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Technical Specifications

|                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Wireless protocol standards</b>                | 3GPP Release 9 LTE Specification<br>WCDMA R99, 3GPP Release 5, 6 and 7 UMTS Specification<br>E-GPRS: Class B, Multi-slot class 33, coding schemes CS1 - CS4 and MSC1 - MSC9<br>EVDO Release 0 and Release A                                                                                                                                                                                                                                                                           |
| <b>GPS</b>                                        | Standalone                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>GPS bands</b>                                  | 1575.42 MHz, GLONASS 1602 MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Maximum data rates</b>                         | LTE (Category 3): 100 Mbps (Download), 50Mbps (Upload)<br>DC-HSPA+: 42 Mbps (Download), 5.76 Mbps (Upload)<br>HSPA+: 21.6 Mbps (Download), 5.76 Mbps (Upload)<br>WCDMA PS: 384 kbs (Download), 384 kbs (Upload)<br>WCDMA CS: 64 kbs (Download), 64 kbs (Upload)<br>E-GPRS: 236.8 kbps (Download), 236.8 kbps (Upload)<br>GPRS: 85.6 kbps(Download), 85.6 kbps (Upload)<br>EV-DO Rev.B: 14.7 Mbps (Download), 5.4 Mbps (Upload)<br>EV-DO Rev.A: 3.1 Mbps (Download), 1.8 Mbps (Upload) |
| <b>Maximum output power</b>                       | LTE: +23 dBm (+1/- 2 dBm)<br>HSPA+: +24 dBm (+1/- 2 dBm)<br>E-GPRS Band 1800/1900: +25 dBm (+/-1 dBm)<br>E-GPRS Band 850/900: +26 dBm (+/-1 dBm)<br>GPRS 1800/1900 : +30 dBm (+1/-2 dBm)<br>GPRS 850/900: +32 dBm (+/- 1 dBm)<br>EV-DO: +24 dBm (+/-1 dBm)                                                                                                                                                                                                                            |
| <b>Maximum power consumption</b>                  | LTE: 1,200 mA (peak); <900 mA (average)<br>HSPA+: 1,100 mA (peak); <800 mA (average)<br>E-GPRS: 2,800 mA (peak); <500 mA (average)<br>EV-DO: 1000 mA (peak); <700 mA (average)                                                                                                                                                                                                                                                                                                        |
| <b>Form Factor</b>                                | M.2, 3042-S3 Key B                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Weight</b>                                     | 6 g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Dimensions</b><br>(Length x Width x Thickness) | 1.65 x 1.18 x 0.09 in (42 x 30 x 2.3 mm)                                                                                                                                                                                                                                                                                                                                                                                                                                              |

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

|                                                       |                                    |                                                                                                                                                                                                                                                                    |
|-------------------------------------------------------|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>HP It4112 LTE/HSPA+ Qualcomm® Gobi™ 4G Module*</b> | <b>Technology/Operating bands</b>  | LTE: 2100 (Band 1)/1900 (Band 2)/1800 (Band 3)/850 (Band 5), 2600 (Band 7), 900 (Band 8), 800 MHz (Band 20, DD800) MHz<br>HSPA+: 2100 (Band 1)/1900 (Band 2)/850 (Band 5)/900 (Band 8) MHz<br>E-GPRS: 1900 (Band 2)/1800 (Band 3)/850 (Band 5)/900 (Band 8) MHz    |
|                                                       | <b>Wireless protocol standards</b> | 3GPP Release 8 LTE Specification<br>WCDMA R99, 3GPP Release 5, 6 and 7 UMTS Specification<br>E-GPRS: Class B, Multi-slot class 33, coding schemes CS1 - CS4 and MSC1 - MSC9                                                                                        |
|                                                       | <b>GPS</b>                         | Standalone                                                                                                                                                                                                                                                         |
|                                                       | <b>GPS bands</b>                   | 1575.42 MHz ± 1.023 MHz, GLONASS 1596-1607MHz                                                                                                                                                                                                                      |
|                                                       | <b>Maximum data rates</b>          | LTE (Category 3): 100 Mbps (Download), 50Mbps (Upload)<br>DC-HSPA+: 42 Mbps (Download), 5.76 Mbps (Upload)<br>HSPA+: 21.6 Mbps (Download), 5.76 Mbps (Upload)<br>EDGE: 236.8 kbps (Download), 236.8 kbps (Upload)<br>GPRS: 85.6 kbps(Download), 85.6 kbps (Upload) |
|                                                       | <b>Maximum output power</b>        | LTE: 23 dBm                                                                                                                                                                                                                                                        |

### Technical Specifications

|                                                   |                                                                                                                                 |
|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
|                                                   | HSPA+: 23.5 dBm<br>E-GPRS 1900/1800: 26.5 dBm<br>E-GPRS 900/850: 27.5 dBm<br>GPRS 1900/1800: 29.5 dBm<br>GPRS 900/850: 32.5 dBm |
| <b>Maximum power consumption</b>                  | LTE: 1,200 mA (peak); 900 mA (average)<br>HSPA+: 1,100 mA (peak); 800 mA (average)<br>E-GPRS: 2,800 mA (peak); 700 mA (average) |
| <b>Form Factor</b>                                | M.2, 3042-S3 Key B                                                                                                              |
| <b>Weight</b>                                     | 6 g                                                                                                                             |
| <b>Dimensions</b><br>(Length x Width x Thickness) | 1.65 x 1.18 x 0.09 in (42 x 30 x 2.3 mm)                                                                                        |

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

|                                                         |                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Broadcom 802.11a/b/g/n (2x2) and Bluetooth® 4.0*</b> | IEEE 802.11a<br>IEEE 802.11b<br>IEEE 802.11g<br>IEEE 802.11n                                                                                                                                                                                                                                                                                                                                               |
| <b>Interoperability</b>                                 | Wi-Fi certified                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Frequency Band</b>                                   | 802.11b/g/n <ul style="list-style-type: none"> <li>• 2.402 – 2.482 GHz</li> </ul> 802.11a/n <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 – 5.855 GHz</li> <li>• 2.402 – 2.482 GHz</li> </ul>                                                                                         |
| <b>Data Rates</b>                                       | 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps<br>802.11b: 1, 2, 5.5, 11 Mbps<br>802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps<br>802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz)                                                                                                                                                                                                                                     |
| <b>Modulation</b>                                       | Direct Sequence Spread Spectrum<br>BPSK, QPSK, CCK, 16-QAM, 64-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 V5</li> <li>• WAPI</li> </ul> |
| <b>Network Architecture Models</b>                      | Ad-hoc (Peer to Peer)<br>Infrastructure (Access Point Required)                                                                                                                                                                                                                                                                                                                                            |
| <b>Roaming</b>                                          | IEEE 802.11 compliant roaming between access points                                                                                                                                                                                                                                                                                                                                                        |

### Technical Specifications

|                                         |                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Output Power<sup>2</sup></b>         | <ul style="list-style-type: none"> <li>2.4G: +13.5dBm minimum</li> <li>5G: +12dBm minimum</li> </ul> <p>Maximum output power must be able to achieve modular regulatory certification with notebooks that have antennas &gt;20cm from the user and peak gain of +3dBi at 2.4GHz and +4dBi at 5GHz</p>             |
| <b>Power Consumption</b>                | <p>Transmit: 2.0 W (max)<br/> Receive: 1.6 W (max)<br/> Idle mode (PSP): 250 mW (WLAN Associated)<br/> Idle mode: 100 mW (WLAN unassociated)<br/> Radio disabled: 75 mW</p>                                                                                                                                       |
| <b>Power Management</b>                 | <p>ACPI and PCI Express compliant power management<br/> 802.11 compliant power saving mode</p>                                                                                                                                                                                                                    |
| <b>Receiver Sensitivity<sup>3</sup></b> | <p>802.11b:-95 dBm (1 Mbps), -93 dBm (2 Mbps), -91 dBm (5.5 Mbps), -88 dBm (11 Mbps)<br/> 802.11a/g:-90 dBm (6 Mbps), -89 dBm (9 Mbps), -87 dBm (12 Mbps), -85 dBm (18 Mbps), -82 dBm (24 Mbps), -79 dBm (36 Mbps), -76 dBm (48 Mbps), -74 dBm (54 Mbps)<br/> 802.11n:-69 dBm (72.2 Mbps), -66 dBm (300 Mbps)</p> |
| <b>Antenna type</b>                     | <p>High efficiency antenna with spatial diversity, mounted in the display enclosure<br/> Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications</p>                                                                                  |
| <b>Form Factor</b>                      | PCI-Express Half-MiniCard                                                                                                                                                                                                                                                                                         |
| <b>Dimensions</b>                       | 0.19 x 1.06 x 1.18 in (4.75 x 26.8 x 30 mm)                                                                                                                                                                                                                                                                       |
| <b>Weight</b>                           | 3.1g                                                                                                                                                                                                                                                                                                              |
| <b>Operating Voltage</b>                | 3.3v +/- 9%                                                                                                                                                                                                                                                                                                       |
| <b>Temperature</b>                      | <p>Operating 14° to 158° F (-10° to 70° C)<br/> Non-operating -40° to 176° F (-40° to 80° C)</p>                                                                                                                                                                                                                  |
| <b>Humidity</b>                         | <p>Operating 10% to 90% (non-condensing)<br/> Non-operating 5% to 95% (non-condensing)</p>                                                                                                                                                                                                                        |
| <b>Altitude</b>                         | <p>Operating 0 to 10,000 ft (3,048 m)<br/> Non-operating 0 to 50,000 ft (15,240 m)</p>                                                                                                                                                                                                                            |

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 \(OFDM modulation\).](#)

#### Bluetooth Specification

V4.0 High Speed, V2.1+EDR, backwards compatible with V1.1, 1.2 and 2.0

|                                     |                                                                                                                                                                                                                                      |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Number of Available Channels</b> | 79 (1 MHz) available channels                                                                                                                                                                                                        |
| <b>Data Rates and Throughput</b>    | <p>3 Mbps data rate; throughput up to 2.17 Mbps<br/> Synchronous Connection Oriented links up to 3, 64 kbps, voice channels</p> <p>Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric or 1306.9 kbps symmetric</p> |
| <b>Transmit Power</b>               | -6 dBm to 4 dBm (Bluetooth Class II)                                                                                                                                                                                                 |
| <b>Receiver Sensitivity</b>         | Better than -80 dBm at 0.1 % raw bit error rate                                                                                                                                                                                      |
| <b>Power Consumption</b>            | <p>Peak (Tx) 330 mW<br/> Peak (Rx) 230 mW</p>                                                                                                                                                                                        |

### Technical Specifications

|                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                     | Sleep <17 mW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Antenna</b>                      | Internally integrated within module                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Range</b>                        | Up to 33 ft (10 m)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Electrical Interface</b>         | USB 2.0 compliant<br>Microsoft Windows Plug and Play compliant                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Bluetooth Software Supported</b> | Broadcom Bluetooth for Windows<br>Microsoft Windows Bluetooth Software                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Link Topology</b>                | Point to Point, Multipoint Pico Nets up to 7 slaves                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Security</b>                     | Full support of Bluetooth Security Provisions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Power Management</b>             | Microsoft Windows ACPI, and USB Bus Support<br>Self configurable to optimize power conservation in all operating modes, including Standby, Hold, Park, and Sniff                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Certifications</b>               | All necessary regulatory approvals for supported countries, including:<br>FCC (47 CFR) Part 15C, Section 15.247 & 15.249<br>ETS 300 328, ETS 300 826<br>Low Voltage Directive IEC950<br>UL, CSA, and CE Mark                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Bluetooth Profiles Supported</b> | Generic Access Profile (GAP)<br>Service Discovery Application Profile (SDAP)<br>Serial Port Profile (SPP)<br>Dial_Up Networking Profile (DUN)<br>Generic Object Exchange Profile (GOEP)<br>Object Push Profile (OPP)<br>File Transfer Profile (FTP)<br>Synchronization Profile (SYNC)<br>Hard Copy Cable Replacement (HCRP)<br>Personal Area Networking Profile (PAN)<br>Human Interface Device Profile (HID)<br>Generic Audio/Video Distribution Profile (GAVDP)<br>Advanced Audio/Video Distribution Profile (A2DP)<br>FAX Profile (FAX)<br>Basic Imaging Profile (BIP)<br>Headset Profile (HSP)<br>Hands Free Profile (HFP)<br>Basic Printing Profile (BPP)<br>VDP (Video Distribution Profile)<br>AVRCP (Audio Video Remote Control Profile) |

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

### AUDIO/MULTIMEDIA - DTS SOUND+

|                 |                                     |                                                                       |
|-----------------|-------------------------------------|-----------------------------------------------------------------------|
| <b>Hardware</b> | <b>Implementation</b>               | IDT 92HD91                                                            |
|                 | <b>Function Key Volume Controls</b> | Volume up, volume down, and mute                                      |
|                 | <b>Full Duplex</b>                  | Yes                                                                   |
|                 | <b>Microphone In</b>                | Stereo                                                                |
|                 | <b>Headphone/Line Out</b>           | Stereo                                                                |
|                 | <b>Integrated Microphone</b>        | Yes, dual digital microphone array when equipped with optional webcam |

## Technical Specifications

|                            |                              |                  |
|----------------------------|------------------------------|------------------|
| Audio Output Quality       | Frequency Response           | 20 Hz – 20 kHz   |
|                            | Signal to Noise Ratio        | >85 dB           |
|                            | Total Harmonic Distortion    | 0.01%            |
|                            | Noise Floor                  | –110 dB          |
|                            | Play/Record Sampling Rate(s) | 8 kHz – 48kHz    |
|                            | DAC                          | 16, 20 or 24-bit |
|                            | ADC                          | 16 or 20-bit     |
| Integrated Stereo Speakers | Power Rating                 | 2 Watts          |
|                            | Impedance                    | 4 Ohms           |

### Technical Specifications

#### POWER

|                                              |                                      |                                                                                                                                                                                                                                                                                                                                            |
|----------------------------------------------|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>HP 45W Slim Smart AC Adapter non-slim</b> | <b>Dimensions (H x W x D)</b>        | 95.0 x 40.0 x 26.5mm                                                                                                                                                                                                                                                                                                                       |
|                                              | <b>Input</b>                         | 90 to 265 VAC                                                                                                                                                                                                                                                                                                                              |
|                                              | <b>Input Efficiency</b>              | 88% min at 115 VAC / 89% min at 230VAC                                                                                                                                                                                                                                                                                                     |
|                                              | <b>Input frequency range</b>         | 47 to 63 Hz                                                                                                                                                                                                                                                                                                                                |
|                                              | <b>Input AC current</b>              | 1.4 A at 90 VAC and maximum load                                                                                                                                                                                                                                                                                                           |
|                                              | <b>Output</b>                        | <b>Output power</b> 45W                                                                                                                                                                                                                                                                                                                    |
|                                              |                                      | <b>DC output</b> 19.5V                                                                                                                                                                                                                                                                                                                     |
|                                              |                                      | <b>Hold-up time</b> 5 msec at 115 VAC input                                                                                                                                                                                                                                                                                                |
|                                              |                                      | <b>Output current limit</b> <8A, Over voltage protection- 29V max automatic shutdown                                                                                                                                                                                                                                                       |
|                                              | <b>Connector</b>                     | 3 pin/grounded, mates with 4.5mm barrel type Smart ID DC connector                                                                                                                                                                                                                                                                         |
|                                              | <b>Environmental Design</b>          | <b>Operating temperature</b> 32° to 95° F (0° to 35° C)                                                                                                                                                                                                                                                                                    |
|                                              |                                      | <b>Non-operating (storage) temperature</b> -4° to 121° F (-20° to 85° C)                                                                                                                                                                                                                                                                   |
|                                              |                                      | <b>Altitude</b> 0 to 16,405 ft (0 to 5,000 m)                                                                                                                                                                                                                                                                                              |
|                                              |                                      | <b>Humidity</b> 0% to 95%                                                                                                                                                                                                                                                                                                                  |
|                                              |                                      | <b>Storage Humidity</b> 0% 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; Reliability - failure rate of less than 0.1% annually within the first three years of operation. |
| <b>HP 65W EM Smart AC Adapter</b>            | <b>Dimensions</b>                    | 4.98 x 1.97 x 1.18 in (12.65 x 5.0 x 3.0 cm)                                                                                                                                                                                                                                                                                               |
|                                              | <b>Weight</b>                        | 0.62 lb (290 g) max                                                                                                                                                                                                                                                                                                                        |
|                                              | <b>Input</b>                         | 90 to 265 VAC                                                                                                                                                                                                                                                                                                                              |
|                                              | <b>Input Efficiency</b>              | 87% min at 115 VAC                                                                                                                                                                                                                                                                                                                         |
|                                              | <b>Input frequency range</b>         | 47 to 63 Hz                                                                                                                                                                                                                                                                                                                                |
|                                              | <b>Input AC current</b>              | 1.7 A at 90 VAC                                                                                                                                                                                                                                                                                                                            |
|                                              | <b>Output</b>                        | <b>Output power</b> 65W                                                                                                                                                                                                                                                                                                                    |
|                                              |                                      | <b>DC output</b> 19.5V                                                                                                                                                                                                                                                                                                                     |
|                                              |                                      | <b>Hold-up time</b> 5 msec at 115 VAC input                                                                                                                                                                                                                                                                                                |
|                                              |                                      | <b>Output current limit</b> <11A, Over voltage protection- 29V max automatic shutdown                                                                                                                                                                                                                                                      |
|                                              | <b>Connector</b>                     | 3 pin/grounded, mates with interchangeable cords                                                                                                                                                                                                                                                                                           |
|                                              | <b>Environmental Design</b>          | <b>Operating temperature</b> 32° to 95° F (0° to 35° C)                                                                                                                                                                                                                                                                                    |
|                                              |                                      | <b>Non-operating (storage) temperature</b> -4° to 185° F (-20° to 85° C)                                                                                                                                                                                                                                                                   |
|                                              |                                      | <b>Altitude</b> 0 to 10,000 ft (0 to 3,048 m)                                                                                                                                                                                                                                                                                              |
|                                              |                                      | <b>Humidity</b> 20% to 95%                                                                                                                                                                                                                                                                                                                 |
|                                              |                                      | <b>Storage Humidity</b> 10% to 95%                                                                                                                                                                                                                                                                                                         |

### Technical Specifications

|                                                        |                                          |                                                                                                                                                                                                                                                                                                |                               |
|--------------------------------------------------------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| <b>3-cell HP Long Life (50Whr) Lithium-Ion Polymer</b> | <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. |                               |
|                                                        | <b>Dimensions (H x W x L)</b>            | 0.85 x 1.76 x 10.59 in (2.16 x 4.46 x 26.9 cm)                                                                                                                                                                                                                                                 |                               |
|                                                        | <b>Weight</b>                            | 262 g                                                                                                                                                                                                                                                                                          |                               |
|                                                        | <b>Cells/Type</b>                        | 3-cell Lithium-Ion Polymer                                                                                                                                                                                                                                                                     |                               |
|                                                        | <b>Energy</b>                            | Voltage                                                                                                                                                                                                                                                                                        | 11.1                          |
|                                                        |                                          | Amp-hour capacity                                                                                                                                                                                                                                                                              | 4.4Ah                         |
|                                                        |                                          | Watt-hour capacity                                                                                                                                                                                                                                                                             | 50Wh                          |
|                                                        | <b>Temperature</b>                       | Operating (Charging)                                                                                                                                                                                                                                                                           | 32° to 113° F (0° to 45° C)   |
|                                                        |                                          | Operating (Discharging)                                                                                                                                                                                                                                                                        | 14° to 122° F (-10° to 50° C) |
|                                                        |                                          | Non-operating                                                                                                                                                                                                                                                                                  | -4° to 122° F (-20° to 50° C) |
|                                                        | <b>Fuel Gauge LED</b>                    | No                                                                                                                                                                                                                                                                                             |                               |
|                                                        | <b>Warranty</b>                          | 1 year or 3 years*                                                                                                                                                                                                                                                                             |                               |
|                                                        |                                          | *Battery warranty depends on the platform warranty.                                                                                                                                                                                                                                            |                               |
|                                                        | <b>Optional Travel Battery Available</b> | No                                                                                                                                                                                                                                                                                             |                               |

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.

### ENVIRONMENTAL

**System Configuration** The configuration used for the Energy Consumption and Declared Noise Emissions data for the Notebook model is based on a "Typically Configured Notebook".

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

|                                  | 115VAC, 60Hz | 230VAC, 50Hz | 100VAC, 60Hz |
|----------------------------------|--------------|--------------|--------------|
| Normal Operation<br>(Short idle) | 13.01 W      | 13.33 W      | 13.12 W      |
| Normal Operation<br>(Long idle)  | 9.78 W       | 9.83 W       | 9.86 W       |
| Sleep                            | 0.82 W       | 0.84 W       | 0.81 W       |
| Off                              | 0.23 W       | 0.25 W       | 0.23 W       |

#### NOTE:

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

| <b>Heat Dissipation*</b>      | 115VAC, 60Hz | 230VAC, 50Hz | 100VAC, 60Hz |
|-------------------------------|--------------|--------------|--------------|
| Normal Operation (Short idle) | 44 BTU/hr    | 46 BTU/hr    | 45 BTU/hr    |
| Normal Operation (Long)       | 33 BTU/hr    | 34 BTU/hr    | 34 BTU/hr    |

### Technical Specifications

idle)

|       |          |          |          |
|-------|----------|----------|----------|
| Sleep | 3 BTU/hr | 3 BTU/hr | 3 BTU/hr |
| Off   | 1 BTU/hr | 1 BTU/hr | 1 BTU/hr |

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

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

**Sound Power  
( $L_{WA}$ , bels)**

**Sound Pressure  
( $L_{pAm}$ , decibels)**

### Batteries

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

Batteries used in the product do not contain:

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

Battery size: CR2032 (coin cell)

Battery type: Lithium

Battery size: 6-cell high capacity Lithium-Ion battery (optional 8 cell available)

Battery type:

### Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC.
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This product is in compliance with the IEEE 1680 (EPEAT) standard at the <Gold> level, see [www.epeat.net](http://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 97.3% recycle-able when properly disposed of at end of life.

### Packaging Materials

|                  |                                     |       |
|------------------|-------------------------------------|-------|
| <b>External:</b> | PAPER/Corrugated                    | 405 g |
| <b>Internal:</b> | PLASTIC/EPE (Expanded Polyethylene) | 45 g  |
|                  | PLASTIC/Polyethylene low density    | 26 g  |

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

The corrugated paper packaging materials contains at least 70% recycled content.

### Eco-Label Certifications

This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:

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

### Technical Specifications

#### Material Usage

This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at:

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

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants - may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- Nickel - finishes must not be used on the external surface designed to be frequently handled or carried by the user.
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Biphenyl Ethers (PBBEs)
- Polybrominated Biphenyl Oxides (PBBOs)
- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) - except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.
- Radioactive Substances
- Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

#### Packaging Usage

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

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

#### End-of-life Management and Recycling

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

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

#### Hewlett-Packard Corporate Environmental Information

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

Global Citizenship Report: <http://www.hp.com/hpinfo/globalcitizenship/qcreport/index.html>

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



## Technical Specifications

ISO 14001 certificates: [http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/PC\\_GBU\\_Product\\_Design\\_ISO\\_14K\\_Certificate.pdf](http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/PC_GBU_Product_Design_ISO_14K_Certificate.pdf)  
and <http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf>

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

| Type                    | Description                                                | Part #      |
|-------------------------|------------------------------------------------------------|-------------|
| <b>Docking</b>          | HP 2013 UltraSlim Docking Station                          | D9Y32AA#xxx |
| <b>Adapters</b>         | HP 45W Smart AC Adapter 4.5mm                              | H6Y88AA#xxx |
| <b>Security</b>         | HP Docking Station Cable Lock                              | AU656AA#xxx |
|                         | HP UltraSlim Keyed Cable Lock                              | H4D73AA     |
|                         | HP Notebook Combo Lock                                     | AY475AA     |
|                         | HP 14-inch PC Privacy Filter                               | J6E65AA     |
| <b>Displays</b>         | HP EliteDisplay S231d 23" IPS BLU Notebook Docking Monitor | F3J72A8     |
|                         | HP EliteDisplay S240ml 23.8" IPS LED Backlit MHL Monitor   | F4M47AA     |
| <b>Port Replicators</b> | HP 3001pr USB3 Port Replicator                             | F3S42AA     |
|                         | HP 3005pr USB 3.0 Port Replicator                          | H1L08AA     |

## Summary of Changes

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

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