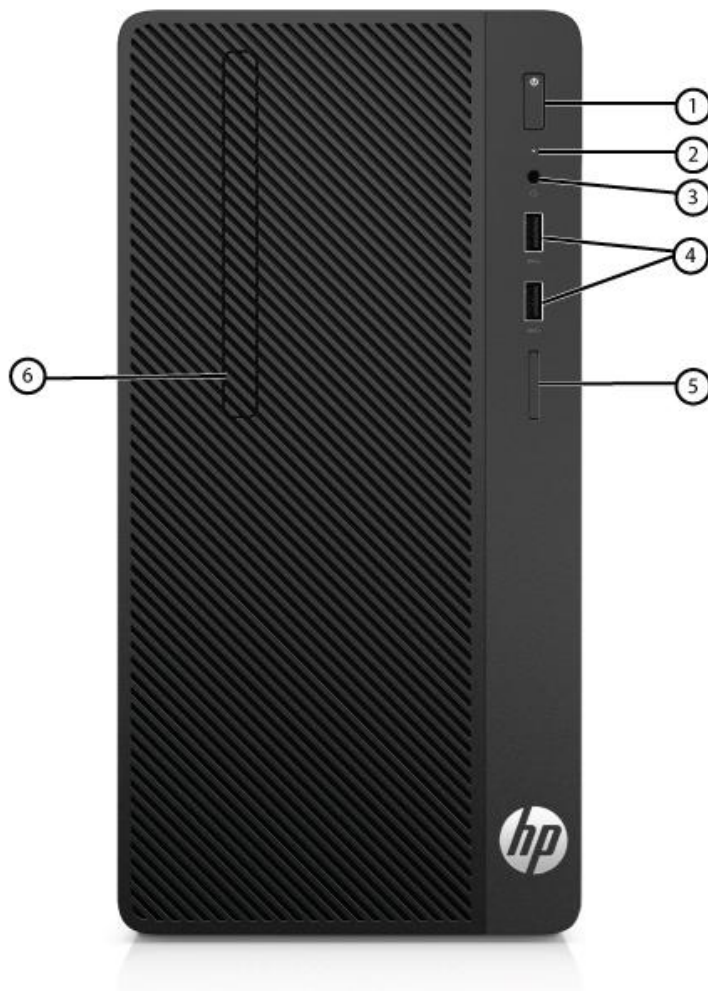


### Overview

### HP 280 G3 Microtower Business PC



#### **Front**

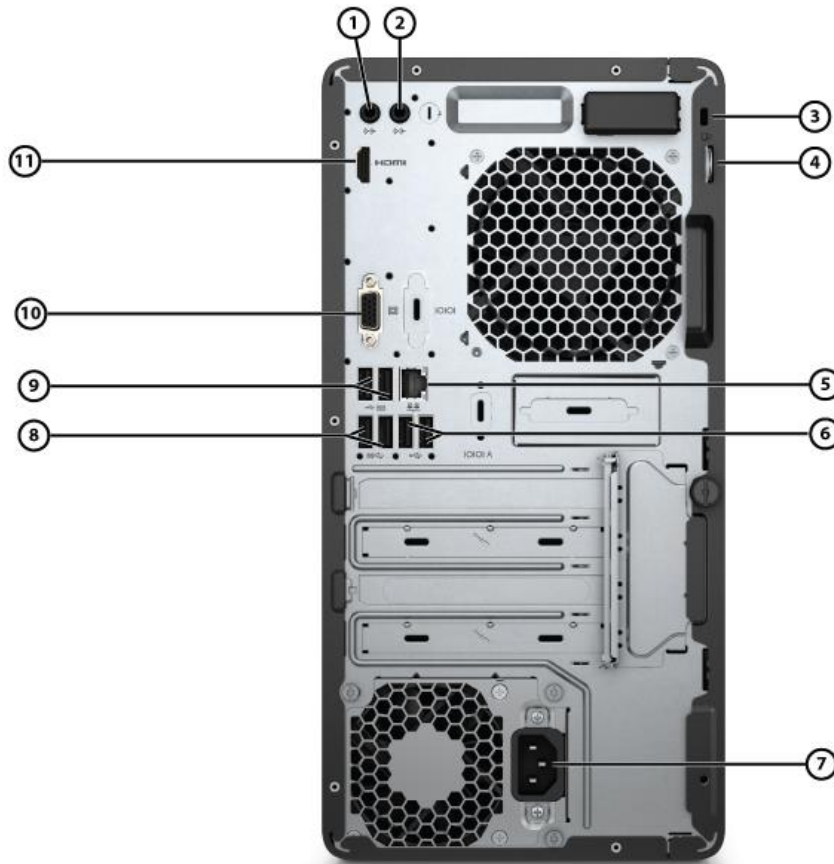
1. Power Button
2. PC Status LED
3. Microphone/Headphone Combo Jack
4. (2) USB 3.0 Ports
5. SD Media Card Reader (optional)
6. 5.25" Slim-height Bay - supporting an optical disk drive (optional)

#### **Not Shown**

- Slots (1) PCI Express x16 TLC 3.0 Graphics Connector  
(1) PCI Express x1 2.0 Accessory Connector  
(1) PCI 2.1 (optional, select countries only)  
(1) M.2 for WLAN
- Bays (1) 3.5" internal storage drive bay  
(1) 3.5" internal storage drive bay (optional)

### Overview

### HP 280 G3 Microtower Business PC

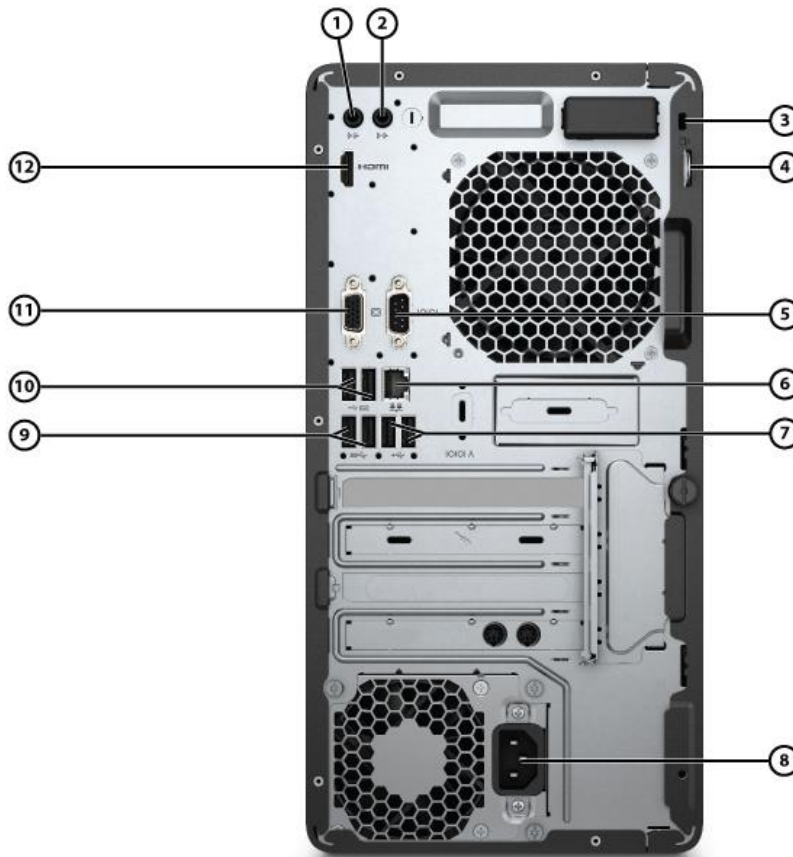


#### **Back**

- |                            |                           |
|----------------------------|---------------------------|
| 1. Audio Line In Connector | 7. Power Cord Connector   |
| 2. Audio-out connector     | 8. (2) USB 2.0 Ports      |
| 3. Cable Lock Slot         | 9. (2) USB 3.0 Ports      |
| 4. Pad Lock Slot           | 10. VGA monitor connector |
| 5. RJ-45 (network) jack    | 11. HDMI connector        |
| 6. (2) USB 2.0 Ports       |                           |

### Overview

### HP 280 G3 Microtower Business PC (Legacy) - Available in selected countries only



#### **Back**

- |                            |                           |
|----------------------------|---------------------------|
| 1. Audio Line In Connector | 7. (2) USB 2.0 Ports      |
| 2. Audio-out connector     | 8. Power Cord Connector   |
| 3. Cable Lock Slot         | 9. (2) USB 2.0 Ports      |
| 4. Pad Lock Slot           | 10. (2) USB 3.0 Ports     |
| 5. Serial port             | 11. VGA monitor connector |
| 6. RJ-45 (network) jack    | 12. HDMI connector        |

### Overview

#### AT A GLANCE

- Windows 10 Pro , Windows 10 Home, NeoKylin Linux (selected countries only) or FreeDOS 2.0
- Intel® H110 chipset supporting Intel® 6<sup>th</sup> and 7<sup>th</sup> generation Intel® Celeron®, Pentium®, Core™ i3, i5 and i7 processors featuring Intel® HD Graphics
- Supports an optional discrete graphics card
- Integrated 10/100/1000 Ethernet Controller
- Supports Wake-on-LAN (WOL)
- Up to 32GB DDR4 Unbuffered Memory (UDIMM)
- Supports both Hard Disk and Solid State Drives
- Independent monitor support via VGA video interfaces
- TPM 2.0 support
- High definition audio
- 8 USB ports (including 4 USB 3.0 ports)
- Security cable lock supported (sold separately)
- Protected by HP Services; terms and conditions vary by country; certain restrictions and exclusions apply

### Standard Features and Configurable Modules

#### CHIPSET

Intel® H110 Chipset

#### PROCESSORS

**NOTE:** Multi-Core is designed to improve performance of certain software products. Not all customers or software applications will necessarily benefit from use of this technology. Performance and clock frequency will vary depending on application workload and your hardware and software configurations. Intel's numbering is not a measurement of higher performance.

##### **Intel® 7th Generation Core™ i5 Processors\***

###### Intel® Core™ i5-7500 Processor

65W

Up to 3.8 GHz Max. Turbo Frequency (3.4 GHz base frequency)

6 MB cache, 4 cores, 4 threads

Intel® HD Graphics 630

Supports DDR4 memory up to 2400 MT/s data rate

##### **Intel® 7th Generation Core™ i3 Processors\***

###### Intel® Core™ i3-7100 Processor

51W

3.9 GHz base frequency

3 MB cache, 2 cores, 4 threads

Intel® HD Graphics 630

Supports DDR4 memory up to 2400 MT/s data rate

##### **Intel® 7th Generation Pentium® Processors\***

###### Intel® Pentium® G4560 Processor

54W

3.5 GHz Base Frequency

3 MB cache, 2 cores, 4 threads

Intel® HD Graphics 610

Supports DDR4 memory up to 2400 MT/s data rate

##### **Intel® 6th Generation Core™ i7 Processors**

###### Intel® Core™ i7-6700 Processor

65W

Up to 4.0 GHz Max. Turbo Frequency (3.4 GHz base frequency)

8 MB cache, 4 cores, 8 threads

Intel® HD Graphics 530

Supports DDR4 memory up to 2133 MT/s data rate

##### **Intel® 6th Generation Core™ i5 Processors**

###### Intel® Core™ i5-6500 Processor

65W

Up to 3.6 GHz Max. Turbo Frequency (3.2 GHz base frequency)

6 MB cache, 4 cores, 4 threads

Intel® HD Graphics 530

Supports DDR4 memory up to 2133 MT/s data rate

##### **Intel® 6th Generation Core™ i3 Processors**

###### Intel® Core™ i3-6100 Processor

### Standard Features and Configurable Modules

51W  
3.7 GHz base frequency  
3 MB cache, 2 cores, 4 threads  
Intel® HD Graphics 530  
Supports DDR4 memory up to 2133 MT/s data rate

#### Intel® 6th Generation Pentium® Processors

##### Intel® Pentium® G4400 Processor

54W  
3.3 GHz Base Frequency  
3 MB cache, 2 cores, 2 threads  
Intel® HD Graphics 510  
Supports DDR4 memory up to 2133 MT/s data rate

#### Intel® 6th Generation Celeron® Processors

##### Intel® Celeron® G3900 Processor

51W  
2.8 GHz Base Frequency  
2 MB cache, 2 cores, 2 threads  
Intel® HD Graphics 510  
Supports DDR4 memory up to 2133 MT/s data rate

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

## GRAPHICS

### Integrated

Intel® Integrated HD Graphics Varies by Processor

**Discrete** (optional for selected countries only)

NVIDIA® GeForce® GT 730 1GB PCIe x8 HDMI

AMD Radeon™ R5 420 Card

AMD Radeon™ R7 430 Card

## MEMORY\*

Both slots are customer accessible / upgradeable, Supports Dual Channel Memory

Form Factor	Type	Maximum	# of Slots
Microtower	DDR4-2400 (Transfer rates up to 2400 MT/s)	32 GB capacity	2 DIMM

4GB DDR4-2400 DIMM (1x4GB)

8GB DDR4-2400 DIMM (1x8GB)

16GB DDR4-2400 DIMM (1x16GB)

\* Full availability of 4 GB or more of memory requires a 64-bit operating system. With Windows 32-bit operating systems, the amount of usable memory is dependent upon your configuration, so that above 3 GB all memory may not be available due to system resource requirements.

Memory modules support data transfer rates up to 2400 MT/s; actual data rate is determined by the system's configured processor. See processor specifications for supported memory data rate.

### Standard Features and Configurable Modules

#### STORAGE\*

##### SATA 3.5" 6Gb/s HDDs\*

500GB 7200 RPM SATA Hard Disk Drive

1TB 7200 RPM SATA Hard Disk Drive

##### Solid State Drives 2.5" \*

128GB SATA SSD

256GB SATA SSD

##### Multi-format Digital Media Card Reader (optional)\*\*

HP 6-in-1 SD Media Card Reader (optional)

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

\*\*Card sold separately

#### OPTICAL DISC DRIVES\*

HP 9.5mm Desktop G3 Slim DVD-ROM Drive

HP 9.5mm Desktop G3 Slim DVD Writer Drive

\*Optical drives are optional or add on features. HD-DVD disks cannot be played on this drive. No support for DVD-RAM. Duplication of copyrighted material is strictly prohibited. Actual speeds may vary. Double Layer discs can store more data than single layer discs. Double Layer media compatibility will widely vary with some home DVD players and drives.

#### AUDIO/MULTIMEDIA

Integrated Hi-Definition Audio: Internal amplifier (Conexant CX20632 Audio Codec)

Combo Microphone/Headphone Jack

Line-out and Line-in rear port (3.5mm)

Standard internal speaker

#### NETWORKING

##### Ethernet (RJ-45)

Integrated 10/100/1000M Gigabit Ethernet Controller - Realtek RTL8111HSH-CG GbE Ethernet

Supports Wake-on-LAN (WOL)

##### Wireless (Optional)\*

Intel® 3168 802.11AC 2x2 Wi-Fi +Bluetooth® M.2 Combo Card non-vPro™ (optional)

Realtek RTL8723DE 802.11b/g/n (1x1) M.2 PCIe (optional)

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

### Standard Features and Configurable Modules

#### PORTS

##### Front I/O Ports

Two (2) USB 3.0 ports

One (1) Microphone/Headphone Combo Jack (CTIA)

##### Rear I/O Ports

Four (4) USB 2.0 ports

Two (2) USB 3.0 ports

One (1) RJ45 network connection

One (1) Audio Line out

One (1) Audio Line in

One (1) VGA

One (1) HDMI

##### Optional, select countries only

One (1) PS/2 port

One (1) Serial

##### Internal I/O Ports

One (1) PCIe x 16 (3.0)

One (1) PCIe x 1 (2.0)

One (1) M.2 for WLAN

One (1) PCI 2.3 (optional, select countries only)

#### BAYS

One (1) 3.5" Hard Disc Drive Bay

One (1) 3.5" / 2.5" Hard Disc Drive Bay (no bracket required)

One (1) 9.5 mm Slim ODD Bay

One (1) SD Card Reader bay (Optional)

#### KEYBOARDS AND POINTING DEVICES\*\*

##### Keyboards

Universal USB Wired Keyboard

HP PS/2 Business Slim Keyboard (optional, select countries only)

HP PS/2 Keyboard (optional, select countries only)

HP USB Antimicrobial Keyboard (China only)

HP USB Business Slim Keyboard

##### Mice

HP USB Mouse (not available for India)

HP USB Hardened Mouse (India only)

HP PS/2 Mouse (optional, select countries only)

HP USB Antimicrobial Mouse (China only)

\*\*Keyboards and mouse are optional or add-on features.



### Standard Features and Configurable Modules

#### **SERVICE AND SUPPORT**

On-site Warranty 1: Available three-year (3-3-3) or one-year (1-1-1) limited warranty (varies by country) delivers on-site, next business day 2 service for parts and labor and complimentary limited technical support.<sup>3</sup> Three-year onsite and labor are not available in all countries. Service offers terms up to 5 years by choosing an optional HP Care Pack.<sup>4</sup> To choose the right level of service for your HP product, visit HP Care Pack Central: <http://www.hp.com/go/cpc>.

**NOTE 1:** Terms and conditions may vary by country. Certain restrictions and exclusions apply. Other warranty variations may be offered in your region.

**NOTE 2:** On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.

**NOTE 3:** Technical telephone support applies only to HP-configured and third-party HP qualified hardware and software.

**NOTE 4:** 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. For details, visit [www.hp.com/go/cpc](http://www.hp.com/go/cpc). HP services are governed by the applicable HP terms and conditions of service provided or indicated to Customer at the time of purchase. Customer may have additional statutory rights according to applicable local laws, and such rights are not in any way affected by the HP terms and conditions of service or the HP Limited Warranty provided with your HP Product.

### Operating Systems & Software

#### **OPERATING SYSTEMS**

##### **Preinstalled (Windows)**

Windows 10 Pro 64<sup>1</sup>

Windows 10 Pro 64 (National Academic License)<sup>3</sup>

Windows 10 Home 64<sup>1</sup>

Windows 10 Home Single Language 64<sup>1</sup>

Windows 7 Professional 64 (available through downgrade rights from Windows 10 Pro)<sup>2,4</sup>

##### **Pre-installed (Other)**

FreeDOS 2.0

NeoKylin Linux 64

##### **Web-supported**

Windows 10 Enterprise 64<sup>1</sup>

Windows 7 Enterprise 64<sup>4</sup>

1. Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. Windows 10 is automatically updated, which is always enabled. ISP fees may apply and additional requirements may apply over time for updates. See <http://www.windows.com>.
2. This system is preinstalled with Windows 7 Pro software also comes with a license and media for Windows 10 Pro software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.
3. Some devices for academic use will automatically be updated to Windows 10 Pro Education with the Windows 10 Anniversary Update. Features vary; see <https://aka.ms/ProEducation> for Windows 10 Pro Education feature information.
4. Only available with 7<sup>th</sup> generation (Intel) processors.

### Operating Systems & Software

#### **SOFTWARE COMPONENTS AND APPLICATIONS WITH WINDOWS**

Preinstalled (varies by country)

##### **Multimedia**

CyberLink Power Media Player CMIT (select platforms only)

CyberLink Power2Go (select platforms only)

##### **Communication / Connectivity**

HP Velocity (select platforms only)

##### **HP Value Add Software**

HP ePrint Driver + JetAdvantage<sup>1</sup>

HP Hotkey Support - CMIT

HP Recovery Manager

HP Recovery Disc Creator (Windows 7 only)

HP Support Assistant

HP Jumpstart

Foxit PhantomPDF Express (Windows 7 only)

##### **Microsoft Products**

Buy Office

Skype<sup>2</sup>

##### **Manageability**

Discover HP Touchpoint Manager<sup>3</sup>

##### **Security**

Microsoft Security Essentials<sup>4</sup> (Windows 7 only)

Microsoft Defender

1. Requires an Internet connection to HP web-enabled printer and HP ePrint account registration (for a list of eligible printers, supported documents and image types and other HP ePrint details, see <http://www.hp.com/go/eprintcenter>). Print times and connection speeds may vary.
2. Skype is not offered in China.
3. HP Touchpoint Manager requires purchase of a subscription and supports Android™, iOS and Windows 7 or higher operating systems and PCs, notebooks, tablets and smartphones from various manufacturers. Not available in all countries see <http://www.hp.com/touchpoint> for availability information.
4. Opt in and internet connection required for updates.

### Technical Specifications

#### UNIT ENVIRONMENT AND OPERATING CONDITIONS

##### General Unit Operating Guidelines

- Keep the computer away from excessive moisture, direct moisture and the extremes of heat and cold, to ensure that unit is operated within the specified operating range.
- Leave a 10.2 cm (4 in) clearance on all vented sides of the computer to permit the required airflow.
- Never restrict airflow into the computer by blocking any vents or air intakes.
- Do not stack computers on top of each other or place computers so near each other that they are subject to each other's re-circulated or preheated air.
- Occasionally clean the air vents on the front, back, and any other vented side of the computer. Lint, dust and other foreign matter can block the vents and limit the airflow.
- If the computer is to be operated within a separate enclosure, intake and exhaust ventilation must be provided on the enclosure, and the same operating guidelines listed above will still apply.

Temperature Range	Operating: 32° to 104° F (0° to 40° C)* Non-operating: -22° to 140° F(-30° to 60° C)
Relative Humidity	Operating: 10% to 90% (non-condensing at ambient) Non-operating: 0% to 95% (non-condensing at ambient)
Maximum Altitude (unpressurized)	Operating: 10,000 ft (3048 m) Non-operating: 30,000 ft (9144 m)

\*Operating temperature is de-rated 1.0 deg C per 300 m (1000 ft) to 3000 m (10,000 ft) above sea level, no direct sustained sunlight. Maximum rate of change is 10 deg C/Hr. The upper limit may be limited by the type and number of options installed.

#### POWER SUPPLY\*

- 180W HE (full range)
- 310W HE (full range) – Selected countries only

\*Note: All power supplies are not available in every region.

### Technical Specifications

#### **DIMENSIONS AND WEIGHT (configured with 1 HDD and 1 ODD)**

Chassis (WxDxH in vertical orientation)	6.69 x 10.79 x 13.31 in 17 x 27.4 x 33.8 cm
--	--

System Weight	12.02 lbs / 5.45 kg
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#### **PACKAGING DIMENSIONS AND WEIGHT (configured with 1 HDD and 1 ODD)**

Dimensions	19.65 x 15.35 x 11.73 in 49.9 x 39 x 29.8 cm
------------	---

Weight	17.17 lbs / 7.79 kg
--------	---------------------

#### **SECURITY FEATURES**

Trusted Platform Module (TPM) 2.0  
Security cable slot

#### **CERTIFICATIONS**

EPEAT® Silver\* 1.0  
CECP (China Only)  
SEPA (China Only)  
WEEE (Waste, Electric and electronic equipment)  
ENERGY STAR® 6.1  
EuP Lot 3  
CEL Level 1  
FCC  
UL  
RoHS 2.06 Compliance

\*EPEAT® registered where applicable/supported. EPEAT registration varies by country. See [www.epeat.net](http://www.epeat.net) for registration status by country.

### Technical Specifications - Graphics

<b>Intel® HD Graphics (integrated)</b>			
DisplayPort™	Multimode capable; supports HDCP, DisplayPort™ Audio (2 streams), HBR2 link rates and Multi-Stream Technology for a maximum of 3 displays (including the integrated panel)		
Memory	The BIOS has options for selecting the dedicated memory size of 128MB, 256MB or 512MB Additional memory is allocated for graphics as needed using Intel's Dynamic Video Memory Technology (DVMT), to provide an optimal balance between graphics and system memory use.		
Maximum Graphics Memory	Microsoft Windows 7	Windows 8.1	Windows 10
	Up to 1.7GB	Up to 1.8GB	>4 GB
Note: the actual amount of maximum graphics memory can be less than the amounts listed above depending upon your computer's configuration.			
Maximum Color Depth	32 bits/pixel		
Graphics/Video API Support	6th Generation Core™ processors: <ul style="list-style-type: none"> <li>• Next Generation Intel® Clear Video Technology HD Support is a collection of video playback and enhancement features that improve the end user's viewing experience               <ul style="list-style-type: none"> <li>○ Encode/transcode HD content</li> <li>○ Playback of high definition content including Blu-ray Disc</li> <li>○ Superior image quality with sharper, more colorful images</li> </ul> </li> <li>• DirectX Video Acceleration (DXVA) support for accelerating video processing               <ul style="list-style-type: none"> <li>○ Full AVC/VC1/MPEG2/HEVC HW Decode</li> </ul> </li> <li>• Advanced Scheduler 2.0, 1.0</li> <li>• Windows 7, Windows 8.1, Windows 10, Linux OS Support</li> <li>• DirectX 12.1</li> <li>• OpenGL 4.4</li> <li>• Open CL 1.2 (Intel® HD Graphics 510)</li> <li>• Open CL 1.2/2.0 (Intel® HD Graphics 530)</li> </ul>		

#### Supported Display Resolutions and Refresh Rates

Note: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP. For All in One platforms, resolutions higher than the integrated panel resolution are not supported on the integrated panel.

Resolution	Refresh Rate	VGA	DisplayPort™	HDMI	Standard
640 x 480	60, 75, 85	X	X	X	VESA DMT, CVT 0.31M3
720 x 400	70	X	X	X	IBM VGA
800 x 600	60, 75, 85	X	X	X	VESA DMT, CVT0.48M3
1024 x 768	60, 75, 85	X	X	X	VESA DMT, CVT 0.79M3
1152 x 864	60, 75, 85	X	X	X	VESA DMT, CVT 0.83MA

### Technical Specifications - Graphics

1280 x 720	60, 75, 85	X	X	X	VESA DMT, CVT 0.92M9, CEA-770.3
1280 x 768	60, 60RB, 75, 85	X	X	X	VESA DMT, CVT 0.98M9/0.98M9-R
1280 x 800	60, 75, 85	X	X	X	VESA DMT
1280 x 960	60, 75, 85	X	X	X	VESA DMT
1280 x 1024	60, 75, 85	X	X	X	VESA DMT, CVT 1.31M4
1366 x 768	60, 60RB	X	X	X	VESA DMT
1440 x 900	60, 60RB	X	X	X	VESA DMT
1600 x 900	60, 60RB, 75, 85	X	X	X	VESA DMT
1680 x 1050	60, 60RB, 75	X	X	X	VESA DMT, CVT 1.76MA/1.76MA-R
1920 x 1080	60	X	X	X	VESA DMT, CVT 2.07M9, SMPTE 274M
1920 x 1200	60, 60RB, 75, 85	X*	X	X	DMT, CVT 2.30MA/2.30MA-R
1600 x 1200	60, 75, 85	X*	X	X	VESA DMT, 1.92M3
1920 x 1440	60, 75, 85		X	X	VESA DMT, CVT 2.76M3
2048 x 1536	60,75		X	X	CVT 3.15M3
2560 x 1440	59.951		X	X	CVT 3.69M9-R
2560 x 1600	60, 60RB		X	X	VESA DMT, CVT 4.10MA/4.10MA-R
3840 x 2160	24		X	X	CVT-RBv1/v2 (8.29M9-R), SMPTE 274M
3840 x 2160	25		X	X	CVT-RBv1/v2 (8.29M9-R), SMPTE 274M
3840 x 2160	30		X	X	CVT-RBv1/v2 (8.29M9-R), SMPTE 274M
3840 x 2160	50		X	X	CVT-RBv1/v2 (8.29M9-R), SMPTE 274M
3840 x 2160	60		X	X	CVT-RBv1/v2 (8.29M9-R), SMPTE 274M
4096 x 2160	24		X	X	CVT-RBv1/v2 (8.85M-R), SMPTE 274M
4096 x 2160	25		X	X	CVT-RBv1/v2 (8.85M-R), SMPTE 274M
4096 x 2160	30		X	X	CVT-RBv1/v2 (8.85M-R), SMPTE 274M
4096 x 2160	50		X	X	CVT-RBv1/v2 (8.85M-R), SMPTE 274M
4096 x 2160	60		X	X	CVT-RBv1/v2 (8.85M-R), SMPTE 274M
1920 x 1080	60		X	X	VESA (SMPTE 274M)
1920 x 1080	50		X	X	SMPTE 274M
1920 x 1080	30		X	X	SMPTE 274M
1920 x 1080	24		X	X	SMPTE 274M
1280 x 720	60		X	X	VESA (CEA-770.3)
1280 x 720	50		X	X	SMPTE 296M
720 x 480	60		X	X	MHL (CEA-770.2)
720 x 576	50		X	X	ITU-R BT.1358

### Technical Specifications - Graphics

640 x 480	60		X	X	CEA (VESA DMT)
* 60Hz refresh rate only on VGA					

### NVIDIA® GeForce® GT 730 1GB PCIe x8 HDMI Graphics Card

<b>Memory</b>	1GB GDDR5 64-bit wide frame buffer operating at 2.5GHz.
<b>Controller Clock Speed</b>	NVIDIA® Kepler™ GPU operating at 901 MHz
<b>Multi-display Support</b>	A maximum of 2 displays are supported by the card
<b>Graphics /API support</b>	Supports Microsoft DirectX 12, OpenGL 4.4 and OpenCL 2 API, Shade Model 5 and DirectCompute 11
<b>Output Connectors</b>	1 x Dual-Link DVI-I; 1x HDMI; Includes DVI to VGA adapter

### Supported Display Resolutions and Refresh Rates

**Note:** other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	Refresh Rate*	VGA (DVI-VGA adapter)	DVI-D	HDMI	Standard
640 x 480	60, 75, 85	X	X	X	VESA DMT, CVT 0.31M3
720 x 400	70	X	X	X	IBM VGA
800 x 600	60, 75, 85	X	X	X	VESA DMT, CVT0.48M3
1024 x 768	60, 75, 85	X	X	X	VESA DMT, CVT 0.79M3
1152 x 864	60, 75, 85	X	X	X	VESA DMT, CVT 0.83MA
1280 x 720	60, 75, 85	X	X	X	VESA DMT, CVT 0.92M9, CEA-770.3
1280 x 768	60, 60RB, 75, 85	X	X	X	VESA DMT, CVT 0.98M9/0.98M9-R
1280 x 800	60, 75, 85	X	X	X	VESA DMT
1280 x 960	60, 75, 85	X	X	X	VESA DMT
1280 x 1024	60, 75, 85	X	X	X	VESA DMT, CVT 1.31M4
1366 x 768	60, 60RB	X	X	X	VESA DMT
1440 x 900	60, 60RB	X	X	X	VESA DMT
1600 x 900	60, 60RB, 75, 85	X	X	X	VESA DMT
1680 x 1050	60, 60RB, 75	X	X	X	VESA DMT, CVT 1.76MA/1.76MA-R
1920 x 1080	60	X	X	X	VESA DMT, CVT 2.07M9, SMPTE 274M
1920 x 1200	60, 60RB, 75, 85	X	X	X	DMT, CVT 2.30MA/2.30MA-R



### Technical Specifications - Graphics

1600 x 1200	60, 75, 85	X	X	X	VESA DMT, 1.92M3
1920 x 1440	60, 75, 85	X	X	X	VESA DMT, CVT 2.76M3
2048 x 1536	60,75	X	X	X	CVT 3.15M3
2560 x 1440	59.951		X	X	CVT 3.69M9-R
2560 x 1600	60, 60RB		X	X	VESA DMT, CVT 4.10MA/4.10MA-R
3840 x 2160	24			X	CVT-RBv1/v2 (8.29M9-R), SMPTE 274M
3840 x 2160	25			X	CVT-RBv1/v2 (8.29M9-R), SMPTE 274M
3840 x 2160	30		X	X	CVT-RBv1/v2 (8.29M9-R), SMPTE 274M
3840 x 2160	50				CVT-RBv1/v2 (8.29M9-R), SMPTE 274M
3840 x 2160	60				CVT-RBv1/v2 (8.29M9-R), SMPTE 274M
4096 x 2160	24			X	CVT-RBv1/v2 (8.85M-R), SMPTE 274M
4096 x 2160	25			X	CVT-RBv1/v2 (8.85M-R), SMPTE 274M
4096 x 2160	30			X	CVT-RBv1/v2 (8.85M-R), SMPTE 274M
4096 x 2160	50				CVT-RBv1/v2 (8.85M-R), SMPTE 274M
4096 x 2160	60				CVT-RBv1/v2 (8.85M-R), SMPTE 274M
1920 x 1080	60		X	X	VESA (SMPTE 274M)
1920 x 1080	50		X	X	SMPTE 274M
1920 x 1080	30		X	X	SMPTE 274M
1920 x 1080	24		X	X	SMPTE 274M
1280 x 720	60		X	X	VESA (CEA-770.3)
1280 x 720	50		X	X	SMPTE 296M
720 x 480	60		X	X	MHL (CEA-770.2)

\* >60 refresh rates only for analog (VGA) signaling

### Technical Specifications – Hard Disk and Solid State Storage

<b>500GB* 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive</b>		
<b>Formatted Capacity</b>	500,107,862,016 bytes	
<b>Spindle Speed</b>	7,200 rpm	
<b>Interface</b>	Serial ATA 3.0 (6.0 Gb/s)	
<b>Buffer Size</b>	16 MB	
<b>Logical Blocks</b>	976,773,168	
<b>Seek Time (average)</b>	Single Track:	2.0 ms
	Average:	11 ms
	Full-Stroke:	21 ms
<b>Height (nominal)</b>	1 in/2.54 cm	
<b>Width (nominal)</b>	Media diameter: 3.5 in/8.89 cm	
	Physical size: 4 in/10.2 cm	
<b>Operating Temperature</b>	41° to 131° F (5° to 55° C)	
<p>*NOTE: For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.</p>		

<b>HP 1 TB* 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive*</b>		
<b>Formatted Capacity</b>	1,000,204,886,016 bytes	
<b>Rotational Speed</b>	7,200 rpm	
<b>Interface</b>	Serial ATA 3.0 (6.0 Gb/s)	
<b>Buffer Size</b>	32 MB	
<b>Logical Blocks</b>	1,953,525,168	
<b>Seek Time (average)</b>	Single Track:	2.0 ms
	Average:	11 ms
	Full-Stroke:	21 ms
<b>Height (nominal)</b>	1 in/2.54 cm	
<b>Width (nominal)</b>	Media diameter: 3.5 in/8.89 cm	
	Physical size: 4 in/10.2 cm	
<b>Operating Temperature</b>	41° to 131° F (5° to 55° C)	

### Technical Specifications – Hard Disk and Solid State Storage

\* For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software.

#### 128GB SATA 2.5" Value (Non-SED) Solid State Drive

<b>Unformatted Capacity</b>	128 GB	
<b>Architecture</b>	TLC NAND Flash	
<b>Interface</b>	SATA 3.2 (6.0 Gb/s)	
<b>Form Factor</b>	2.5 inch	
<b>Dimensions (W x H x D)</b>	6.98 x 0.7 x 10.05 cm	
<b>Weight</b>	31g	
<b>Bandwidth Performance</b>	Sustained Sequential Read:	Up to 510 MB/s
	Sustained Sequential Write:	Up to 330 MB/s
	Random Read:	Up to 38K IOPs
	Random Write:	Up to 70K IOPs
<b>Power</b>	DC power requirement:	5 VDC 5%-100 mV ripple p-p
	Total power consumption:	50mW (active); 20mW (idle)
<b>Useful Drive Life</b>	72TB written, up to 40GB/day for 5 years	
<b>Environmental</b> (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity:	5% to 95%
	Shock:	1,500 G/0.5 ms

NOTE: "For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software."

#### 256GB SATA 2.5" Value (Non-SED) Solid State Drive

<b>Unformatted Capacity</b>	256 GB
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### Technical Specifications – Hard Disk and Solid State Storage

<b>Architecture</b>	TLC NAND Flash	
<b>Interface</b>	SATA 3.2 (6.0 Gb/s)	
<b>Form Factor</b>	2.5 inch	
<b>Dimensions (W x H x D)</b>	6.98 x 0.7 x 10.05 cm	
<b>Weight</b>	31g	
<b>Bandwidth Performance</b>	Sustained Sequential Read:	Up to 510 MB/s
	Sustained Sequential Write:	Up to 330 MB/s
	Random Read:	Up to 38K IOPs
	Random Write:	Up to 70K IOPs
<b>Power</b>	DC power requirement:	5 VDC 5%-100 mV ripple p-p
	Total power consumption:	50mW (active); 20mW (idle)
<b>Useful Drive Life</b>	72TB written, up to 40GB/day for 5 years	
<b>Environmental</b> (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity:	5% to 95%
	Shock:	1,500 G/0.5 ms

**NOTE:** "For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB (for Windows 10) of system disk is reserved for the system recovery software."

### Technical Specifications - Removable Storage

<b>HP 9.5mm Desktop G3 Slim DVD Writer Drive*</b>		
<b>Height</b>	9.5 mm height	
<b>Orientation</b>	Either horizontal or vertical	
<b>Interface type</b>	SATA/ATAPI	
<b>Disc recording capacity</b>	Up to 8.5 GB DL or 4.7 GB standard	
<b>Dimensions (W x H x D)</b>	5.04 x 0.37 x 5.0 in (128 x 9.5 x 127 mm) without bezel	
<b>Weight (max)</b>	0.31 lb (140 g)	
	DVD-R DL	Up to 6X
	DVD+R	Up to 8X
	DVD+RW	Up to 8X
	DVD+R DL	Up to 6X
	DVD-R	Up to 8X
	DVD-RW	Up to 6X
	CD-R	Up to 24X
	CD-RW	Up to 10X
	DVD-RW, DVD+RW	Up to 8X
	DVD-R DL, DVD+R DL	Up to 8X
	DVD+R, DVD-R	Up to 8X
	DVD-ROM DL, DVD-ROM	Up to 8X
	CD-ROM, CD-R	Up to 24X
	CD-RW	Up to 24X
<b>Access time</b> (typical reads, including settling)	Random	DVD-ROM: 170 ms (typical), CD-ROM: 170 ms (typical)
	Full Stroke	DVD-ROM: 320 ms (typical), CD-ROM: 320 ms (typical)
	Stop Time	6 seconds (typical)
<b>Power</b>	Source	Slimline SATA DC power receptacle
	DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p
	DC Current	5 VDC (< 1000 mA typical, 1600 mA maximum)
<b>Environmental conditions</b> (operating - non-condensing)	Temperature	41° to 122° F (5° to 50° C)
	Relative Humidity	10% to 80%
	Maximum Wet Bulb Temperature	84° F (29° C)
*HD-DVD disks cannot be played on this drive. No support for DVD-RAM. Actual speeds may vary. Don't copy copyright-protected materials. Double Layer discs can store more data than single layer-discs. Discs burned with this drive may not be compatible with many existing single-layer DVD drives and players.		

### Technical Specifications - Removable Storage

<b>HP 9.5mm Desktop G3 Slim DVD-ROM Drive</b>		
<b>Height</b>	9.5mm	
<b>Orientation</b>	Either horizontal or vertical	
<b>Interface type</b>	SATA/ATAPI	
<b>Dimensions (W x H x D)</b>	5.04 x 0.37 x 5.0 in (128 x 9.5 x 127 mm) without bezel	
<b>Weight (max)</b>	Up to 0.31 lb (140g) without bezel	
<b>Read speeds</b>	DVD+R/-R/+RW/ -RW/+R DL /-R DL	Up to 8X
	DVD-ROM	Up to 8X
	CD-ROM, CD-R	Up to 24X
	CD-RW	Up to 24X
<b>Access time</b> (typical reads, including settling)	Random	DVD-ROM: 170 ms (typical), CD-ROM: 170 ms (typical)
	Full Stroke	DVD-ROM: 320 ms (typical), CD-ROM: 320 ms (typical)
<b>Power</b>	Source	Slimline SATA DC power receptacle
	DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p
	DC Current	5 VDC - <1000 mA typical, < 1600 mA maximum
<b>Environmental</b> (all conditions non-condensing)	Temperature	41° to 122° F (5° to 50° C)
	Relative Humidity	10% to 80%
	Maximum Wet Bulb Temperature (operating)	84° F (29° C)

### Technical Specifications - Audio

#### High Definition Audio

<b>Type</b>	Integrated
<b>HD Stereo Codec</b>	Conexant CX20632
<b>Audio I/O Ports</b>	Headset connector supports a CTIA style headset and is re-taskable as a Line-in, Line-out, Microphone-in or Headphone-out port
	Rear Line-In can be retasked to function as a microphone input
	Rear Line-Out
	Front Headphone-Out
	All ports are 3.5mm and support stereo ( see above tables for system configurations)
<b>Internal Speaker Amplifier</b>	2W class D mono amplifier for the internal speaker only. External speakers must be powered externally.
<b>Multi-streaming Capable</b>	Playback multi-streaming can be enabled in the audio control panel to allow independent audio streams to be sent to/from the front and rear jacks or integrated speaker.
<b>Sampling</b>	Independent sampling rates for DAC's and ADC's; supports resolutions from 16 to 24-bit; 44.1 kHz to 192 kHz for DAC and 44.1 kHz to 96 kHz for ADC
<b>Wavetable Syntheses</b>	Yes – Uses OS soft wavetable
<b>Analog Audio</b>	Yes
<b># of Channels on Line-Out</b>	Stereo (Left & Right channels)
<b>Internal Speaker</b>	Yes
<b>External Speaker Jack</b>	2W class D mono amplifier for the internal speaker only. External speakers must be powered externally.

### Technical Specifications - Networking

<b>Realtek RTL8111HSH-CG GbE</b>		
<b>10/100/1000 NIC</b>	<b>Ethernet Features</b>	10 Mbit/s operation (10BASE-T; IEEE 802.3i; IEEE 802.3 clauses 13-14) 100 Mbit/s operation (100BASE-TX; IEEE 802.3u; IEEE 802.3 clauses 21-30) 1000 Mbit/s operation (1000BASE-T; IEEE 802.3ab; IEEE 8023 clauses 40) Auto-Negotiation (Automatic Speed Selection) Full Duplex Operation at all Speeds, Half Duplex operation at 10 and 100 Mbit/s IEEE 802.1p QoS (Quality of Service) Support IEEE 802.1q VLAN support IEEE 802.3x Flow Control (IEEE 802.3 clauses 31-32; configurable) IEEE 802.3az EEE (Energy Efficient Ethernet) Jumbo Frame 9K Auto MDI/MDIX Crossover cable detection
	<b>Power Management</b>	ACPI compliant – multiple power modes Situation-sensitive features reduce power consumption Advanced link down power saving for reducing link down power consumption
	<b>Performance Features</b>	TCP/IP/UDP Checksum Offload (configurable) Protocol Offload (ARP & NS) Large send offload and Giant send offload 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) PXE 2.1 Remote Boot Statistics Gathering (SNMP MIB II, Ethernet-like MIB, Ethernet MIB (802.3x, clause 30)) Comprehensive diagnostic and configuration software suite Virtual Cable Doctor for Ethernet cable status
	<b>Interface</b>	PCI Express 1.1 x1 to fully support ASPM L0s/L1 and CLKREQ
	<b>NIC Device Driver Name</b>	PCIe GBE Ethernet Family Controller



### Technical Specifications - Networking

<b>Intel® 3168 802.11AC 2x2 Wi-Fi +Bluetooth® M.2 Combo Card non-vPro™*</b>	
<b>Wireless LAN Standards</b>	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11ac
<b>Interoperability</b>	Wi-Fi certification
<b>Frequency Bands</b>	802.11b/g/n  2.402 – 2.482 GHz  <b>Note:</b> The FCC has declared as of January 1, 2015 products that utilize passive scanning on channel 12/13 and are capable of transmitting must fully comply with requirements of 15.247 or otherwise disable those channels.
	802.11a/n  4.9 – 4.95 GHz (Japan) 5.15 – 5.25 GHz 5.25 – 5.35 GHz 5.47 – 5.725 GHz 5.825 – 5.850 GHz <b>Note: Indonesia only supports 5.725 - 5.825 GHz (CH149 - CH161)</b>
<b>Data Rates</b>	<ul style="list-style-type: none"> <li>• 802.11b: 1, 2, 5.5, 11 Mbps</li> <li>• 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</li> <li>• 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</li> <li>• 802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz)</li> <li>• 802.11ac : MCS0 ~ MCS7, (1SS) (20MHz, 40MHz, and 80MHz)</li> </ul>
<b>Modulation</b>	Direct Sequence Spread Spectrum  BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM
<b>Security<sup>1</sup></b>	<ul style="list-style-type: none"> <li>• IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only</li> <li>• AES-CCMP: 128 bit in hardware</li> <li>• 802.1x authentication</li> <li>• WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.</li> <li>• WPA2 certification</li> <li>• IEEE 802.11i</li> <li>• Cisco Certified Extensions, all versions through CCX4 and CCX Lite</li> <li>• WAPI</li> </ul>
<sup>1</sup> Check latest software/driver release for updates on supported security features.	

### Technical Specifications - Networking

<b>Network Architecture Models</b>	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
<b>Roaming</b>	802.11r Fast Roaming
<b>Output Power<sup>2</sup></b>	<ul style="list-style-type: none"> <li>• 802.11b : +16dBm minimum</li> <li>• 802.11g : +14dBm minimum</li> <li>• 802.11a : +14dBm minimum</li> <li>• 802.11n HT20(2.4GHz) : +14dBm minimum</li> <li>• 802.11n HT40(2.4GHz) : +12dBm minimum</li> <li>• 802.11n HT20(5GHz) : +14dBm minimum</li> <li>• 802.11n HT40(5GHz) : +12dBm minimum</li> <li>• 802.11ac 80MHz(5GHz) : +11dBm minimum</li> </ul> <p><sup>2</sup> Maximum output power may vary by country according to local regulations.</p>
<b>Power Consumption</b>	Transmit: 2.0 W (max) Receive: 1.6 W (max) Idle mode (PSP): 180 mW (WLAN Associated) Idle mode: 50 mW (WLAN unassociated) Connect Standby: 10 mW (WLAN+BT) Radio disabled: 5 mW
<b>Power Management</b>	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
<b>Receiver Sensitivity<sup>3</sup></b>	802.11b, 1Mbps : -94dBm maximum 802.11b, 11Mbps : -86dBm maximum 802.11g, 6Mbps : -88dBm maximum 802.11g, 54Mbps : -74dBm maximum 802.11a, 6Mbps : -88dBm maximum 802.11a, 54Mbps : -74dBm maximum 802.11n, MCS07 : -69dBm maximum 802.11n, MCS15 : -66dBm maximum 802.11ac, 1SS, MCS-0 : -86dBm maximum 802.11ac, 1SS, MCS-9 : -61dBm maximum 802.11ac, 2SS, MCS-0 : -83dBm maximum 802.11ac, 2SS, MCS-9 : -58dBm maximum
	<sup>3</sup> 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).
<b>Antenna type</b>	High efficiency antenna with spatial diversity, mounted in the display enclosure Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth® communications
<b>Form Factors</b>	PCI-Express M.2 MiniCard
<b>Dimensions</b>	Type 2230 : 2.3 x 22.0 x 30.0 mm Or Type 1630 : 2.3 x 16.0 x 30.0 mm

### Technical Specifications - Networking

<b>Weight</b>	Type 2230 : 2.8g Or Type 1630 : 2g													
<b>Operating Voltage</b>	3.3v +/- 9%													
<b>Temperature</b>	<b>Operating:</b> <b>Non-operating:</b>	14° to 158° F (-10° to 70° C) -40° to 176° F (-40° to 80° C)												
<b>Humidity</b>	<b>Operating:</b> <b>Non-operating:</b>	10% to 90% (non-condensing) 5% to 95% (non-condensing)												
<b>Altitude</b>	<b>Operating:</b> <b>Non-operating:</b>	0 to 10,000 ft (3,048 m) 0 to 50,000 ft (15,240 m)												
<b>LED Activity</b>	LED Amber – Radio OFF; LED White – Radio ON													
* Wireless access point and Internet service required and not included. Availability of public wireless access points limited.														
<b>HP Integrated Module with Bluetooth® 4.0/4.1/4.2 Wireless Technology</b>														
<b>Bluetooth® Specification</b>	4.0/4.1/4.2 Compliant													
<b>Frequency Band</b>	2402 to 2480 MHz													
<b>Number of Available Channels</b>	Legacy : 0~79 (1 MHz/CH) BLE : 0~39 (2 MHz/CH)													
<b>Data Rates and Throughput</b>	Legacy : 3 Mbps data rate; throughput up to 2.17 Mbps													
	BLE : 1 Mbps data rate; throughput up to 0.2 Mbps Legacy : Synchronous Connection Oriented links up to 3, 64 kbps, voice channels													
	Legacy : Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)													
<b>Transmit Power</b>	The Bluetooth® component shall operate as a Class II Bluetooth® device with a maximum transmit power of + 4 dBm for BR and EDR.													
<b>Receiver Sensitivity Legacy</b>	<table border="1"> <thead> <tr> <th>Modulation</th> <th>0.01% BER</th> <th>0.001% BER</th> </tr> </thead> <tbody> <tr> <td>GFSK</td> <td>-80 dBm</td> <td>-70 dBm</td> </tr> <tr> <td>π/4-DQPSK</td> <td>-80 dBm</td> <td>-70 dBm</td> </tr> <tr> <td>8DPSK</td> <td>-80 dBm</td> <td>-70 dBm</td> </tr> </tbody> </table>		Modulation	0.01% BER	0.001% BER	GFSK	-80 dBm	-70 dBm	π/4-DQPSK	-80 dBm	-70 dBm	8DPSK	-80 dBm	-70 dBm
Modulation	0.01% BER	0.001% BER												
GFSK	-80 dBm	-70 dBm												
π/4-DQPSK	-80 dBm	-70 dBm												
8DPSK	-80 dBm	-70 dBm												
<b>Power Consumption</b>	Peak (Tx) 330 mW Peak (Rx) 230 mW Selective Suspend 17 mW													

### Technical Specifications - Networking

<b>Range</b>	Legacy Up to 33 ft (10 m) BLE Up to 99 ft (30 m)
<b>Electrical Interface</b>	USB 2.0 compliant
<b>Bluetooth® Software Supported Link Topology</b>	Microsoft Windows Bluetooth® Software
<b>Electrical Interface Bluetooth® Software Supported Security</b>	Point to Point, Multipoint Pico Nets up to 7 slaves
	Full support of Bluetooth® Security Provisions
<b>Power Management Certifications</b>	Microsoft Windows ACPI, and USB Bus Support
	Self-configurable to optimize power conservation in all operating modes, including Standby, Hold, Park, and Sniff
<b>Security</b>	All necessary regulatory approvals for supported countries, including:
<b>Certifications Bluetooth® Profiles Supported</b>	FCC (47 CFR) Part 15C, Section 15.247 & 15.249
<b>Power Management Certifications</b>	ETS 300 328, ETS 300 826
	Low Voltage Directive IEC950
<b>Certifications Bluetooth® Profiles Supported</b>	UL, CSA, and CE Mark
	Serial Port Profile (SPP) <sup>1</sup> Service Discovery Application Profile (SDAP) Dial-Up Networking (DUN) <sup>1,2</sup> Generic Object Exchange Profile (GOEP) <sup>1,2</sup> Object Push Profile (OPP) <sup>1,2</sup> Hard Copy Cable Replacement (HCRP) <sup>1,2</sup> Personal Area Networking Profile (PAN) <sup>1,2</sup> Human Interface Device Profile (HID) <sup>1,2</sup> Hands Free Profile (HFP) Advanced Audio Distribution Profile (A2DP)
	Audio Video Remote Control Profile (AVRCP)
<b>Bluetooth® V4.1/V4.2 support feature</b>	V4.1: ESR5/6/7 compliant
	V4.2: ESR8 compliant, LE Secure Connection – Basic.

### Technical Specifications - Networking

<b>Realtek RTL8723DE 802.11b/g/n (1x1) M.2 PCIe (optional)</b>			
<b>Wireless LAN Standards</b>	IEEE802.11b; IEEE 802.11g; IEEE 802.11n; BT v2.1+EDR/3.0/4.0/4.1/4.2		
<b>Bus Interface</b>	Complies with PCI Express for WLAN Complies with USB for BT		
<b>Form Factor</b>	M.2 1630-S3-AE		
<b>Data Rate</b>	802.11b: 11, 5.5, 2, 1 Mbps; 802.11g: 54, 48, 36, 24, 18, 12, 9, 6 Mbps 802.11n: HT20 mode: MCS0 to 7 HT40 mode: MCS0 to 7 BT: 1Mbps for basic rate, 2Mbps/3Mbps for enhanced data rate		
<b>Media Access Control</b>	WiFi: CSMA/CA with ACK BT: AFH, Time Division		
<b>Modulation Techniques</b>	802.11b: CCK, DQPSK, DBPSK 802.11g: 64QAM, 16QAM, QPSK, BPSK 802.11n: BPSK, QPSK, 16-QAM, 64-QAM BT: 8DPSK, $\pi/4$ -DQPSK, GFSK		
<b>Network Architecture</b>	WiFi: Ad-hoc mode (Peer-to-Peer), Infrastructure mode BT: Pico net, Scatter net		
<b>Operating Channel</b>	WIFI 2.4GHz Channels 1-11 with active scan, Channels 12,13 with passive scan BT (CHO~78)		
<b>Frequency Range</b>	WiFi: 2.4~2.4835GHz, BT: 2.400~2.483GHz		
<b>Transmit Output Power<sup>1</sup></b>	802.11 b 11Mbps 16dBm	802.11 g 54Mbps 14dBm	802.11 n MCS7 13dBm(HT20) ; 13dBm (HT40)
	BT Max +6dBm		
<b>Receiver Sensitivity<sup>1</sup></b>	802.11 b 11Mbps <-83dBm	802.11 g 54Mbps <-70dBm	802.11 n MCS7 <67dBm(HT20) ; <64dBm (HT40)
	<sup>1</sup> TX power and sensitivity level are for Mfg test spec.		
<b>Security</b>	WiFi: WPA, WPA-PSK, WPA2, WPA2-PSK, WEP 64bit&128bit, IEEE 802.11x, IEEE 802.11i BT: simple paring		
<b>Current Consumption</b>	Wi-Fi enable, BT disabel TX mode : 268mA maximum RX mode: 270mA maximum WiFi disable, BT enable: BT Tx mode: 216mA maximum BT Rx mode: 92mA maximum		

### Technical Specifications - Networking

<b>Radio ON/OFF Switch</b>	Active Low Signals with Weakly Pull-up Pin-56: WL_DIS # to enable/disable WiFi, active low signal Pin-54: BT_DIS # to enable/disable BT, active low signal	
<b>LED status indicator</b>	Active Low Signals with Open-Drain Pin-6: LED_WLAN # WiFi active indicator Pin-16: LED_BT # BT active indicator	
<b>Dimensions (LxWxH)</b>	.8 x 16 x 30.0 mm	
<b>Operating Voltage</b>	3.3v typical	
<b>Temperature</b>	<b>Operating:</b>	14° to 158° F (32° to 70° C)

### After-Market Options (availability may vary by region)

<b>Type</b>	<b>Description</b>	<b>Part #</b>
<b>Displays</b>	HP v194 18.5-inch Display	V5E94AA V5E94A6 V5E94A8
	HP v197 18.5 –inch Display	V5J61AA
	HP v214a 20.7 –inch Display	1FR84AA
<b>Memory</b>	HP 4GB DDR4-2400 DIMM	Z9H59AA
	HP 8GB DDR4-2400 DIMM	Z9H60AA
	HP 16GB DDR4-2400 DIMM	Z9H57AA
<b>Storage</b>	HP 500GB 3.5" SATA 6.0Gb/s Hard Drive	QK554AA
	HP 1TB 7200rpm SATA 6Gbps Hard Drive	QK555AA
	HP 9.5mm G3 8/4 SFF G4 400 SFF/MT DVD-Writer	1CA53AA
<b>Graphics</b>	NVIDIA GeForce GT730 2GB PCIe x8 DP GFX	N3R90AA
	AMD Radeon R5 420	1MX31AA
	AMD Radeon R7 430	1MX32AA
<b>Security</b>	HP UltraSlim Cable Lock Kit	H4D73AA
	HP Business PC Security Lock Kit	PV606AA
<b>Adapters</b>	HP USB to Serial Adapter	J7B60AA
<b>Networking</b>	Intel® 7265 802.11ac PCIe x1 Card	N4G85AA
	Intel Ethernet I210-T1 GbE NIC Card	E0X95AA
<b>Multimedia</b>	HP Business Headset v2	T4E61AA
	HP USB Business Speaker v2	N3R89AA
<b>Input</b>	HP USB Keyboard	QY776AA
	HP Conferencing Keyboard	K8P74AA
	HP USB Antimicrobial Keyboard and Mouse (China Only)	K7X25AA
	HP USB Mouse	QY777AA

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### Change Log

Date of change:	Version History:		Description of change:
25/05/2017	V1 to V2	Update	Parallel Port removed from "PORTS"