

### Overview

#### HP ProOne 245 23.8 inch G10 All-in-One Desktop PC

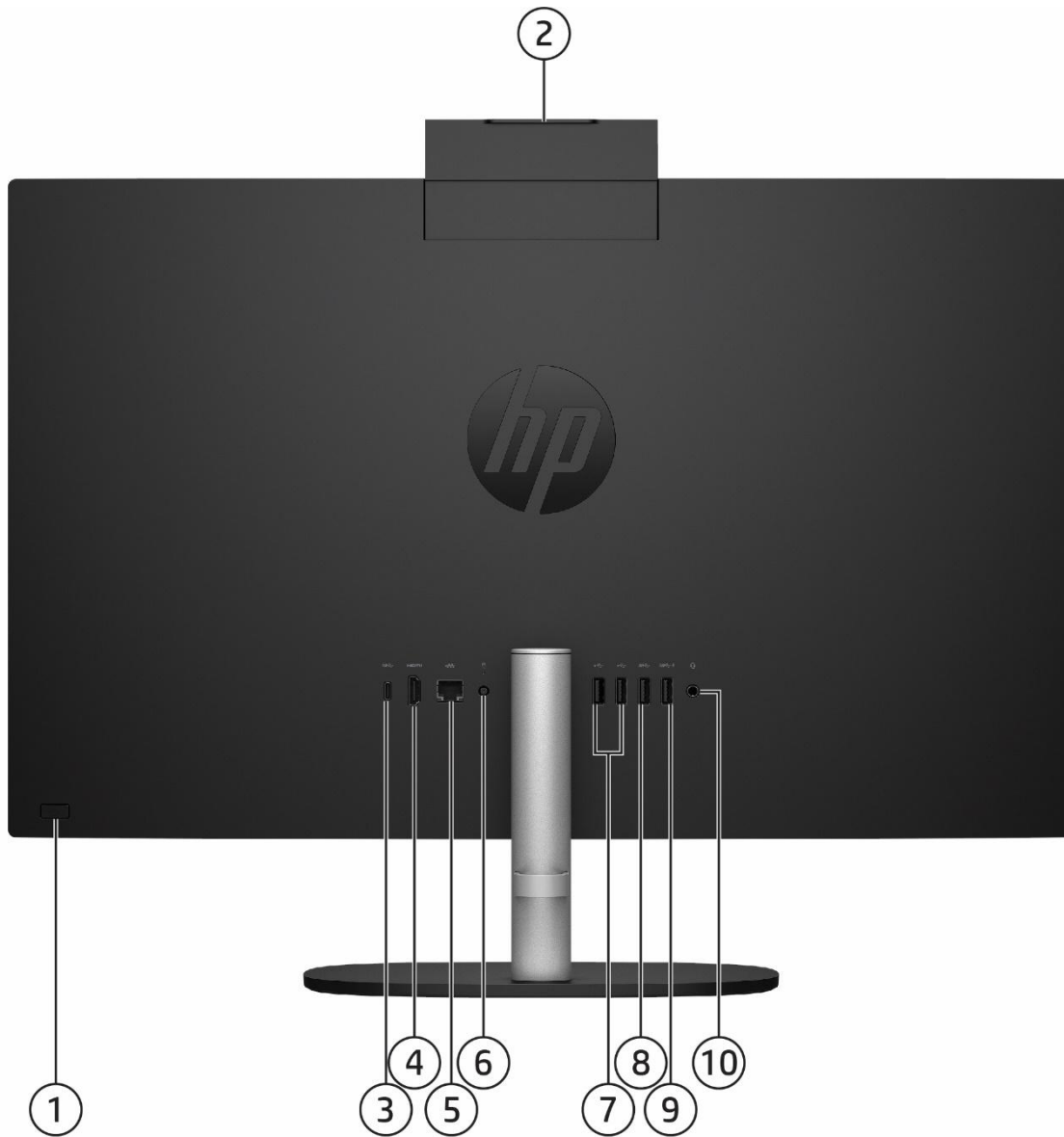


**Front**

1. Pull-up tiltable 5mp webcam and microphone
2. Speakers (downfiring)

### Overview

### HP ProOne 245 23.8 inch G10 All-in-One Desktop PC



#### Rear

1. Power button
2. Pull-up webcam
3. One (1) Type-C USB 5Gbps signaling rate port
4. HDMI 1.4 out connector
5. RJ-45 (network) jack
6. Power connector
7. Two (2) Type-A Hi-Speed USB 480Mbps signaling rate ports
8. One (1) Type-A SuperSpeed USB 5Gbps signaling rate port
9. One (1) Type-A SuperSpeed USB 5Gbps signaling rate port with HP Sleep and Charge
10. Microphone/Headphone Combo Jack

### Overview

#### AT A GLANCE

- Choice of Windows 11 Pro, Windows 11 Home, and FreeDOS.
- Integrated All-in-One form factor.
- 23.8-inch diagonal widescreen Full HD anti-glare display.
- Latest AMD® Ryzen™ and Athlon™ Processors with AMD Radeon™ 610M Graphics.
- Up to 16GB of LPDDR5 3200 memory and up to 32GB of DDR4 3200 SODIMM memory.
- Integrated 10/100/1000 Gigabit LAN Ethernet Controller.
- Wi-Fi 6 wireless connectivity.
- Integrated HD audio card and stereo speakers.
- Integrated 5MP (Pixel size: 1.12µm x 1.12µm) pull-up tiltable camera to ensure no accidental recording to safeguard user's privacy.
- Storage options with up to 1TB SSD.
- Optional HP external USB DVD/RM Drive.
- TPM 2.0 support.
- Low halogen materials, ENERGY STAR® certified and EPEAT® gold registered where applicable.
- Optional HP Care Pack available. Terms and conditions vary by country. Certain restrictions and exclusions apply.

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

### Features

#### OPERATING SYSTEMS

<b>Preinstalled</b>	Windows 11 Pro <sup>1</sup> Windows 11 Home - HP recommends Windows 11 Pro for Business <sup>1</sup> Windows 11 Home Single Language - HP recommends Windows 11 Pro for Business <sup>1</sup> FreeDOS
<b>Pre-installed (other)</b>	FreeDOS

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 is automatically updated and enabled. High speed internet and Microsoft account required. ISP fees may apply and additional requirements may apply over time for updates.

See <http://www.windows.com>.

#### PROCESSORS\*

##### **AMD Ryzen™ 7 7730U<sup>1</sup>**

2 GHz base clock, up to 4.5 GHz max boost clock  
16 MB L3 cache, 8 cores  
Integrated Radeon™ Graphics  
Supports DDR4 memory up to 64GB 3200 MHz data rate<sup>2</sup>

##### **AMD Ryzen™ 5 7520U<sup>1</sup>**

2.8 GHz base clock, up to 4.3 GHz max boost clock  
4 MB L3 cache, 4 cores  
Integrated Radeon™ Graphics  
Supports LPDDR5 memory up to 3200 MHz data rate<sup>2</sup>

##### **AMD Ryzen™ 3 7320U<sup>1</sup>**

2.4 GHz base clock, up to 4.1 GHz max boost clock  
4 MB L3 cache, 4 cores  
Integrated Radeon™ Graphics  
Supports LPDDR5 memory up to 3200 MHz data rate<sup>2</sup>

##### **AMD Athlon™ Silver 7120U<sup>1</sup>**

2.4 GHz base clock, up to 3.5 GHz max boost clock  
4 MB L3 cache, 4 cores  
Integrated Radeon™ 610M  
Supports LPDDR5 memory up to 3200 MT/s data rate<sup>2</sup>

1. Multicore is designed to improve performance of certain software products. Not all customers or software applications will necessarily benefit from use of this technology. Performance and clock frequency will vary depending on application workload and your hardware and software configurations. AMD's numbering is not a measurement of clock speed.

2. Actual data rate is determined by both the system's configured processor and memory module installed.

**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>.

### Features

#### GRAPHICS

AMD Radeon™ Graphics  
AMD Radeon™ 610M

**NOTE:** AMD integrated Radeon™ Vega Graphics varies by processor

#### DISPLAY

**Non-Touch**  
23.8" diagonal FHD IPS anti-glare WLED-backlit (1920 x 1080)

#### STORAGE AND DRIVES\*

**NOTE:** Starting from November 1<sup>st</sup>, 2023, all shipments will require Windows to be installed when selecting a SSD.

##### **M.2 PCIe NVMe Solid State Drives (SSD)**

128GB 2230 PCIe NVMe Solid State Drive  
256GB 2280 PCIe NVMe Solid State Drive  
512GB 2280 PCIe NVMe Solid State Drive  
1TB 2280 PCIe NVMe Solid State Drive  
512GB 2280 PCIe NVMe TLC Solid State Drive  
1TB 2280 PCIe NVMe TLC Solid State Drive

**NOTE:** For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36 GB is reserved (for Windows) for system recovery software.

### Features

#### MEMORY

##### Maximum

LPDDR5 up to 3200MT/s

DDR4 up to 3200MT/s

##### Memory Slots

LPDDR5: No SODIMM slot, on board memory

DDR4: SODIMM up to 2 slots

##### Available Configurations

4GB LPDDR5 3200MT/s

8GB LPDDR5 3200MT/s

16GB LPDDR5 3200MT/s

4GB DDR4 3200MT/s

8GB DDR4 3200MT/s

16GB DDR4 3200MT/s

32GB (2x16GB) DDR4 3200MT/s

1. Due to the non-industry standard nature of some third-party memory modules, we recommend HP branded memory to ensure compatibility. If you mix memory speeds, the system will perform at the lower memory speed.

**NOTE:** Actual data rate is determined by both the system's configured processor and memory module installed.

#### NETWORKING/COMMUNICATIONS

##### Wireless LAN

Realtek® 8852BE Wi-Fi 6<sup>1</sup> (802.11ax) 2x2 Wi-Fi® M.2 Card<sup>2</sup>

Realtek® 8852BE-VS Wi-Fi 6<sup>3</sup> (802.11ax) 1x1 Wi-Fi® M.2 Card<sup>2</sup>

Realtek® 8851BE Wi-Fi 6<sup>3</sup> (802.11ax) 1x1 Wi-Fi® M.2 Card<sup>2</sup>

Realtek® 8852BE-VT Wi-Fi 6<sup>1</sup> +Bluetooth® 5.4 WW WLAN<sup>2</sup>

##### Ethernet (RJ-45) Integrated

Realtek® RTL8111HSH-CG Gigabit Ethernet Controller

1. Wireless access point and Internet service required and sold separately. Availability of public wireless access points limited. Wi-Fi 6 (802.11 ax) is backwards compatible with prior 802.11 specs.

2. Must be configured at time of purchase.

3. Wireless access point and internet service required and sold separately. Availability of public wireless access points limited. Wi-Fi 5 (802.11 ac) is backwards compatible with prior 802.11 specs.

#### AUDIO/MULTIMEDIA

##### High Definition Audio

Integrated Realtek ALC3274 Audio Codec

High performance integrated stereo speakers

3.5mm combo (microphone/headphone) jack

##### Webcams & Mic

Integrated tiltable 5MP webcam (Pixel size: 1.12µm x 1.12µm), Up to 30 frames/sec, dual array microphone included

### Features

#### **KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS**

##### **Keyboards**

HP Universal USB Wired Keyboard

##### **Mice**

HP USB Hardened Optical Mouse

HP USB Universal Mouse

##### **Keyboard and Mouse Combo**

HP Universal wireless Keyboard & Mouse combo

**NOTE:** Availability may vary by country

### Features

#### SOFTWARE AND SECURITY

##### HP Support

HP PC Hardware Diagnostics  
HP Cloud Recovery  
HP Support Assistant

##### Internet Security and Antivirus

McAfee LiveSafe (30-day subscription)<sup>1</sup>

##### Product Setup

myHP

##### Security Features

Trusted Platform Module (TPM) 2.0 (firmware)<sup>2,3</sup>

##### Productivity

Xerox® DocuShare® (90 days free trial offer)<sup>4</sup>  
Microsoft 365 (sold separately and requires Internet access for activation)

1. 30 days trial period. Internet access required to receive updates. First update included. Subscription required for updates thereafter
2. TPM feature will not be supported on machines pre-configured with FreeDOS and Linux
3. In selected countries, machines pre-configured with Windows OS will be shipped with TPM disabled.
4. Simply sign up and start using Xerox® DocuShare® Go. No credit card. No obligation. Data will become unavailable unless a subscription is entered before the end of the 90 days free trial period. See visit <https://xerox.com/docusharego> for details.

#### POWER

##### Power Supply

HP Smart 90W External AC power adapter

#### PORTS/SLOTS

##### Rear I/O Ports

One (1) Type-C SuperSpeed USB 5Gbps signaling rate ports  
One (1) Type-A SuperSpeed USB 5Gbps signaling rate ports  
One (1) Type-A SuperSpeed USB 5 Gbps port with HP Sleep and Charge  
Two (2) Type-A Hi-Speed USB 480Mbps signaling rate ports  
One (1) RJ-45 (network) jack  
One (1) HDMI 1.4 out connector  
One (1) Microphone/Headphone Combo Jack  
One (1) DC in power

##### Internal I/O Ports

One (1) M.2 PCIe x1 2230 (for WLAN)  
One (1) M.2 PCIe x4 2280 (for storage)  
One (1) SATA storage connector

##### Bays

One (1) 2.5" internal storage drive

### Features

#### WEIGHTS & DIMENSIONS

##### Weight

###### 23.8 Non-Touch Product Weight (Unboxed)

**Basic Stand** 5.37 kg, 11.84 lbs

**23.8 Shipping Weight (Boxed)** 8.80 kg, 19.40 lbs

**23.8 Shipping Weight (Pallet)** 225.2 kg, 496.5 lbs

##### Dimension

###### 23.8 System Dimensions

**Without Stand** 540.62 x 183.7 x 351.43 mm  
21.28 x 7.23 x 13.84 in

**Basic Stand** 540.62 x 183.7 x 419.01 mm  
21.28 x 7.23 x 16.50 in

**23.8 Shipping Dimensions (Boxed)** 641 x 277 x 525 mm  
25.2 x 10.7 x 20.6 in

**23.8 Shipping Dimensions (Pallet)** 1200 x 1000 x 2235 mm  
47.24 x 39.37 x 88 in

**23.8 Pallet Quantity (Sea/ Rail)** 24

**23.8 Pallet Quantity (Air)** 12

### Features

#### UNIT ENVIRONMENT AND OPERATING CONDITIONS<sup>9</sup>

- 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.
- Low halogen (chassis, all internal components and modules)<sup>1</sup>

#### Temperature Range

Operating: 50° to 95° F (10° to 35° C)\*

Non-operating: -22° to 140° F (-30° to 60° C)

#### Relative Humidity

Operating: 10% to 90% (non-condensing at ambient)

Non-operating: 5% to 95% (non-condensing at ambient)

#### Maximum Altitude (unpressurized)

Operating: 5000m

Non-operating: 50000ft (15240 m)

1. External power supplies, power cords, cables and peripherals are not Low Halogen. Service parts obtained after purchase may not be Low Halogen.

**NOTE:** 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.

#### ENVIRONMENTAL & INDUSTRY

##### Eco-Label Certifications & declarations

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

- IT ECO declaration
- US ENERGY STAR®
- US Federal Energy Management Program (FEMP)
- EPEAT® Gold registered in the United States. See <http://www.epeat.net> for registration status in your country.
- China Energy Conservation Program (CECP)
- China State Environmental Protection Administration (SEPA)
- Taiwan Green Mark
- Korea Eco-label
- Japan PC Green label\*

##### Sustainable Impact Specifications

- [Product Carbon Footprint \(hp.com\)](#)
- Ocean-bound plastic in CPU fan, stand
- 45% post-consumer recycled plastic
- 10% recycled metal
- Low halogen<sup>1</sup>
- Outside Box and corrugated cushions are 100% sustainably sourced and recyclable
- Molded Paper Pulp Cushion inside box is 100% sustainably sourced and recyclable

##### System Configuration

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

### Features

#### Energy Consumption

(in accordance with US ENERGY STAR® test method)

	115VAC, 60Hz	230VAC, 50Hz	100VAC, 50Hz
Normal Operation (Short idle)	12.456 W	12.528 W	12.192 W
Normal Operation (Long idle)	0.792 W	0.816 W	0.732 W
Sleep	0.792 W	0.816 W	0.732 W
Off	0.336 W	0.372 W	0.324 W

**NOTE:** Energy efficiency data listed is for an ENERGY STAR® certified product if offered within the model family. HP computers marked with the ENERGY STAR® Logo are certified with the applicable U.S. Environmental Protection Agency (EPA) ENERGY STAR® specifications for computers. If a model family does not offer ENERGY STAR® certified 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. Search keyword generator on HP's 3rd party option store for solar generator accessories at <http://www.hp.com/go/options>.

#### Heat Dissipation\*

	115VAC, 60Hz	230VAC, 50Hz	100VAC, 50Hz
Normal Operation (Short idle)	42.6 BTU/hr	42.8 BTU/hr	41.7 BTU/hr
Normal Operation (Long idle)	2.7 BTU/hr	2.8 BTU/hr	2.5 BTU/hr
Sleep	2.7 BTU/hr	2.8 BTU/hr	2.5 BTU/hr
Off	1.1 BTU/hr	1.3 BTU/hr	1.1 BTU/hr

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

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

	Sound Power (L <sub>WAd</sub> , bels)	Sound Pressure (L <sub>pAm</sub> , decibels)
Typically Configured – Idle	1.9	18.7
Fixed Disk – Random writes	2.3	21.9

#### Longevity and Upgrading

This product can be upgraded, possibly extending its useful life by several years. Upgradeable features and/or components contained in the product may include:

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

#### Batteries

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

Batteries used in the product do not contain:

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

Battery size: CR2032 (coin cell)

Battery type: Lithium

#### 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 <http://www.epeat.net>
- Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.
- This product is 96.8% recycle-able when properly disposed of at end of life.

### Features

#### Packaging Materials

<b>External:</b>	PAPER/Corrugated	1004 g
	PAPER/Paperboard	294 g
	PAPER/Corrugated	189 g
	PAPER/Corrugated	26 g
	PAPER/Paperboard	41 g
	PAPER/Molded Pulp	552 g
	PAPER/Molded Pulp	430 g
	PLASTIC/Other	36 g
	OTHER/Other	7 g
	OTHER/Other	4 g

The plastic packaging material contains at least 90% recycled content.

#### RoHS Compliance

The corrugated paper packaging materials contains at least 80% recycled content. HP Inc. complies fully with materials regulations. We were among the first companies to extend the restrictions in the European Union (EU) Restriction of Hazardous Substances (RoHS) Directive to our products worldwide through the HP GSE. HP has contributed to the development of related legislation in Europe, as well as China, India, and Vietnam.

We believe the RoHS directive and similar laws play an important role in promoting industry-wide elimination of substances of concern. We have supported the inclusion of additional substances—including PVC, BFRs, and certain phthalates—in future RoHS legislation that pertains to electrical and electronics products.

We met our voluntary objective to achieve worldwide compliance with the new EU RoHS requirements for virtually all relevant products by July 2013, and we will continue to extend the scope of the commitment to include further restricted substances as regulations continue to evolve.

To obtain a copy of the HP RoHS Compliance Statement, see [HP RoHS position statement](#).

#### Material Usage

This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at <http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/gse.pdf>):

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants – may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- Nickel – finishes must not be used on the external surface designed to be frequently handled or carried by the user.
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Biphenyl Ethers (PBBEs)
- Polybrominated Biphenyl Oxides (PBBOs)

### Features

- 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

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

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

### HP, Inc. Corporate Environmental Information

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

Global Citizenship Report

<http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html>

Eco-label certifications

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

ISO 14001 certifications:

<http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842>  
and

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

### Footnotes

1. External power supplies, power cords, cables and peripherals are not Low Halogen. Service parts obtained after purchase may not be Low Halogen.

#### ALL-IN-ONE DISPLAY PANEL SPECIFICATIONS

##### 23.8" diagonal FHD IPS anti-glare WLED-backlit (1920 x 1080)

Non-touch

<b>Type</b>	IPS WLED Backlit LCD
<b>Active area (mm)</b>	527.04 x 296.46
<b>Native resolution (HxV)</b>	1920 x 1080
<b>Refresh rate</b>	60 Hz @ 1920 x 1080
<b>Aspect ratio</b>	16:9
<b>Pixel pitch (HxV)(mm)</b>	0.2745 x 0.2745
<b>Contrast ratio (typical)</b>	1000:1
<b>Brightness (typical)</b>	250nits
<b>Viewing angle (typical) (HxV)</b>	178 ° x 178 °
<b>Backlight lamp life (to half brightness)</b>	30,000 hours minimum
<b>Color support</b>	Up to 16.7 million colors with the use of FRC technology
<b>Color gamut (typical)</b>	NTSC 72%
<b>Anti-glare</b>	Yes
<b>Response time (typical)</b>	14ms
<b>Default color temperature</b>	Warm (6500K)

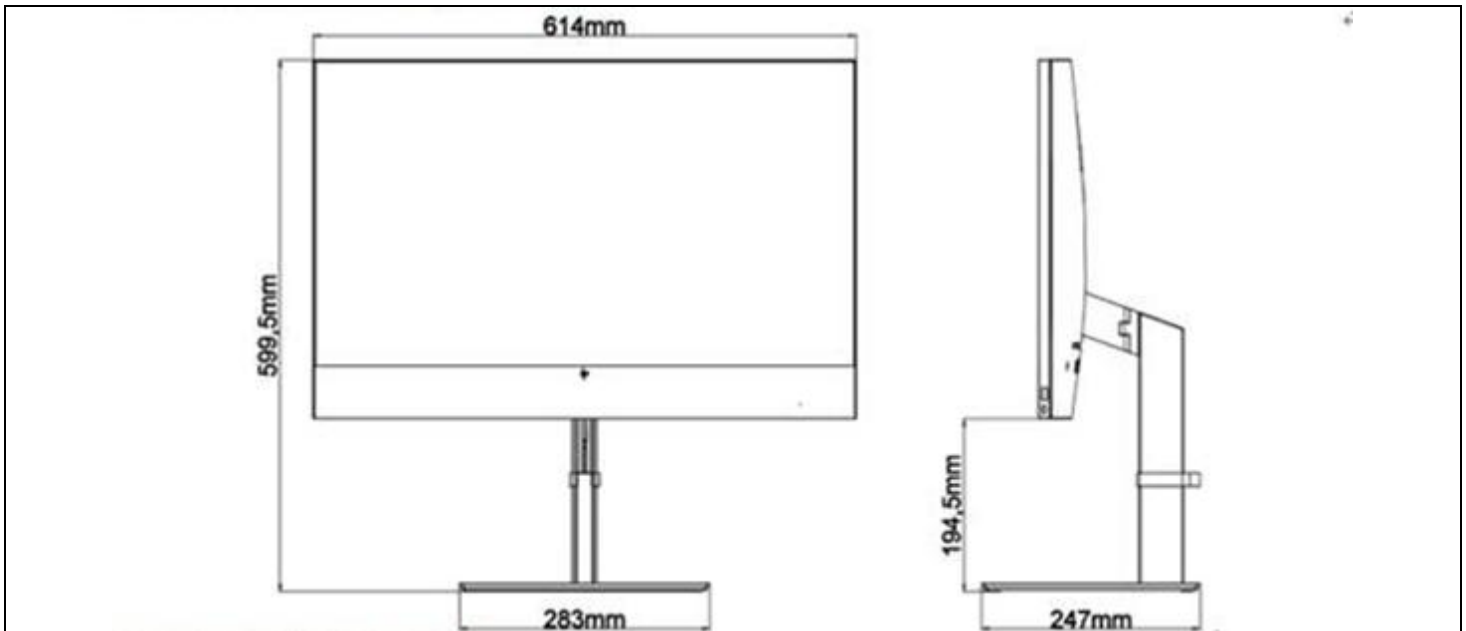
**NOTE:** All performance specifications represent the typical specifications provided by HP's component manufacturers; actual performance may vary either higher or lower.

### Technical Specifications – Stand

#### ALL-IN-ONE STAND SPECIFICATIONS

<b>Standard stand:</b>	<b>Tilt angle</b>	-5° to +20°
	<b>Rotation (Swivel)</b>	None

<b>Adjustable Height Stand:</b>	Height - Vertical/Landscape Adjustment	130mm (±2 mm)
	Portrait Adjustment	No portrait
	Tilt Angle	-5° to +18° (±2°) in landscape and portrait
	Rotation (Swivel)	86° (±4°) (45 left, 45 right)
	Pivot	No pivot



#### STORAGE AND DRIVES

**NOTE:** Starting from November 1<sup>st</sup>, 2023, all shipments will require Windows to be installed when selecting a SSD.

##### 128GB M.2 2230 PCIe NVMe SSD

<b>Drive Weight</b>	< 10g
<b>Capacity</b>	128GB
<b>Height</b>	2.3mm
<b>Length</b>	30mm
<b>Width</b>	22mm
<b>Interface</b>	PCIe NVMe
<b>Maximum Sequential Read</b>	Up to 1600MB/s
<b>Maximum Sequential Write</b>	Up to 780MB/s
<b>Logical Blocks</b>	290,069,680
<b>Operating Temperature</b>	0° to 70°C (32° to 158°F) [ambient temp]
<b>Features</b>	Pyrite

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

##### 256GB M.2 2280 PCIe NVMe SSD

<b>Drive Weight</b>	< 10g
<b>Capacity</b>	256GB
<b>Height</b>	2.38mm
<b>Length</b>	80mm
<b>Width</b>	22mm
<b>Interface</b>	PCIe Gen4
<b>Maximum Sequential Read</b>	Up to 1600MB/s
<b>Maximum Sequential Write</b>	Up to 780MB/s
<b>Logical Blocks</b>	500,118,192
<b>Operating Temperature</b>	0° to 70°C (32° to 158°F) [ambient temp]
<b>Features</b>	APST; ASPM L1.2; NVMe spec 1.2

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

##### 512GB M.2 2280 PCIe NVMe SSD

<b>Drive Weight</b>	< 10g
<b>Capacity</b>	512GB
<b>Height</b>	2.38mm
<b>Length</b>	80mm
<b>Width</b>	22mm
<b>Interface</b>	PCIe Gen4
<b>Maximum Sequential Read</b>	Up to 1600MB/s
<b>Maximum Sequential Write</b>	Up to 860MB/s

### Technical Specifications – Storage

<b>Logical Blocks</b>	1,000,215,216
<b>Operating Temperature</b>	0° to 70°C (32° to 158°F) [ambient temp]
<b>Features</b>	APST; ASPM L1.2; NVME spec 1.2

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

#### 1TB M.2 2280 PCIe NVMe SSD

<b>Drive Weight</b>	< 10g
<b>Capacity</b>	1TB
<b>Height</b>	2.38mm
<b>Length</b>	80mm
<b>Width</b>	22mm
<b>Interface</b>	PCIe Gen4
<b>Maximum Sequential Read</b>	Up to 1600MB/s
<b>Maximum Sequential Write</b>	Up to 860MB/s
<b>Logical Blocks</b>	1,000,215,216
<b>Operating Temperature</b>	0° to 70°C (32° to 158°F) [ambient temp]
<b>Features</b>	APST; ASPM L1.2; NVME spec 1.2

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

#### 512GB M.2 2280 PCIe NVMe Three Layer Cell SSD

<b>Drive Weight</b>	< 10g
<b>Capacity</b>	512GB
<b>Height</b>	2.38mm
<b>Length</b>	80mm
<b>Width</b>	22mm
<b>Interface</b>	PCIe Gen4
<b>Maximum Sequential Read</b>	Up to 2900MB/s
<b>Maximum Sequential Write</b>	Up to 1100MB/s
<b>Logical Blocks</b>	1,000,215,216
<b>Operating Temperature</b>	0° to 70°C (32° to 158°F) [ambient temp]
<b>Features</b>	APST; ASPM L1.2; NVME spec 1.2

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

#### 1TB M.2 2280 PCIe NVMe Three Layer Cell SSD

<b>Drive Weight</b>	< 10g
<b>Capacity</b>	1 TB
<b>Height</b>	2.38mm
<b>Length</b>	80mm
<b>Width</b>	22mm
<b>Interface</b>	PCIe Gen4

### Technical Specifications – Storage

<b>Maximum Sequential Read</b>	Up to 2900MB/s
<b>Maximum Sequential Write</b>	Up to 1100MB/s
<b>Logical Blocks</b>	1,000,215,216
<b>Operating Temperature</b>	0° to 70°C (32° to 158°F) [ambient temp]
<b>Features</b>	APST; ASPM L1.2; NVME spec 1.2

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

#### HP EXTERNAL USB DVD/RW

<b>Drive</b>	Manual tray load
<b>Interface</b>	USB 2.0
<b>Dimensions (H x W x D)</b>	0.55 X 5.41 X 5.94 in (1.40 X 14.40 X 13.75 cm)
<b>Form factor</b>	External
<b>Access Times CD 1/3 STROKE</b>	140 ms
<b>DVD 1/3 Stroke</b>	160 ms
<b>Supported media (read)</b>	DVD-ROM, DVD-R DVD-R, DVD-R DL, DVD-RW, DVD+R, DVD+R DL, AND +RW CD-ROM, CD-ROM XA, CD-DA SUPER AUDIO CD CD-R DISCS CD-RW DISCS CPRM (DVD-R/RW/RAM) SUPPORTED
<b>Supported media (write)</b>	DVD-R DVD-R DL DVD-RW DVD+R DVD+R DL DVD+RW CD-R/RW
<b>System requirements</b>	Pentium IV 2.4GHz or higher, Compatible (recommended: Pentium IV 3.2GHz or higher)
<b>RAM</b>	256MB or higher (recommended: 128MB)
<b>Video memory</b>	64MB or higher (recommend: 128MB)
<b>Maximum speed normal</b>	
<b>Write Speeds</b>	DVD-RW 6X MAXIMUM BY ZCLV DVD+RW 8X MAXIMUM BY ZCLV CD-RW 24 X MAXIMUM BY ZCLV
<b>Read Speeds</b>	DVD-R/RW/ROM 8 X MAXIMUM DVD-R DL 8 X MAXIMUM DVD-VIDEO 4 X MAXIMUM M-DISC (DVD+R SL) 8 X MAXIMUM DVD+R/+RW 8 X MAXIMUM DVD+R DL 8 X MAXIMUM CD-R/RW/ROM 24 X MAXIMUM CD-DA 24 X MAXIMUM
<b>Access time (typical reads, including settling)</b>	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)

### Technical Specifications – Storage

<b>Power</b>	Source Slimline SATA DC power receptacle DC Power Requirement 5 VDC $\pm$ 5%-100 mV ripple p-p DC Current 5 VDC (< 1000 mA typical, 1600 mA maximum)
<b>Environmental conditions (All conditions, non- condensing)</b>	Temperature (operating, read and write): 41°F to 104°F (5°C to 40°C) Relative Humidity (operating): 10% to 80% Relative Humidity (non-condensing, read): 15% to 85% Relative Humidity (depending on temperature, write): 15% to 85% Temperature (non-operating): -22°F to 104°F (-30°C to 40°C) Relative Humidity (non-operating, non-condensing): 10% to 90%
<b>Option kit contents</b>	HP Mobile USB DVD/RW Drive, software, documentation

**NOTE:** Actual speeds may vary. Intended only for creation and storage of original material and other lawful uses. Double layer discs may not be compatible with many existing single layer DVD drives and players.

### Technical Specifications - Audio

#### HIGH DEFINITION AUDIO

<b>Type</b>	Integrated
<b>HD Audio Codec</b>	Realtek ALC3274 Audio Codec
<b>Audio I/O Ports</b>	Rear 3.5mm combo (microphone/headphone) jack (32 Ohm) supporting CTIA and OMTP style headset Microphone (2K Ohm)
<b>Analog Audio</b>	Yes
<b>Internal Speaker Amplifier</b>	2W per channel stereo amplifier for the internal speakers only
<b>Internal Speaker</b>	Yes - Stereo Speaker
<b>DAC Sampling Rates</b>	44.1 kHz/48 kHz/96 kHz/192 kHz
<b>ADC Sampling Rates</b>	44.1 kHz/48 kHz/96 kHz/192 kHz

### Technical Specifications – Input/Output

#### INPUT/OUTPUT DEVICES

##### HP Wireless Keyboard

	Keys	104, 105 lay out (depending upon country)
<b>Physical Characteristics</b>	Dimensions (L x W x H)	18.15 x 6.02 x 1.08 in (461 x 153 x 27.4 mm)
	Weight	1.32 lb (600g) min
	Operating voltage	5 VDC, +/-5%
<b>Electrical</b>	Power consumption	50mA Max (All LED on)
	System interface	USB Type A plug connector
	ESD	Contact Discharge: 8 KV Air Discharge: 15 KV
	EMI - RFI	Conforms to FCC rules for a Class B computing device
<b>Mechanical</b>	Keycaps	Mid-profile design
	Switch actuation	60±10g nominal peak force with tactile feedback
	Switch life	10 million keystrokes (Life tester)
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
	Acoustics	43-dBA maximum sound pressure level
	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
Non-operating humidity	20% to 80% (non-condensing at ambient)	
<b>Environmental</b>	Operating shock	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
Drop (in box)	30 in (76.2 cm) on concrete, 16-drop sequence	

### Technical Specifications – Input/Output

#### HP USB Wireless Mouse

<b>Dimensions (H x L x W)</b>	4.21 x 2.64 x 1.52 in (107 x 67 x 38.7 mm)	
<b>Weight</b>	0.19lb (90g)	
<b>Environmental</b>	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	20% to 80% (non-condensing at ambient)
	Operating shock	50 g, 6 surfaces
	Non-operating shock	80 g, 6 surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Operating voltage	5 VDC, +/-5%
	Power consumption	50mA Max
<b>Electrical</b>	Resolution	800, 1200, 1600 DPI
	Tracking speed	31 inch/sec (max)
	Tracking acceleration	8G(max), 1G=9.8m/s <sup>3</sup>
<b>Mechanical</b>	Connector	USB 2.0
	Cable length	6 ft (1.8 m)

### Technical Specifications – Input/Output

#### HP Universal USB Wired Keyboard

	Keys	104, 105 layout (depending upon country)
<b>Physical Characteristics</b>	Dimensions (L x W x H)	18.15 x 6.02 x 1.08 in (461 x 153 x 27.4 mm)
	Weight	1.32 lb (600g) min
	Operating voltage	5 VDC, +/-5%
	Power consumption	50mA Max (All LED on)
<b>Electrical</b>	System interface	USB Type A plug connector
	ESD	Contact Discharge: 8 KV Air Discharge: 15 KV
	EMI - RFI	Conforms to FCC rules for a Class B computing device
	Keycaps	Mid-profile design
	Switch actuation	60±10g nominal peak force with tactile feedback
<b>Mechanical</b>	Switch life	10 million keystrokes (Life tester)
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
	Acoustics	43-dBA maximum sound pressure level
	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	20% to 80% (non-condensing at ambient)
<b>Environmental</b>	Operating shock	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	30 in (76.2 cm) on concrete, 16-drop sequence

### Technical Specifications – Input/Output

#### HP USB Universal Wired Mouse

<b>Dimensions (H x L x W)</b>	4.21 x 2.64 x 1.52 in (107 x 67 x 38.7 mm)	
<b>Weight</b>	0.19lb (90g)	
<b>Environmental</b>	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	20% to 80% (non-condensing at ambient)
	Operating shock	50 g, 6 surfaces
	Non-operating shock	80 g, 6 surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Operating voltage	5 VDC, +/-5%
	Power consumption	50mA Max
<b>Electrical</b>	Resolution	800, 1200, 1600 DPI
	Tracking speed	31 inch/sec (max)
	Tracking acceleration	8G(max), 1G=9.8m/s <sup>3</sup>
<b>Mechanical</b>	Connector	USB 2.0
	Cable length	6 ft (1.8 m)

### Technical Specifications – Input/Output

#### HP USB Optical Mouse

**Dimensions (H x L x W)** 4.53 x 2.50 x 1.40 in (115 x 63.46 x 35.48 mm)

**Weight** 0.18lb (80g)

<b>Environmental</b>	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	20% to 80% (non-condensing at ambient)
	Operating shock	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Operating voltage	5 VDC, +/-5%
	Power consumption	50mA Max
<b>Electrical</b>	Resolution	1,000 DPI
	Sensor	Pixart PAN3606DL
	Tracking speed	30 inch/sec (max)
	Tracking acceleration	9G(max), 1G=9.8m/s <sup>2</sup>
<b>Mechanical</b>	Connector	USB 2.0
	Cable length	6 ft (1.8 m)

### NETWORKING/COMMUNICATIONS

<b>Realtek® RTL8111HSH-CG Gigabit Ethernet Controller</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

### WLAN\*

<b>Realtek® 8852BE Wi-Fi 6<sup>1</sup> (802.11 ax) 2x2 with Bluetooth® Wireless Card M.2</b>	
<b>Wireless LAN Standards</b>	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11ac IEEE 802.11ax IEEE 802.11d IEEE 802.11e IEEE 802.11h IEEE 802.11i IEEE 802.11k IEEE 802.11r IEEE 802.11v
<b>Interoperability</b>	Wi-Fi® certified
<b>Frequency Band</b>	802.11b/g/n/ax • 2.402 – 2.482 GHz 802.11a/n/ac/ax • 4.9 – 4.95 GHz (Japan) • 5.15 – 5.25 GHz • 5.25 – 5.35 GHz

### Technical Specifications - Networking

	<ul style="list-style-type: none"> <li>• 5.47 – 5.725 GHz</li> <li>• 5.825 – 5.850 GHz</li> </ul>
<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: max 300Mbps</li> <li>• 802.11ac : max 866.7Mbps</li> <li>• 802.11ax : max 1201Mbps</li> </ul>
<b>Modulation</b>	Direct Sequence Spread Spectrum BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM
<b>Security<sup>2</sup></b>	<ul style="list-style-type: none"> <li>• IEEE and WiFi certified 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>• WPA3 certification</li> <li>• IEEE 802.11i</li> <li>• WAPI</li> </ul>
<b>Network Architecture Models</b>	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
<b>Roaming</b>	IEEE 802.11 compliant roaming between access points
<b>Output Power<sup>3</sup></b>	<ul style="list-style-type: none"> <li>• 802.11b: +18.5dBm minimum</li> <li>• 802.11g: +17.5dBm minimum</li> <li>• 802.11a: +18.5dBm minimum</li> <li>• 802.11n HT20(2.4GHz): +15.5dBm minimum</li> <li>• 802.11n HT40(2.4GHz): +14.5dBm minimum</li> <li>• 802.11n HT20(5GHz): +15.5dBm minimum</li> <li>• 802.11n HT40(5GHz): +14.5dBm minimum</li> <li>• 802.11ac VHT80(5GHz): +11.5dBm minimum</li> <li>• 802.11ax HE40(2.4GHz): +10dBm minimum</li> <li>• 802.11ax HE80(5GHz): +10dBm minimum</li> </ul>
<b>Power Consumption</b>	<ul style="list-style-type: none"> <li>• Transmit mode:2.5 W</li> <li>• Receive mode:2 W</li> <li>• Idle mode: (PSP) 180 mW (WLAN Associated)</li> <li>• Idle mode:50 mW (WLAN unassociated)</li> <li>• Connected Standby/Modern Standby: 10mW</li> <li>• Radio disabled: 8 mW</li> </ul>
<b>Power Management</b>	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
<b>Receiver Sensitivity<sup>4</sup></b>	802.11b, 1Mbps: -93.5dBm maximum 802.11b, 11Mbps: -84dBm maximum 802.11a/g, 6Mbps: -86dBm maximum 802.11a/g, 54Mbps: -72dBm maximum 802.11n, MCS07: -67dBm maximum 802.11n, MCS15: -64dBm maximum 802.11ac, MCS0: -84dBm maximum 802.11ac, MCS9: -59dBm maximum <ul style="list-style-type: none"> <li>•802.11 ax, MCS11(HE40): -57dBm maximum</li> <li>•802.11 ax, MCS11(HE80): -54dBm maximum</li> </ul>
<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

### Technical Specifications - Networking

<b>Form Factor</b>	PCI-Express M.2 MiniCard	
<b>Dimensions</b>	Type 2230: 2.3 x 22.0 x 30.0 mm	
<b>Weight</b>	Type 2230: 2.8g	
<b>Operating Voltage</b>	3.3v +/- 9%	
<b>Temperature</b>	Operating	14° to 158° F (–10° to 70° C)
	Non-operating	–40° to 176° F (–40° to 80° C)
<b>Humidity</b>	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 95% (non-condensing)
<b>Altitude</b>	Operating	0 to 10,000 ft (3,048 m)
	Non-operating	0 to 50,000 ft (15,240 m)
<b>LED Activity</b>	LED Amber – Radio OFF; LED White – Radio ON	
<p>1. Wireless access point and Internet service required and sold separately. Availability of public wireless access points limited. Wi-Fi 6 (802.11ax) is backwards compatible with prior 802.11 specs.</p> <p>2. Check latest software/driver release for updates on supported security features.</p> <p>3. Maximum output power may vary by country according to local regulations.</p> <p>4. 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).</p>		
<b>HP Integrated Module with Bluetooth 4.0/4.1/4.2/5.0/5.1/5.2 Wireless Card Technology</b>		
<b>Bluetooth® Specification</b>	4.0/4.1/4.2/5.0/5.1/5.2 Wireless Card 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>Power Consumption</b>	Peak (Tx) 330 mW Peak (Rx) 230 mW Selective Suspend 17 mW	
<b>Bluetooth® Software Supported Link Topology</b>	Microsoft Windows Bluetooth® Software	
<b>Power Management</b>	Microsoft Windows ACPI, and USB Bus Support	
<b>Certifications</b>	FCC (47 CFR) Part 15C, Section 15.247 & 15.249 ETS 300 328, ETS 300 826 Low Voltage Directive IEC950 UL, CSA, and CE Mark	
<b>Bluetooth Profiles Supported</b>	BT4.1-ESR 5/6/7 Compliance LE Link Layer Ping LE Dual Mode LE Link Layer LE Low Duty Cycle Directed Advertising LE L2CAP Connection Oriented Channels Train Nudging & Interlaced Scan BT4.2 ESR08 Compliance	

### Technical Specifications - Networking

	<p>LE Secure Connection- Basic/Full          LE Privacy 1.2 –Link Layer Privacy          LE Privacy 1.2 –Extended Scanner Filter Policies          LE Data Packet Length Extension          FAX Profile (FAX)          Basic Imaging Profile (BIP)2          Headset Profile (HSP)          Hands Free Profile (HFP)          Advanced Audio Distribution Profile (A2DP)          BT5.1          ESR9/10 Compliance          LE Advertisement Extensions          Channel Selection Algo          Limited High Duty Cycle Non-Connectable Advertising          2Mbps LE          LE Long Range</p>
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<b>Realtek RT 8852BE-VS Wi-Fi 6<sup>1</sup> (802.11ax) 1x1 with Bluetooth® Wireless Card M.2</b>	
<b>Wireless LAN Standards</b>	<p>IEEE 802.11a            IEEE 802.11b            IEEE 802.11g            IEEE 802.11n            IEEE 802.11ac</p>
<b>Interoperability</b>	Wi-Fi® certified
<b>Frequency Band</b>	<p>802.11b/g/n            • 2.402 – 2.482 GHz            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</p>
<b>Data Rates</b>	<ul style="list-style-type: none"> <li>• 802.11b: 1, 2, 5.5, 11 Mbps</li> <li>• 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</li> <li>• 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</li> <li>• 802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz)</li> <li>• 802.11ac: MCS0 ~ MCS9, (1SS, and 2SS) (20MHz, 40MHz, and 80MHz)</li> </ul>
<b>Modulation</b>	<p>Direct Sequence Spread Spectrum            BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM</p>
<b>Security<sup>2</sup></b>	<ul style="list-style-type: none"> <li>• IEEE 64 / 128 bit WEP encryption for a/b/g mode only</li> <li>• AES-CCMP: 128 bit in hardware</li> <li>• 802.1x authentication</li> <li>• WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.</li> <li>• WPA2 certification</li> <li>• IEEE 802.11i</li> <li>• Cisco Certified Extensions, all versions through CCX4 and CCX Lite</li> <li>• WAPI</li> </ul>
<b>Network Architecture Models</b>	<p>Ad-hoc (Peer to Peer)            Infrastructure (Access Point Required)</p>
<b>Roaming</b>	IEEE 802.11 compliant roaming between access points
<b>Output Power<sup>3</sup></b>	<ul style="list-style-type: none"> <li>• 802.11b: +14dBm minimum</li> </ul>

### Technical Specifications - Networking

	<ul style="list-style-type: none"> <li>• 802.11g: +12dBm minimum</li> <li>• 802.11a: +12dBm minimum</li> <li>• 802.11n HT20(2.4GHz): +12dBm minimum</li> <li>• 802.11n HT40(2.4GHz): +12dBm minimum</li> <li>• 802.11n HT20(5GHz): +10dBm minimum</li> <li>• 802.11n HT40(5GHz): +10dBm minimum</li> <li>• 802.11ac VHT80(5GHz): +10dBm minimum</li> </ul>				
<b>Power Consumption</b>	<ul style="list-style-type: none"> <li>• Transmit mode 2.0 W</li> <li>• Receive mode 1.6 W</li> <li>• Idle mode (PSP) 180 mW (WLAN Associated)</li> <li>• Idle mode 50 mW (WLAN unassociated)</li> <li>• Connected Standby 10mW</li> <li>• Radio disabled 8 mW</li> </ul>				
<b>Power Management</b>	ACPI and PCI Express compliant power management 802.11 compliant power saving mode				
<b>Receiver Sensitivity<sup>4</sup></b>	802.11b, 1Mbps: -93.5dBm maximum 802.11b, 11Mbps: -84dBm maximum 802.11a/g, 6Mbps: -86dBm maximum 802.11a/g, 54Mbps: -72dBm maximum 802.11n, MCS07: -67dBm maximum 802.11n, MCS15: -64dBm maximum 802.11ac, MCS0: -84dBm maximum 802.11ac, MCS9: -59dBm maximum				
<b>Antenna type</b>	High efficiency antenna. One embedded dual band 2.4/5 GHz antenna is provided to the card to support WLAN communications and Bluetooth communications				
<b>Form Factor</b>	PCI-Express M.2 MiniCard				
<b>Dimensions</b>	Type 2230: 2.3 x 22.0 x 30.0 mm				
<b>Weight</b>	Type 2230: 2.8g				
<b>Operating Voltage</b>	3.3v +/- 9%				
<b>Temperature</b>	<table border="1"> <tr> <td>Operating</td> <td>14° to 158° F (-10° to 70° C)</td> </tr> <tr> <td>Non-operating</td> <td>-40° to 176° F (-40° to 80° C)</td> </tr> </table>	Operating	14° to 158° F (-10° to 70° C)	Non-operating	-40° to 176° F (-40° to 80° C)
Operating	14° to 158° F (-10° to 70° C)				
Non-operating	-40° to 176° F (-40° to 80° C)				
<b>Humidity</b>	<table border="1"> <tr> <td>Operating</td> <td>10% to 90% (non-condensing)</td> </tr> <tr> <td>Non-operating</td> <td>5% to 95% (non-condensing)</td> </tr> </table>	Operating	10% to 90% (non-condensing)	Non-operating	5% to 95% (non-condensing)
Operating	10% to 90% (non-condensing)				
Non-operating	5% to 95% (non-condensing)				
<b>Altitude</b>	<table border="1"> <tr> <td>Operating</td> <td>0 to 10,000 ft (3,048 m)</td> </tr> <tr> <td>Non-operating</td> <td>0 to 50,000 ft (15,240 m)</td> </tr> </table>	Operating	0 to 10,000 ft (3,048 m)	Non-operating	0 to 50,000 ft (15,240 m)
Operating	0 to 10,000 ft (3,048 m)				
Non-operating	0 to 50,000 ft (15,240 m)				
<b>LED Activity</b>	LED Amber – Radio OFF; LED White – Radio ON				

1. Wireless access point and internet service required and sold separately. Availability of public wireless access points limited. Wi-Fi 5 (802.11 ac) is backwards compatible with prior 802.11 specs.
2. Check latest software/driver release for updates on supported security features.
3. Maximum output power may vary by country according to local regulations.
4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).

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

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

### Technical Specifications - Networking

	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>Power Consumption</b>	Peak (Tx) 330 mW Peak (Rx) 230 mW Selective Suspend 17 mW
<b>Bluetooth® Software Supported Link Topology</b>	Microsoft Windows Bluetooth® Software
<b>Power Management</b>	Microsoft Windows ACPI, and USB Bus Support
<b>Certifications</b>	ETS 300 328, ETS 300 826 Low Voltage Directive IEC950 UL, CSA, and CE Mark
<b>Bluetooth Profiles Supported</b>	BT4.1-ESR 5/6/7 Compliance LE Link Layer Ping LE Dual Mode LE Link Layer LE Low Duty Cycle Directed Advertising LE L2CAP Connection Oriented Channels Train Nudging & Interlaced Scan BT4.2 ESR08 Compliance LE Secure Connection- Basic/Full LE Privacy 1.2 –Link Layer Privacy LE Privacy 1.2 –Extended Scanner Filter Policies LE Data Packet Length Extension FAX Profile (FAX) Basic Imaging Profile (BIP)2 Headset Profile (HSP) Hands Free Profile (HFP) Advanced Audio Distribution Profile (A2DP)

<b>Realtek RTL8852BE-VT 802.11ax 2x2 Wi-Fi™ + Bluetooth® 5.4 Wireless Card</b> (802.11ax 2x2, supporting gigabit data rate) <sup>1</sup>	
<b>Wireless LAN Standards</b>	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11ac IEEE 802.11ax IEEE 802.11d IEEE 802.11e IEEE 802.11h IEEE 802.11i IEEE 802.11k IEEE 802.11r IEEE 802.11v
<b>Interoperability</b>	Wi-Fi certified modules

### Technical Specifications - Networking

<b>Frequency Band</b>	<p>802.11b/g/n/ax</p> <ul style="list-style-type: none"> <li>•2.402 – 2.482 GHz</li> </ul> <p>802.11a/n/ac/ax</p> <ul style="list-style-type: none"> <li>•4.9 – 4.95 GHz (Japan)</li> <li>•5.15 – 5.25 GHz</li> <li>•5.25 – 5.35 GHz</li> <li>•5.47 – 5.725 GHz</li> <li>•5.825 – 5.850 GHz</li> </ul>
<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: max 300Mbps</li> <li>•802.11ac: max 866.7Mbps</li> <li>• 802.11ax: max 1201Mbps</li> </ul>
<b>Modulation</b>	Direct Sequence Spread Spectrum, OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM
<b>Security<sup>2</sup></b>	<ul style="list-style-type: none"> <li>•IEEE and WiFi certified 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>•WPA3 certification</li> <li>•IEEE 802.11i</li> <li>•WAPI</li> </ul>
<b>Network Architecture Models</b>	<p>Ad-hoc (Peer to Peer)</p> <p>Infrastructure (Access Point Required)</p>
<b>Roaming</b>	IEEE 802.11 compliant roaming between access points
<b>Output Power<sup>3</sup></b>	<ul style="list-style-type: none"> <li>• 802.11b: +18.5dBm minimum</li> <li>• 802.11g: +17.5dBm minimum</li> <li>• 802.11a: +18.5dBm minimum</li> <li>• 802.11n HT20(2.4GHz): +15.5dBm minimum</li> <li>• 802.11n HT40(2.4GHz): +14.5dBm minimum</li> <li>• 802.11n HT20(5GHz): +15.5dBm minimum</li> <li>• 802.11n HT40(5GHz): +14.5dBm minimum</li> <li>• 802.11ac VHT80(5GHz): +11.5dBm minimum</li> <li>• 802.11ax HE40(2.4GHz): +10dBm minimum</li> <li>• 802.11ax HE80(5GHz): +10dBm minimum</li> </ul>
<b>Power Consumption</b>	<ul style="list-style-type: none"> <li>•Transmit mode: 2.5 W</li> <li>•Receive mode: 2 W</li> <li>•Idle mode (PSP): 180 mW (WLAN Associated)</li> <li>•Idle mode: 50 mW (WLAN unassociated)</li> <li>•Connected Standby/Modern Standby: 10mW</li> <li>•Radio disabled: 8 mW</li> </ul>
<b>Power Management</b>	<p>ACPI and PCI Express compliant power management</p> <p>802.11 compliant power saving mode</p>

### Technical Specifications - Networking

<b>Receiver Sensitivity<sup>4</sup></b>	802.11b, 1Mbps: -93.5dBm maximum 802.11b, 11Mbps: -84dBm maximum 802.11a/g, 6Mbps: -86dBm maximum 802.11a/g, 54Mbps: -72dBm maximum 802.11n, MCS07: -67dBm maximum 802.11n, MCS15: -64dBm maximum 802.11ac, MCS0: -84dBm maximum 802.11ac, MCS9: -59dBm maximum •802.11ax, MCS11(HE40): -57dBm maximum •802.11ax, MCS11(HE80): -54dBm maximum
<b>Antenna type</b>	High efficiency antenna with spatial diversity. Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications
<b>Form Factor</b>	PCI-Express M.2 MiniCard
<b>Dimensions</b>	1. Type 2230: 2.4 x 22.0 x 30.0 mm
<b>Weight</b>	1. Type 2230: 2.8g
<b>Operating Voltage</b>	3.3v +/- 9%
<b>Temperature</b>	Operating: 14° to 158° F (-10° to 70° C) Non-operating: -40° to 176° F (-40° to 80° C)
<b>Humidity</b>	Operating: 10% to 90% (non-condensing) Non-operating: 5% to 95% (non-condensing)
<b>Altitude</b>	Operating: 0 to 10,000 ft (3,048 m) Non-operating: 0 to 50,000 ft (15,240 m)
<b>LED Activity</b>	LED Amber – Radio OFF; LED OFF – Radio ON
<b>HP Integrated Module with Bluetooth® 4.0/4.1/4.2/5.0/5.1/5.2/5.3/5.4 Wireless Card Technology</b>	
<b>Bluetooth® Specification</b>	4.0/4.1/4.2/5.0/5.1/5.2/5.3/5.4 wireless card 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>Power Consumption</b>	Peak (Tx): 330 mW Peak (Rx): 230 mW Selective Suspend: 17 mW
<b>Bluetooth® Software Supported Link Topology</b>	Microsoft Windows Bluetooth Software
<b>Power Management</b>	Microsoft Windows ACPI, and USB Bus Support
<b>Certifications</b>	FCC (47 CFR) Part 15C/E, Section 15.247, 15.249  ETSI 300 328, ETSI 301 893

### Technical Specifications - Networking

<b>Bluetooth® Profiles Supported</b>	Bluetooth 4.1-ESR 5/6/7 Compliance LE Link Layer Ping LE Dual Mode LE Link Layer LE Low Duty Cycle Directed Advertising LE L2CAP Connection Oriented Channels Train Nudging & Interlaced Scan Bluetooth 4.2 ESR08 Compliance LE Secure Connection- Basic/Full LE Privacy 1.2 –Link Layer Privacy LE Privacy 1.2 –Extended Scanner Filter Policies LE Data Packet Length Extension FAX Profile (FAX) Basic Imaging Profile (BIP)2 Headset Profile (HSP) Hands Free Profile (HFP) Advanced Audio Distribution Profile (A2DP) Bluetooth 5.1 ESR9/10 Compliance LE Advertisement Extensions Channel Selection Algo Limited High Duty Cycle Non-Connectable Advertising 2Mbps LE LE Long Range
<p>1. Wi-Fi 6 is designed to support gigabit data rate when transferring files between two devices connected to the same router. Requires a wireless router, sold separately, that supports 80MHz and higher channels. Wireless access point and Internet service required and sold separately. Availability of public wireless access points limited. Wi-Fi 6 (802.11ax) is backwards compatible with prior 802.11 specs.</p> <p>2. The FCC has declared as of September 1, 2014 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.</p> <p>3. 1. Check latest software/driver release for updates on supported security features.</p> <p>4. 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).</p>	

### Technical Specifications - Power

#### POWER

<b>Efficiency</b>	65W EPS, 88% average efficiency at 115V & 89% at 230Vac
<b>Operating Voltage Range</b>	90Vac~264Vac
<b>Rated Voltage Range</b>	100Vac~240Vac
<b>Rated Line Frequency</b>	50Hz~60Hz
<b>Operating Line Frequency</b>	47Hz~63Hz
<b>Rated Input Current</b>	≤1.6A
<b>Rated Input Current with Energy Efficient* Power Supply</b>	≤1.6A
<b>DC Output</b>	+19.5V
<b>Current Leakage (NFPA 99: 2102)</b>	Less than 500 microamps of leakage current at 120 Vac with the ground wire disconnected, as required for Non-Patient Electrical Appliances and Equipment used in a patient care facility or that contact patients in normal use. Per section 10.3.5.1. Less than 100 microamps of leakage current at 120 Vac with the ground wire intact with normal polarity, as required for Non-Patient Electrical Appliances and Equipment used in a patient care facility or that contact patients in normal use. Per section 10.3.5.1.
<b>Dimensions</b>	102 x 55 x 30 mm
<b>Efficiency</b>	90W EPS, 88% average efficiency at 115V & 89% at 230Vac
<b>Operating Voltage Range</b>	90Vac~264Vac
<b>Rated Voltage Range</b>	100Vac~240Vac
<b>Rated Line Frequency</b>	50Hz~60Hz
<b>Operating Line Frequency</b>	47Hz~63Hz
<b>Rated Input Current</b>	≤1.6A
<b>Rated Input Current with Energy Efficient* Power Supply</b>	≤1.6A
<b>DC Output</b>	+19.5V
<b>Current Leakage (NFPA 99: 2102)</b>	Less than 500 microamps of leakage current at 120 Vac with the ground wire disconnected, as required for Non-Patient Electrical Appliances and Equipment used in a patient care facility or that contact patients in normal use. Per section 10.3.5.1. Less than 100 microamps of leakage current at 120 Vac with the ground wire intact with normal polarity, as required for Non-Patient Electrical Appliances and Equipment used in a patient care facility or that contact patients in normal use. Per section 10.3.5.1.
<b>Dimensions</b>	102 x 55 x 30 mm

### ADDITIONAL FEATURES

**SMART Technology (Self-Monitoring, Analysis and Reporting Technology)**

Description

Allows hard drives to monitor their own health and to raise flags if imminent failures were predicted

### Summary of Changes

#### SUMMARY OF CHANGES

Date of change:	Version History:		Description of change:
July 27, 2023	V1 to V2	Update	Back call outs page corrected
August 1, 2023	V2 to V3	Update	Environmental table updated
January 10, 2024	V3 to V4	Update	Memory section updated
January 17, 2024	V4 to V5	Removal	HDD removed from the platform
January 24, 2024	V5 to V6	Correction	Memory mention corrected in "At a glance" section.
July 15, 2024	V6 to V7	Update	DDR4 cards specs added
December 19, 2024	V7 to V8	Addition	Processor i5-1334U / WLAN Cass: Realtek 8852BE-VT Wi-Fi 6 added
January 6, 2025	V8 to V9	Removal	Processor i5-1334U removed
February 20, 2025	V9 to V10	Addition	Realtek RTL8852BE-VT 802.11ax specs table added to N/C section
May 22, 2025	V10 to V11	Removal	Stand specs in ALL-IN-ONE STAND SPECIFICATIONS section removed
March 20, 2026	V11 to V12	Removal	HDD row removed from HP EXTERNAL USB DVD/RW table

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