## Overview

**HP Pro Mini 400 G9 Desktop PC**
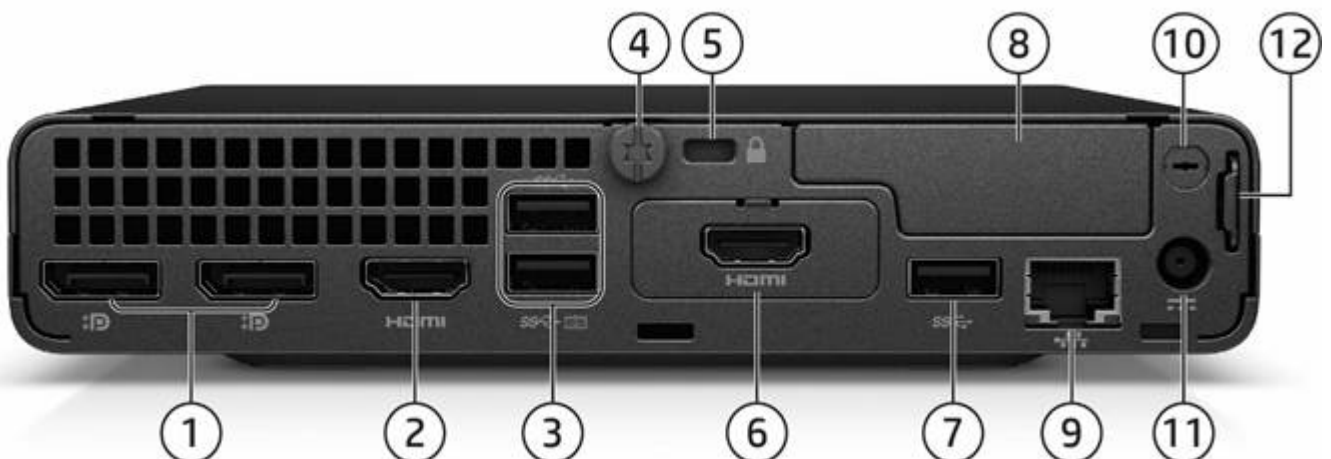


1. Type-C® SuperSpeed USB 20Gbps signaling rate port (charge support up to 5V/3A)

2. Type-A SuperSpeed USB 10Gbps signaling rate port

3. Type-A SuperSpeed USB 10Gbps signaling rate port (charge support up to 5V/1.5A)

4. Combo Audio Jack with CTIA and headset support

5. Dual-state power button

6. Hard drive activity light

**Not Shown**

(2) M.2 (1 as M.2 2230 socket for WLAN/BT and 1 as M.2 2280 socket for storage)

(1) 2.5" internal storage drive bay

**HP Pro Mini 400 G9 Desktop PC**



1. 2x Dual Mode DisplayPort™ 1.4a(DP++)

2. HDMI 2.1

3. 2x Type-A SuperSpeed USB 5Gbps signaling rate port (Supporting wake from S4/S5 with keyboard/mouse connected and enabled in BIOS)

7. Type-A SuperSpeed USB 10Gbps signaling rate port

8. Flex Port 2[2], choice of:
   - 2x Type-A Hi-Speed USB 480Mbps signaling rate port
   - Serial
   - 2nd External Antenna

## Overview

4. Cover release thumbscrew

5. Standard cable lock slot (10 mm)

6. Flex Port 1, choice of:
   - DisplayPort$^{TM}$1 .4a with HBR3
   - HDMI 2.1
   - VGA
   - Serial[1]
   - Type-C® SuperSpeed USB 10Gbps signaling rate port w/ DisplayPort$^{TM}$ Alt Mode and power intake via USB Type-C® Power Delivery up to 100W

9. RJ45 network connector

10. External WLAN antenna opening[2]

11. Power connector

12. Retractable Padlock loop

1. Sold separately or as an optional feature.
2. Must be configured at time of purchase.

## Standard Features and Configurable Components (availability may vary by country)

**HP Pro SFF 400 G9 Desktop PC**



1. Slim optical drive (optional)
2. (1) Type-C® SuperSpeed USB 10Gbps signaling rate port
3. (1) Type-A SuperSpeed USB 10Gbps signaling rate port
4. (2) Type-A SuperSpeed USB 10Gbps signaling rate port

5. SD card 4.0 reader (optional)
6. Combo Audio Jack with CTIA and OMTP and headset support
7. Dual-state power button
8. Hard drive activity light

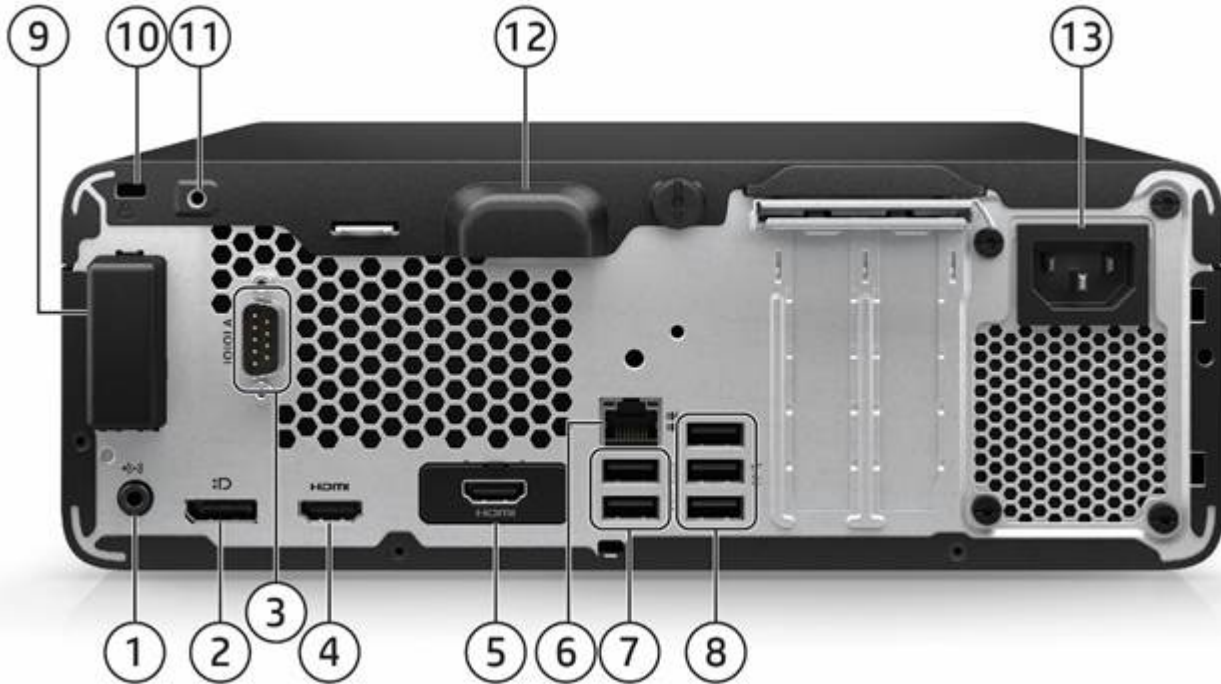**Not Shown**

(1) PCI Express x16

(1) PCI Express x1

(2) M.2 (1 as M.2 2230 socket for WLAN/BT/storage[1] and 1 as M.2 2280 socket for storage)

1. Must be configured at time of purchase.

## Standard Features and Configurable Components (availability may vary by country)

**HP Pro SFF 400 G9 Desktop PC**



1. Audio line-in/line-out connector

2. Dual-Mode DisplayPort™ 1.4a (DP++)

3. Serial Port (Optional)

4. HDMI 1.4

5. Flex Port, choice of:
   - DisplayPort™1.4
   - VGA
   - Serial
   - HDMI 2.1
   - Dual Type-A SuperSpeed USB 5Gbps signaling rate
   - Type-C® SuperSpeed USB 10Gbps signaling rate with DisplayPort™ Alt mode

6. RJ45 network connector

7. (2) Type-A Hi-Speed USB 480Mbps signaling rate port (Supporting wake from S4/S5 with keyboard/mouse connected and enabled in BIOS)

8. (3) Type-A SuperSpeed USB 5Gbps signaling rate port

9. Internal WLAN antenna cover (optional)

10. Standard cable lock slot

11. HP Business PC Security Lock slot

12. Integrated accessory cable lock

13. Power cord connector

**Not Shown**

**Port**

Optional PS/2 (2 ports) & serial port card[1] (connected with mainboard via flyer cable)

Optional parallel port[1]

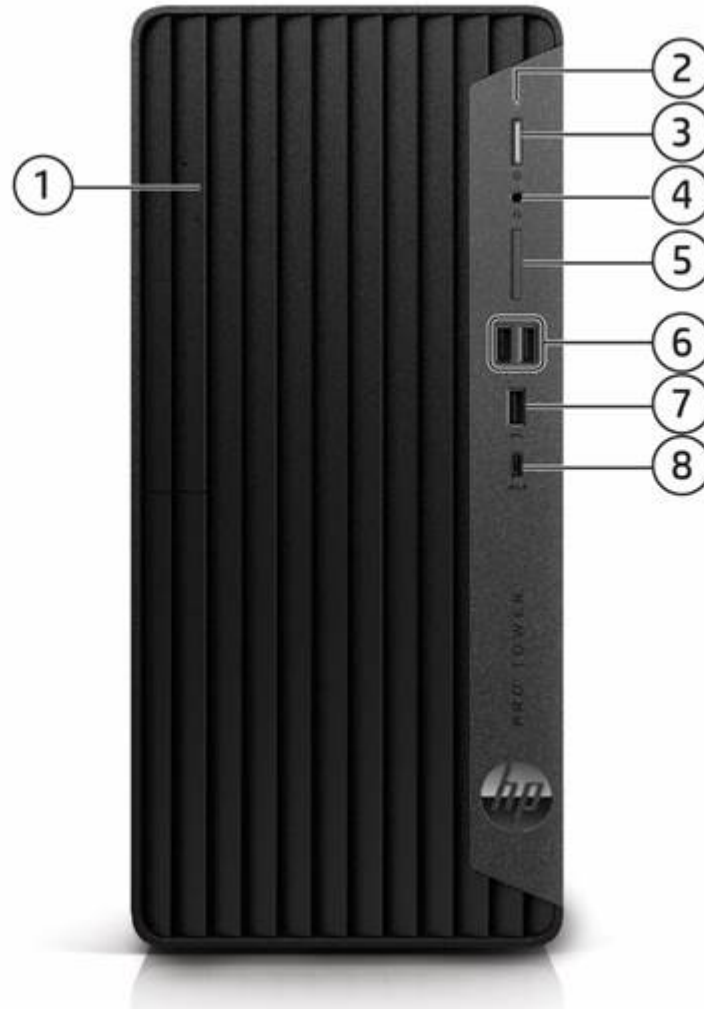Optional 4 Serial Port PCIe Card[1] (1 to 4 serial port dongle)

**Bay**

(1) 9.5mm internal optical drive bay
(1) 3.5" internal storage drive bay

1. Each of the legacy options will occupy one rear slot.

## Standard Features and Configurable Components (availability may vary by country)

**HP Pro Tower 400/480 G9 PCI Desktop PC**



1. Slim optical drive (optional)
2. Hard drive activity light
3. Dual-state power button
4. Combo Audio Jack with CTIA and OMTP headset support

5. SD card 4.0 reader (optional)[2]
6. (2) Type-A SuperSpeed USB 10Gbps signaling rate port
7. (1) Type-A SuperSpeed USB 10Gbps signaling rate port
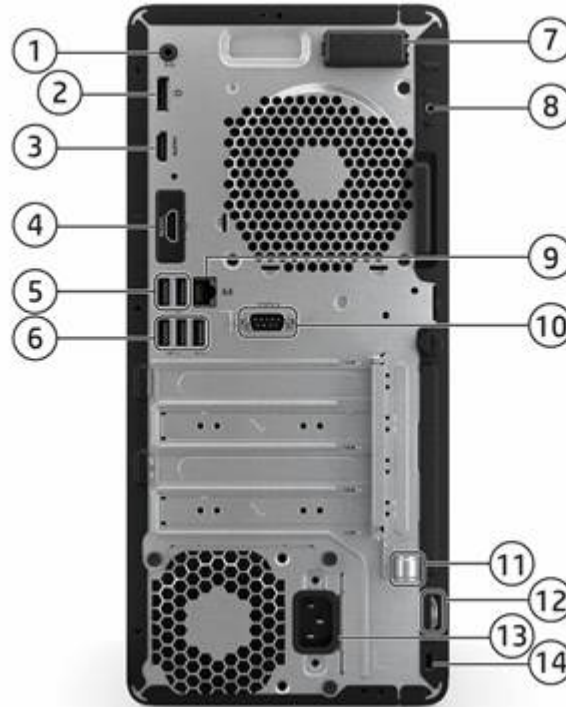8. (1) Type-C® SuperSpeed USB 10Gbps signaling rate port

### Not Shown

(1) PCI Express x16

(1) PCI Express x1

(1) PCI x1

(2) M.2 (1 as M.2 2230 socket for WLAN/BT/storage[1] and 1 as M.2 2280 socket for storage)
(1) Front Flex Port – Dual SuperSpeed USB Type-A 5Gbps signaling rate[2]

1. Optional
2. SD card and front flex port can only select one at the same time

## Standard Features and Configurable Components (availability may vary by country)

**HP Pro Tower 400/480 G9 PCI Desktop PC**



1. Audio line-in/line-out connector
2. Dual-Mode DisplayPort™ 1.4a (DP++)
3. HDMI 1.4
4. Flex Port, choice of:
   - DisplayPort™ 1.4
   - HDMI 2.1
   - VGA
   - Serial
   - Dual Type-A SuperSpeed USB 5Gbps signaling rate
   - Type-C® SuperSpeed USB 10Gbps signaling rate with DisplayPort™ Alt mode)
5. (2) Type-A Hi-Speed USB 480Mbps signaling rate (Supporting wake from S4/S5 with keyboard/mouse connected and enabled in BIOS)

6. (3) Type-A SuperSpeed USB 5Gbps signaling rate port
7. Internal WLAN antenna cover (optional)
8. HP Business PC Security Lock slot
9. RJ45 network connector
10. Serial port (optional)
11. Integrated keyboard/mouse wire hoop
12. Pad lock
13. Power cord connector
14. Standard cable lock slot

**Not Shown**

**Port**

Optional PS/2 (2 ports) & serial port card (connected with mainboard via flyer cable) [1]

Optional parallel port[1]

Optional 4 Serial Port PCIe Card[1] (1 to 4 serial port dongle)

**Bay**

(1) 9.5mm internal optical drive bay

(2) 3.5"? internal storage drive bay

1. Each of the legacy options will occupy one rear slot

## Standard Features and Configurable Components (availability may vary by country)

**HP ProOne 440 23.8 inch G9 All-in-One Desktop PC (Touch/Non-Touch)**



1. Pull-up webcam (optional)
2. Combo Audio Jack with CTIA and OMTP headset support
3. Speakers (optional)
4. SD media card reader (optional)
5. On-screen display (OSD) buttons
6. Power button
7. Power activity light
8. Type-C® SuperSpeed USB 10Gbps signaling rate port (charge support up to 5V/3A)
9. Type-A SuperSpeed USB 10Gbps signaling rate port (charge support up to 5V/1.5A)

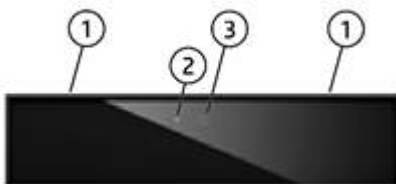| 5MP webcam (optional) | 5MP webcam with Infrared (IR) sensors (optional) | 5MP webcam with Infrared (IR) / Color Light Sensor (optional) |
|---|---|---|
|  |  |  |
| 1. Dual microphones | 1. Dual microphones | 1. Dual microphones |
| 2. Webcam light | 2. Webcam light | 2. Webcam light |
| 3. 5MP webcam | 3. IR/5MP webcam | 3. IR/5MP/CLS webcam |
|  | 4. IR light | 4. IR light |
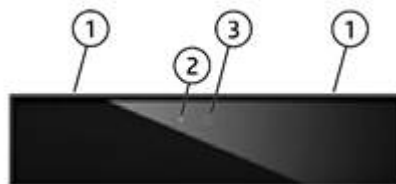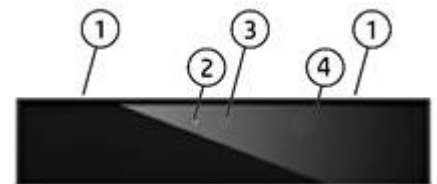
Standard Features and Configurable Components (availability may vary by country)

**HP ProOne 440 23.8 inch G9 All-in-One Desktop PC (Touch & Non-Touch)**
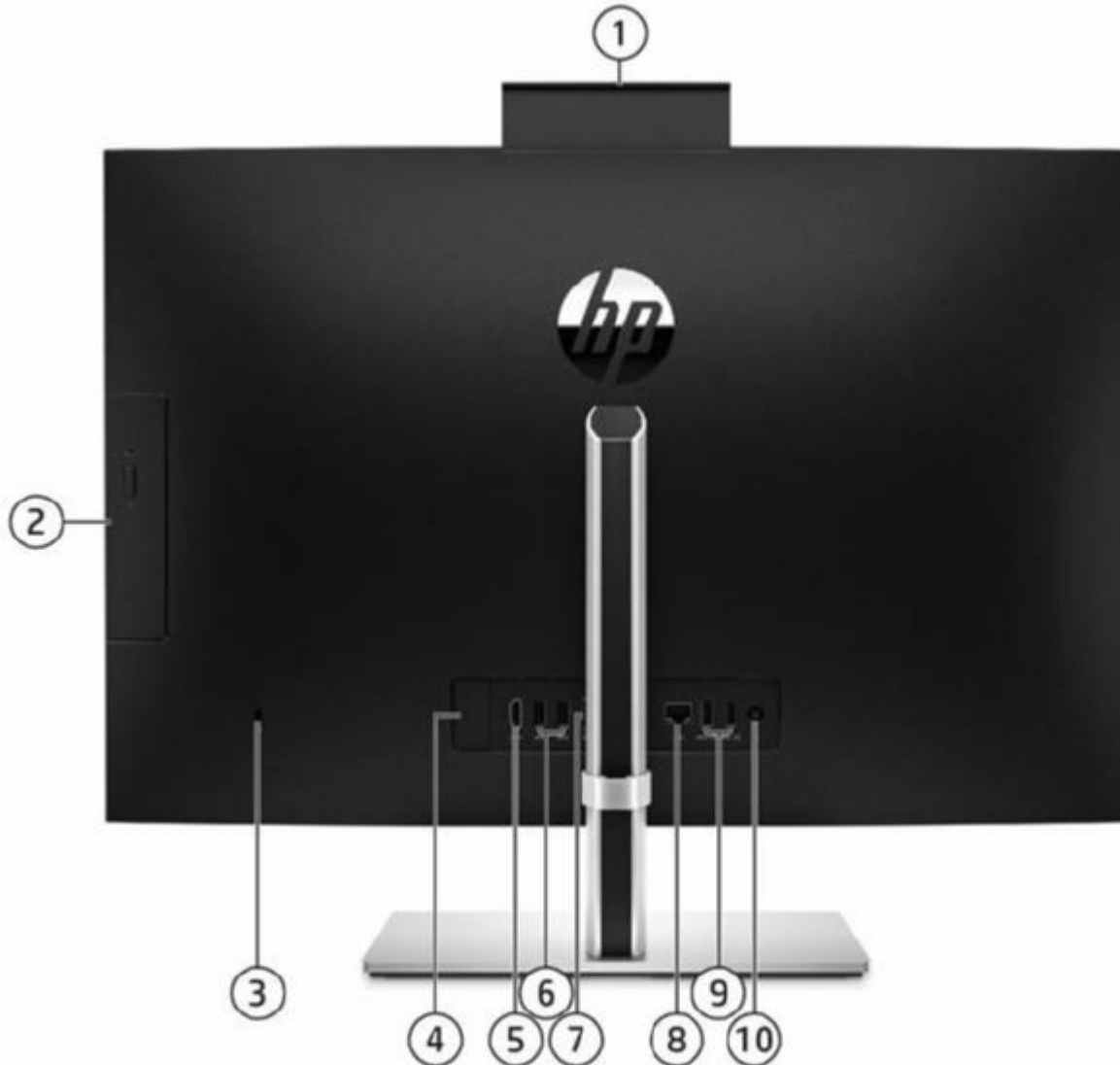


1.  Pull-up webcam (optional)

2.  Optical disc drive (optional)

3.  Standard cable lock slot

4.  Flex Port, choice of:
    - DisplayPort$^T$$_M$
    - Serial
    - HDMI 2.0a
    - Type-C

5.  HDMI-in

6.  (2) Type-A SuperSpeed USB 5Gbps signaling rate port (Supporting wake in from S4/S5 with keyboard/mouse connected and enabled BIOS)

7.  Dual-Mode DisplayPort$^{TM}$ 1.4 (DP++)

8.  RJ45 network connector

9.  (2) Type-A SuperSpeed USB 10Gbps signaling rate port

10. Power connector

1. Availability may vary by country

**AT A GLANCE**

## Standard Features and Configurable Components (availability may vary by country)

- Choice of four form factors: Tower, Small Form Factor, Mini Desktop and All-in-One.
- HP developed and engineered UEFI V2.7 BIOS supporting security, manageability and software image stability.
- Latest commercial class Intel Q670 chipsets supporting latest Intel® 12$^{th}$ Generation Core$^{TM}$ processors, featuring integrated Intel® UHD Graphics.
  - Intel Standard Manageability (ISM) comes standard for Intel® Core$^{TM}$ and Pentium$^{TM}$ configurations.
  - Optional Intel® vPro$^{TM}$ Technology upgrade with selected Core$^{TM}$ i5 and Core$^{TM}$ i7 processors (vPro$^{TM}$ is optional and requires factory configuration).
- Processors support up to 65W for TWR/SFF/AiO and up to 35W for Mini Desktop.
- Choice of Windows 11 Professional, Windows 11 Home, and FreeDOS.
- Integrated 10/100/1000 Ethernet Controller, with optional Wi-Fi 6E, Wi-Fi 6 (802.11ax) and Wi-Fi 5 (802.11ac) and Bluetooth®.
- Up to 64GB of DDR4 Synchronous Dynamic Random Access Memory (SDRAM).
- Support for up to three video outputs via three standard video connectors and an optional third video port connector which provides the following choices: DisplayPort$^{TM}$, HDMI, VGA, or USB Type-C® with DisplayPort$^{TM}$ Output on TWR/SFF/Mini.
- Power consumption of Desktop Mini PC varies per configuration, for the best user experience, please connect PC power cord whi using USB-C® cable via Super Speed USB Type-C® port in the rear side of the platform.
- Reduce clutter on Mini Desktop with single cable connection for power and video through USB Type-C® enabled displays with the optional USB- Type-C® port w/ DisplayPort Alt Mode and power intake via USB Type-C® Power Delivery up to 100W; reduce desktop footprint with the DM mounted behind a USB-C$^{TM}$ enabled display.
- New flexibility is delivered by the All-in-One that can be used as a full PC or as an additional display for another desktop or laptop PC via the new HDMI-in functionality.
- Monitor Mode disassociates Panel from CPU for a true monitor experience.
- Optional Serial port available on all form factors.
- Multiple HDD data drives set up in a SATA RAID array for TWR/SFF and support RAID 1 configured from factory for TWR.
- M.2 raid array available on AiO.
- Integrated accessory cable lock helps secure cabled mouse and keyboard on TWR/SFF.
- Trusted Platform Module (TPM) 2.0.
- HP BIOSphere Gen6.
- HP Client Security Manager Gen6.
- HP Sure Click.
- HP Manageability Integration Kit Gen4.
- HP Image Assistant Gen5.
- HP Support Assistant.
- High efficiency energy saving power supply.
- ENERGY STAR® certified. EPEAT® registered where applicable.
- TUV Low Blue Light certified for All-in-One.
- Low halogen.
- All form factors undergo MIL-STD tests.[1]
- Dust filter available for TWR/SFF/Mini Desktop.
- Protected by HP Services, including limited warranty up to 1-1-1 (terms and conditions vary by country; certain restrictions an exclusions apply); Care Packs available with up to 5 years Next Business Day Onsite Hardware Support.
- Compliance with CE (Class B) / FCC (Class B) / UL / UL62368-1) / CSA ( / CSA C22.2 No. 62368-1) / ICES-003 / CCC / VCCI (Class B) KCC (Class B).

1. MIL-STD testing is not intended to demonstrate fitness for U.S. Department of Defense contract requirements or for military use. Test results are not a guarantee of future performance under these test conditions. Accidental damage requires an optional HP Accidental Damage Protection Care Pack.

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

## PRODUCT NAME

HP Pro Mini 400 G9 Desktop PC
HP Pro SFF 400 G9 Desktop PC
HP Pro Tower 400 G9 PCI Desktop PC
HP Pro Tower 480 G9 PCI Desktop PC
HP ProOne 440 23.8 inch G9 All-in-One Desktop PC

Standard Features and Configurable Components (availability may vary by country)

## OPERATING SYSTEM

**Preinstalled**
Windows 11 Pro[1]
Windows 11 Pro Education[1]
Windows 11 Home - HP recommends Windows 11 Pro for business[1]
Windows 11 Home Single Language - HP recommends Windows 11 Pro for business[1]
Windows 10 Pro (available through downgrade rights from Windows 11 Pro)[1]
Windows 11 Pro (Windows 11 Enterprise or Windows 10 Enterprise available with a Volume Licensing Agreement)[1,2]
FreeDOS

1. Device comes with Windows 10 and a free Windows 11 upgrade or may be preloaded with Windows 11. Upgrade timing may vary by device. Features and app availability may vary by region. Certain features require specific hardware (see Windows 11 Specifications).
2. 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 interneet and Microsoft account required. ISP fees apply and additional requirements may apply over time for updates. See http://www.windows.com.

## CHIPSET

|  | Mini | SFF | TWR | AiO |
|---|---|---|---|---|
| Intel® Q670 | X | X | X | X |

## PROCESSORS

| Intel® 12th Generation Core™ Processors | Mini | SFF | TWR | AiO |
|---|---|---|---|---|
| Intel® Core™ i7-12700 Processor[1]<br>65W<br>2.1 GHz base frequency<br>Up to 4.9 GHz max. turbo frequency with Intel® Turbo Boost Technology[2]<br>25 MB cache, 12 cores, 20 threads<br>Intel® UHD Graphics 770<br>Supports DDR4 memory up to 3200 MT/s data rate<br>Supports Intel® vPro™ Technology and Intel® Stable Image Platform Program (SIPP)[3] |  | X | X | X* |
| Intel® Core™ i7-12700T Processor[1]<br>35W<br>1.4 GHz base frequency<br>Up to 4.7 GHz max. turbo frequency with Intel® Turbo Boost Technology 3.0[2]<br>25 MB cache, 12 cores, 20 threads<br>Intel® UHD Graphics 770<br>Supports DDR4 memory up to 3200 MT/s data rate<br>Supports Intel® vPro™ Technology and Intel® Stable Image Platform Program (SIPP)[3] | X |  |  | X |
| Intel® Core™ i5-12600 Processor[1]<br>65W<br>3.3 GHz base frequency<br>Up to 4.8 GHz max. turbo frequency with Intel® Turbo Boost Technology[2] |  |  |  |  |

## Standard Features and Configurable Components (availability may vary by country)

| | Mini | SFF | TWR | AiO |
|---|:---:|:---:|:---:|:---:|
| 18 MB cache, 6 cores, 12 threads<br>Intel® UHD Graphics 770<br>Supports DDR4 memory up to 3200 MT/s data rate<br>Supports Intel® vPro™ Technology and Intel® Stable Image Platform Program (SIPP)[3] | | X | X | X |
| Intel® Core™ i5-12600T Processor[1]<br>35W<br>2.1 GHz base frequency<br>Up to 4.6 GHz max. turbo frequency with Single P-core turbo Technology<br>18 MB cache, 6 cores, 12 threads<br>Intel® UHD Graphics 770<br>Supports DDR4 memory up to 3200 MT/s data rate<br>Supports Intel® vPro™ Technology and Intel® Stable Image Platform Program (SIPP)[3] | X | | | X |

**NOTE***: Only available with discrete graphics card.

| | Mini | SFF | TWR | AiO |
|---|:---:|:---:|:---:|:---:|
| Intel® Core™ i5-12500 Processor[1]<br>65W<br>3.0 GHz base frequency<br>Up to 4.6 GHz max. turbo frequency with Intel® Turbo Boost Technology[2]<br>18 MB cache, 6 cores, 12 threads<br>Intel® UHD Graphics 770<br>Supports DDR4 memory up to 3200 MT/s data rate<br>Supports Intel® vPro™ Technology and Intel® Stable Image Platform Program (SIPP)[3] | | X | X | X |
| Intel® Core™ i5-12500T Processor[1]<br>35W<br>2.0 GHz base frequency<br>Up to 4.4 GHz max. turbo frequency with Single P-core Turbo Technology18 MB cache, 6 cores, 12 threads<br>Intel® UHD Graphics 770<br>Supports DDR4 memory up to 3200 MT/s data rate<br>Supports Intel® vPro™ Technology and Intel® Stable Image Platform Program (SIPP)[3] | X | | | X |
| Intel® Core™ i5-12400 Processor[1]<br>65W<br>2.5 GHz base frequency<br>Up to 4.4 GHz max. turbo frequency with Intel® Turbo Boost Technology[2]<br>18 MB cache, 6 cores, 12 threads<br>Intel® UHD Graphics 730<br>Supports DDR4 memory up to 3200 MT/s data rate | | X | X | X |
| Intel® Core™ i5-12400T Processor[1]<br>35W<br>1.8 GHz base frequency<br>Up to 4.2 GHz max. turbo frequency with Single P-core Turbo Technology<br>18 MB cache, 6 cores, 12 threads<br>Intel® UHD Graphics 730 | X | | | X |

## Standard Features and Configurable Components (availability may vary by country)

| Supports DDR4 memory up to 3200 MT/s data rate | | | | |
|---|---|---|---|---|

|  | **Mini** | **SFF** | **TWR** | **AiO** |
|---|---|---|---|---|
| Intel® Core™ i3-12300 Processor[1]<br>60W<br>3.5 GHz base frequency<br>Up to 4.4 GHz max. turbo frequency with Single P-Core technology<br>12 MB cache, 4 cores, 8 threads<br>Intel® UHD Graphics 730<br>Supports DDR4 memory up to 3200 MT/s data rate |  | X | X | X |
| Intel® Core™ i3-12300T Processor[1]<br>35W<br>2.3 GHz base frequency<br>Up to 4.2 GHz max. turbo frequency with Single P-Core technology<br>12 MB cache, 4 cores, 8 threads<br>Intel® UHD Graphics 730<br>Supports DDR4 memory up to 3200 MT/s data rate | X |  |  | X |
| Intel® Core™ i3-12100 Processor[1]<br>60W<br>3.3 GHz base frequency<br>Up to 4.3 GHz max. turbo frequency with Intel® Turbo Boost Technology[2]<br>12 MB cache, 4 cores, 8 threads<br>Intel® UHD Graphics 730<br>Supports DDR4 memory up to 3200 MT/s data rate |  | X | X | X |
| Intel® Core™ i3-12100T Processor[1]<br>35W<br>2.2 GHz base frequency<br>Up to 4.1 GHz max. turbo frequency with Single P-core Technology12 MB cache, 4 cores, 8 threads<br>Intel® UHD Graphics 730<br>Supports DDR4 memory up to 3200 MT/s data rate | X |  |  | X |

## Standard Features and Configurable Components (availability may vary by country)

| Intel® Pentium® Processors (For FY22 Mini 400, need to add Pentium/ Celeron 35W CPU) | Mini | SFF | TWR | AiO |
|---|---|---|---|---|
| Intel® Pentium® Gold G-7400 Processor[1]<br>46W<br>3.7 GHz base frequency<br>6 MB cache, 2 cores, 4 threads<br>Intel® UHD Graphics 710<br>Supports DDR4 memory up to 3200 MT/s data rate | | X | X | X |
| Intel® Pentium® Gold G-7400T Processor[1]<br>35W<br>3.1 GHz base frequency<br>6 MB cache, 2 cores, 4 threads<br>Intel® UHD Graphics 710<br>Supports DDR4 memory up to 3200 MT/s data rate | X | | | X |
| Intel® Celeron® 6900 Processor[1]<br>46W<br>3.4 GHz base frequency<br>4 MB cache, 2 cores, 2 threads<br>Intel® UHD Graphics 710<br>Supports DDR4 memory up to 3200 MT/s data rate | | X | | X |
| Intel® Celeron® 6900T Processor[1]<br>35W<br>2.8 GHz base frequency<br>4 MB cache, 2 cores, 2 threads<br>Intel® UHD Graphics 710<br>Supports DDR4 memory up to 3200 MT/s data rate | X | | | X |

1. 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, branding and/or naming is not a measurement of higher performance.
2. Intel® Turbo Boost technology requires a PC with a processor with Intel Turbo Boost capability. Intel Turbo Boost performance varies depending on hardware, software and overall system configuration. See www.intel.com/technology/turboboost for more information.
3. For full Intel®? vPro™? functionality, Windows, a vPro supported processor, vPro enabled chipset, vPro enabled WLAN card and discrete TPM 2.0 are requi See https://www.intel.com/content/www/us/en/architecture-and-technology/vpro/vpro-platform-general.html.

## GRAPHICS

| Integrated Graphics | Mini | SFF | TWR | AiO |
|---|---|---|---|---|
| Intel® UHD Graphics 770 (integrated on 12th gen Core i7, Core i5-12500 and Core i5-12500T) | X | X | X | X |
| Intel® UHD Graphics 730 (integrated on Core i3/i5-12400, i5-12400T) | X | X | X | X |
| Intel® UHD Graphics 710 (integrated on Pentium® Gold and Celeron®) | X | X | X | X |

**Optional Discrete Graphics Solutions**

| | Mini | SFF | TWR | AiO |
|---|---|---|---|---|
| NVIDIA T400 2GB LP PCIe x16 Blower Fan 3 mini DP Graphics | | X | X | |
| NVIDIA® T400 4GB Graphics Card | | X | X | |
| AMD Radeon™ 6300M with 2 GB GDDR6 Graphics | | | | X |

## Standard Features and Configurable Components (availability may vary by country)

**Adapters and Cables**

| HP DisplayPort™ Cable | X | X | X | X |
|---|---|---|---|---|
| HP DisplayPort™ to DVI-D Adapter | X | X | X | X |
| HP DisplayPort™ to HDMI True 4K Adapter | X | X | X | X |
| HP DisplayPort™ to VGA Adapter | X | X | X | X |
| HP USB to Serial Port Adapter | X | X | X | X |

## STORAGE

| 3.5 inch SATA Hard Disk Drives (HDD) | Mini | SFF | TWR | AiO |
|---|---|---|---|---|
| 500GB* 7200RPM 3.5in SATA HDD | | X | X | |
| 1TB* 7200RPM 3.5in SATA HDD | | X | X | |
| 2TB* 7200RPM 3.5in SATA HDD | | X | X | |

| 2.5 inch SATA Hard Disk Drives (HDD) | | | | |
|---|---|---|---|---|
| 500GB* 7200RPM 2.5in SATA HDD | X | | | X |
| 1TB* 7200RPM 2.5in SATA HDD | X | | | X |
| 1TB* 5400RPM 2.5in SATA HDD | X | | | X |
| 2TB* 5400RPM 2.5in SATA HDD | X | | | X |
| 500GB 7200RPM 2.5in Self Encrypted OPAL2 SATA HDD** | X | | | X |

| M.2 PCIe NMVe Solid State Drives (SSD) | | | | |
|---|---|---|---|---|
| 256GB* M.2 2280 PCIe NVMe SSD | X | X | X | X |
| 512GB* M.2 2280 PCIe NVMe SSD | X | X | X | X |
| 1TB M*.2 2280 PCIe NVMe SSD | X | X | X | |
| 256GB* M.2 2280 PCIe NVMe Three Layer Cell SSD | X | X | X | X |
| 512GB* M.2 2280 PCIe NVMe Three Layer Cell SSD | X | X | X | X |
| 1TB* M.2 2280 PCIe NVMe Three Layer Cell SSD | X | X | X | X |
| 2TB* M.2 2280 PCIe NVMe Three Layer Cell SSD | X | X | X | X |
| 256GB* M.2 2280 PCIe NVMe Self Encrypted OPAL2 Three Layer Cell SSD** | X | X | X | X |
| 512GB* M.2 2280 PCIe NVMe Self Encrypted OPAL2 Three Layer Cell SSD** | X | X | X | X |

\* 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) of system disk is reserved for the system recovery software
\*\*Storage DriveLock does not work with Self Encrypting or Optane based storage

## Standard Features and Configurable Components (availability may vary by country)

| Optical Disc Drives | Mini | SFF | TWR | AiO |
|---|---|---|---|---|
| HP 9.5mm Slim DVD-ROM Drive[1] | | X | X | X |
| HP 9.5mm Slim DVD Writer Drive[2] | | X | X | X |
| HP 9.5mm Slim Blu-Ray Writer Drive[3] | | X | X | X |

1. 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.
2. Don't copy copyright-protected materials.
3. With Blu-Ray, certain disc, digital connection, compatibility and/or performance issues may arise, and do not constitute defects in the product. Flawless playback on all systems is not guaranteed. In order for some Blu-ray titles to play, they may require a DVI or HDMI digital connection and your display may require HDCP support. HD-DVD movies cannot be played on this Desktop PC.

| Media Card Reader | Mini | SFF | TWR | AiO |
|---|---|---|---|---|
| SD 4.0 with 5-in-1 Interface (Supports SD, SDXC, SDHC, UHS-I, UHS-II) | | X | X | |
| SD 3.0 with 4-in-1 Interface (Supports SD, SDXC, SDHC, UHS-I) | | | | X |

## MEMORY

| | Mini | SFF | TWR | AiO |
|---|---|---|---|---|
| DDR4-3200 (Transfer rates up to 3200 MT/s), Max 64 GB, 2 SO-DIMM | X | | | X |
| DDR4-3200 (Transfer rates up to 3200 MT/s), Max 64 GB, 2 U-DIMM | | X | X | |

**Memory Configuration**

| | Mini | SFF | TWR | AiO |
|---|---|---|---|---|
| 4GB (4GB x 1) | X | X | X | X |
| 8GB (4GB x 2) | X | X | X | X |
| 8GB (8GB x 1) | X | X | X | X |
| 16GB (8GB x 2) | X | X | X | X |
| 16GB (16GB x 1) | X | X | X | X |
| 32GB (16GB x 2) | X | X | X | X |
| 32GB (32GB x 1) | X | X | X | X |
| 64GB (32GB x 2) | X | X | X | X |

**NOTE:** For systems configured with more than 3GB of memory and a 32-bit operating system, all memory may not be available due to system resource requirements. Addressing memory above 4GB requires a 64-bit operating system.
**NOTE:** Memory modules support data transfer rates up to 3200 MT/s respectively depending on memory module used; actual data rate is determined by the system's configured processor. See processor specifications for supported memory data rate.
**NOTE:** All memory slots are customer accessible / upgradeable.
**NOTE**: Memory speed 3200 MT/s can be achieved via two UDIMMs per channel (2DPC) when populated with the same part number.

## NETWORKING/COMMUNICATIONS

## Standard Features and Configurable Components (availability may vary by country)

| Ethernet (RJ-45) | Mini | SFF | TWR | AiO |
|---|---|---|---|---|
| Intel® I219-LM 1 Gigabit Network Connection LOM (vPro) | X | X | X | X |
| Intel® Ethernet Network Adapter I225-T1 (optional) | | X | X | |

| Wireless | | | | |
|---|---|---|---|---|
| Intel® Wi-Fi 6E[1] AX211 802.11ax 2x2 with Bluetooth® 5.3[2] M.2 Combo Card vPro[TM3] | X | X | X | X |
| Intel® Wi-Fi 6E[1] AX211 802.11ax 2x2 with Bluetooth® 5.3[2] M.2 Combo Card non-vPro[TM3] | X | X | X | |
| Realtek Wi-Fi6[1] RTL8852BE 802.11ax 2x2 with Bluetooth® 5.3[2] M.2 Combo Card | X | X | X | X |
| Realtek RTL8821CE 802.11ac[4] 1x1 with Bluetooth® 5.2 M.2 Combo Card | X | X | X | X |

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.
2. Bluetooth® 5.3 operation requires Microsoft OS support. Until Microsoft OS support is available, Bluetooth® 5.3 will function as Bluetooth® 5.2 or lower
3. 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.
4. 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.
**NOTE:** Intel Wi-Fi 6E modules are available on Elite Tower and SFF G9, but the 6GHz band is not available.

## KEYBOARDS AND POINTING DEVICES

| Keyboards | Mini | SFF | TWR | AiO |
|---|---|---|---|---|
| HP Business Slim PS/2 Wired Keyboard | | X | X | |
| HP Wired Desktop 320K Keyboard | X | X | X | X |
| HP USB Business Slim Wired SmartCard CCID Keyboard | X | X | X | X |
| HP 125 Wired Keyboard | X | X | X | X |
| HP 125 AntiMicrobial Wired Keyboard (China Only) | X | X | X | X |

| Keyboard & Mouse Combo | | | | |
|---|---|---|---|---|
| HP 655 Wireless Keyboard and Mouse Combo | X | X | X | X |

| Mouse | | | | |
|---|---|---|---|---|
| HP PS/2 Mouse | | X | X | |
| HP Wired Desktop 320M Mouse | X | X | X | X |
| HP 125 Wired Mouse | X | X | X | X |
| HP 125 Wired Antimicrobial Mouse (China Only) | X | X | X | X |
| HP 128 Wired Laser Mouse | X | X | X | X |

**NOTE:** Availability may vary by country

## SECURITY

## Standard Features and Configurable Components (availability may vary by country)

| | Mini | SFF | TWR | AiO |
|---|---|---|---|---|
| TPM 2.0 (FW: 15.21) endpoint security controller (Infineon SLB9672) Common Criteria EAL4+ Certified. FIPS 140-2 Level 2 Certified. | X | X | X | X |
| Intrusion Sensor (Optional) | | X | X | |
| Intrusion Sensor (integrated in the system board, can be enabled/disabled through BIOS) | X | | | X |
| Support for chassis cable lock devices | X (10 mm barrel or smaller) | X | X | X |
| Support for chassis padlocks devices | X | X | X | |
| Support for table lock | | | | X |
| SATA port disablement (via BIOS) | X | X | X | X |
| Serial, USB enable/disable (via BIOS) | X | X | X | X |
| Intel® Identify Protection Technology (IPT)[1] | X | X | X | X |
| Removable media write/boot control | X | X | X | X |
| Power-on password (via BIOS) | X | X | X | X |
| Setup password (via BIOS) | X | X | X | X |

1. Models configured with Intel® Core™ processors have the ability to utilize advanced security protection for online transactions. IPT, used in conjunction with participating web sites, provides double identity authentication by adding a hardware component in addition to the usual user name and password. IPT is initialized through an HP Client Security module

## PORTS

| Internal Slots and Ports | Mini | SFF | TWR | AiO |
|---|---|---|---|---|
| M.2 PCIe | (1) M.2 PCIe x1 2230 (for WLAN/BT) (1) M.2 PCIe x4 2280 (for storage) | (1) M.2 PCIe x1 2230 (for WLAN/BT/storage[1]) (1) M.2 PCIe x4 2280 (for storage) | (1) M.2 PCIe x1 2230 (for WLAN/BT/storage[1]) (1) M.2 PCIe x4 2280 (for storage) | (1) M.2 PCIe x1 2230 (for WLAN) (1) M.2 PCIe x4 2280 (for storage) (1) M.2 PCIe x3 2280 (for storage) |
| PCI Express v4.0 x1 | | 1 | 1 | |
| PCI Express v4.0 x16 | | 1 | 1 | |
| PCI x1 | | | 1 | |
| SATA port | | 3 | 3 | |
| Integrated SATA storage connector | 1 | | | 1 |

**NOTE**: For Desktop Mini with M.2 Storage config, there will be no SATA drive bracket. If you plan to use or upgrade the storage with any 2.5" SATA drive, please select a DM SATA Drive Bracket (available as both factory configured and after market option).
1. Optional.

## Standard Features and Configurable Components (availability may vary by country)

| Bays | Mini | SFF | TWR | AiO |
|---|---|---|---|---|
| 9.5mm Slim Optical Disc Drive (ODD) | | 1 | 1 | 1[1] |
| SD Card Reader[1] (optional) | | 1 | 1 | 1 |
| 2.5" Internal Storage Drive | 1 | | | 1 |
| 3.5" Internal Storage Drive | | 1 | 2 | |

1. Must be configured at time of purchase
2. Need to be configured at the time of purchase, either SATA or the ODD can only be selected one at the same time.

| Standard User Accessible Ports | Mini | SFF | TWR | AiO |
|---|---|---|---|---|
| Type-A Hi-Speed USB 480Mbps signaling rate port | | 2 (rear) | 2 (rear) | |
| Type-A SuperSpeed USB 5Gbps signaling rate port | 2 (rear) | 3 (rear) | 3 (rear) | 2 (rear) |
| Type-A SuperSpeed USB 10Gbps signaling rate port | 2 (front) 1 (rear) | 3 (front) | 3 (front) | 2 (rear) 1 (side) |
| Type-C® SuperSpeed USB 10Gbps signaling rate port | | 1 (front) | 1 (front) | 1 (side) |
| Type-C® SuperSpeed USB 20Gbps signaling rate port | 1 (front) | | | |
| Video | 2 DisplayPort™ 1.4 (rear) 1 HDMI 2.1 (rear) | 1 DisplayPort™ 1.4 (rear) 1 HDMI 1.4 (rear) | 1 DisplayPort™ 1.4 (rear) 1 HDMI 1.4 (rear) | 1 DisplayPort™ 1 HDMI-in (Rear) |
| Audio | 1 Combo Audio Jack with CTIA and headset support (front) | 1 Combo Audio Jack with CTIA & OMTP and headset support (front) 1 Audio-Line-in/Line out (rear) | 1 Combo Audio Jack with CTIA & OMTP and headset support (front) 1 Audio-Line-in/Line out (rear) | 1 Combo Audio Jack with CTIA and OMTP headset support (side) |
| Network Interface | 1 RJ45 (rear) | 1 RJ45 (rear) | 1 RJ45 (rear) | 1 RJ45 (rear) |

1. Upgradeable to SuperSpeed USB 10Gbps signaling rate port if configured with additional digital video port via Flex Port 1 and/or Intel® vPro™

### Rear Configurable Non-PCIe/PCI Slot User Accessible Ports

| Flexible Port 1, choice of one of the following: | Mini | SFF | TWR | AiO |
|---|---|---|---|---|
| Type-A USB | | 2 Type-A SuperSpeed USB 5Gbps signaling rate port | 2 Type-A SuperSpeed USB 5Gbps signaling rate port (rear) | |
| Type-C® USB | 1 SuperSpeed USB 10Gbps signaling rate port w/ DisplayPort™ Alt Mode and power intake via USB Type-C® Power Delivery up to 100W | 1 SuperSpeed USB 10Gbps signaling rate port w/ DisplayPort™ Alt Mode | 1 SuperSpeed USB 10Gbps signaling rate port w/ DisplayPort™ Alt Mode | 1 SuperSpeed USB 10Gbps signaling rate port w/ DisplayPort™ Alt Mode |
| Video | 1 DisplayPort™ 1.4 or HDMI 2.1 or VGA | 1 DisplayPort™ 1.4 or HDMI 2.1 or VGA | 1 DisplayPort™ 1.4 or HDMI 2.1 or VGA | 1 DisplayPort™ 1.4 or HDMI 2.0a or USB-C 1 Serial Port |
| Serial (RS-232) | 1[1] | 1 | 1 | 1 |

1. Sold separately or as an optional feature

## Standard Features and Configurable Components (availability may vary by country)

| (1) Flexible Port 2, choice of one of the following: | Mini | SFF | TWR | AiO |
|---|---|---|---|---|
| Type-A USB | 2 Hi-Speed USB 480Mbps signaling rate port[1] | | 2 Type-A SuperSpeed USB 5Gbps signaling rate port[2] (front) | |
| Serial (RS-232) | 1[1] | | | |
| 2nd External antenna | 1[1] | | | |

1. Must be configured at time of purchase
2. Front flex IO – Dual USB port and SD card reader can only select one at the same time.

## USB SPECIFICATION AND MARKETING NAME MAPPING TABLE

| Marketing Name | Technical Terminology |
|---|---|
| Hi-Speed USB 480Mbps signaling rate | USB 2.0 |
| SuperSpeed USB 5Gbps signaling rate | USB 3.2 Gen 1 |
| SuperSpeed USB 10Gbps signaling rate | USB 3.2 Gen 2 |
| SuperSpeed USB 20Gbps signaling rate | USB 3.2 Gen 2x2 |

## SOFTWARE COMPONENTS AND APPLICATIONS WITH WINDOWS

**Software**
HP Easy Clean[1]
HP QuickDrop[2]
HP PC Hardware Diagnostics UEFI
HP Desktop Support Utilities
HP Privacy Settings
HP Setup Integrated OOBE
HP Support Assistant[3]
Touchpoint Customizer for Commercial
myHP
HP Notifications
HP Connection Optimizer
HP Smart Support[4]
Buy Microsoft Office (sold separately)

**Manageability Features**
HP Connect for Microsoft Endpoint Manager[5]
HP Image Assistant Gen5 (download)
HP Manageability Integration Kit (download)[6]
HP Client Management Script Library (download)
HP Patch Assistant (download)[7]
HP Driver Packs (download)
HP Cloud Recovery[8]
HP Client Catalog (download)

**Security Management**
HP Wolf Security for Business[9]:
HP Sure Click[10]

## Standard Features and Configurable Components (availability may vary by country)

HP Sure Sense[11]
HP Sure Start Gen7[12]
HP Tamper Lock
HP Sure Admin[13]

**BIOS**
HP BIOSphere Gen6[14]
HP Secure Erase[15]
HP DriveLock & Automatic DriveLock
BIOS Update via Network
Absolute Persistence Module[16]
TPM 2.0 Embedded Security Chip (Common Criteria EAL4+ Certified) (FIPS 140-2 Level 2 Certified)

1. HP Easy Clean requires Windows 10 RS3 and will disable the keyboard, touchscreen, and clickpad only. Ports are not disabled. See user guide for cleaning instructions.
2. HP Quick Drop requires Internet access and Windows 10 or higher PC preinstalled with HP QuickDrop app and either an Android device (phone or tablet) running Android 7 or higher with the Android HP QuickDrop app, and /or an iOS device (phone or tablet) running iOS 12 or higher with the iOS HP QuickDrop app.
3. HP Support Assistant requires Windows and Internet Access
4. HP Smart Support automatically collects the telemetry necessary upon initial boot of the product to deliver device-level configuration data and health insights and is available preinstalled on select products, or it can be downloaded. For more information about how to enable HP Smart Support or to download, please visit http://www.hp.com/smart-support.
5. HP Connect for Microsoft Endpoint Manager is available from the Azure Market Place for HP Pro, Elite, Z and Point-of-Sale PCs managed with Microsoft Endpoint Manager. Subscription to Microsoft Endpoint Manager required and sold separately. Network connection required.
6. HP Manageability Integration Kit can be downloaded from http://www.hp.com/go/clientmanagement.
7. HP Patch Assistant available on select HP PCs with the HP Manageability Kit that are managed through Microsoft System Center Configuration Manager. HP Manageability Integration Kit can be downloaded from http://www8.hp.com/us/en/ads/clientmanagement/overview.html.
8. HP Cloud Recovery is available for Z by HP, HP Elite and Pro desktops and laptops PCs with Intel® or AMD processors and requires an open, wired network connection. Note: You must back up important files, data, photos, videos, etc. before use to avoid loss of data. Detail, please refer to: https://support.hp.com/us-en/document/c05115630.
9. HP Wolf Security for Business requires Windows 10 or higher, includes various HP security features and is available on HP Pro, Elite, RPOS and Workstation products. See product details for included security features and OS requirement.
10. HP Sure Click requires Windows 10 Pro or higher or Enterprise. See https://bit.ly/2PrLT6A_SureClick for complete details.
11. HP Sure Sense is available on select HP PCs with Windows 10 Pro, Windows 10 Enterprise, Windows 11 Pro, or Windows 11 Enterprise OS.
12. HP Sure Start Gen7 is available on select HP PCs and requires Windows 10 and higher
13. HP Sure Admin requires Windows 10 or higher, HP BIOS, HP Manageability Integration Kit from http://www.hp.com/go/clientmanagement and HP Sure Admin Local Access Authenticator smartphone app from the Android or Apple store.
14. HP BIOSphere Gen6 features may vary depending on the platform and configuration.
15. HP Secure Erase for the methods outlined in the National Institute of Standards and Technology Special Publication 800-88 "Clear" sanitation method. HP Secure Erase does not support platforms with Intel® Optane™.
16. Absolute firmware module is shipped turned off and can only be activated with the purchase a license subscription and full activation of the software agent. License subscriptions can be purchased for terms ranging multiple years. Service is limited, check with Absolute for availability outside the U.S. Certain conditions apply. For full details visit: http://www.absolute.com/about/legal/agreements/absolute.

## UNIT ENVIRONMENT AND OPERATING CONDITIONS

## Standard Features and Configurable Components (availability may vary by country)

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: 5° to 35° C[1] <br> Non-Operating for AiO: -20° to 60° C[1] <br> Non-Operating for MT/SFF/DM: -30° to 60° C[1] |
| Relative Humidity | Operating: 5% to 90% (non-condensing at ambient) <br> Non-operating: 5% to 90% (non-condensing at ambient) |
| Maximum Altitude (unpressurized) | Operating: 5000m <br> Non-operating: 50000ft (15240 m) |

1. 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

### HP Pro Mini 400 G9 Desktop PC

| | |
|---|---|
| **Eco-Label Certifications & declarations** | This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks: <br> • IT ECO declaration <br> • US ENERGY STAR® <br> • US Federal Energy Management Program (FEMP) <br> • EPEAT? Gold registered in the United States. See http://www.epeat.net for registration status in your country. <br> • TCO Certified <br> • China Energy Conservation Program (CECP) <br> • China State Environmental Protection Administration (SEPA) <br> • Taiwan Green Mark <br> • Korea Eco-label <br> • Japan PC Green label <br> • Commission Regulation (EC) No 617/2013 (ErP Lot 3) |
| **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. |

| **Energy Consumption (in accordance with US ENERGY STAR® test method)** | **115VAC, 60Hz** | **230VAC, 50Hz** | **100VAC, 60Hz** |
|---|---|---|---|
| Normal Operation (Short idle) | 7.23 W | 7.31 W | 7.07 W |
| Normal Operation (Long idle) | 2.16 W | 2.24 W | 2.01 W |
| Sleep | 2.14 W | 2.21 W | 1.99 W |
| Off | 0.62 W | 0.7 W | 0.47 W |

# QuickSpecs

## Standard Features and Configurable Components (availability may vary by country)

| | |
|---|---|
| | **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. |

| Heat Dissipation* | 115VAC, 60Hz | 230VAC, 50Hz | 100VAC, 50Hz |
|---|---|---|---|
| Normal Operation (Short idle) | 24.7 BTU/hr | 25 BTU/hr | 24.2 BTU/hr |
| Normal Operation (Long idle) | 7.4 BTU/hr | 7.7 BTU/hr | 6.9 BTU/hr |
| Sleep | 7.3 BTU/hr | 7.6 BTU/hr | 6.8 BTU/hr |
| Off | 2.1 BTU/hr | 2.41 BTU/hr | 1.6 BTU/hr |

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

| Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296) | Sound Power ($L_{WAd}$, bels) | Sound Pressure ($L_{pAm}$, decibels) |
|---|---|---|
| Typically Configured – Idle | 2.7 | 16 |
| Fixed Disk – Random writes | 2.7 | 16 |
| 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:<br><br>• 2 SODIMM memory slots<br>• Interchangeable M.2 PCIe NVME SSD & 2.5"? SATA HDD<br><br>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<br><br>Batteries used in the product do not contain:<br><br>Mercury greater than 1ppm by weight<br><br>Cadmium greater than 20ppm by weight<br><br><br>Battery size: CR2032 (coin cell)<br><br>Battery type: Lithium | |
| Additional Information | • This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC.<br>• This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.<br>• This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).<br>• Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.<br>• This product contains a minimum of 35% post-consumer recycled (PCR) plastic (by wt.); including 10% ITE-derived post-consumer recycled plastic.*<br>• This product is 95.1% recycle-able when properly disposed of at end of life.<br><br>*Recycled plastic content percentage is based on the definition set in the IEEE 1680.1-2018 standard. | |

## Standard Features and Configurable Components (availability may vary by country)

| Packaging Materials (vary by country) | External: | PAPER/Paper | 562g |
|---|---|---|---|
| | **Internal:** | PAPER/Molded Pulp | 79g |
| | | PLASTIC/Polyethylene low density - LDPE | 16g |

| 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)
- 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.

Global Citizenship Report
http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html
Eco-label certifications
http://www8.hp.com/us/en/hp-information/environment/ecolabels.html
ISO 14001 certificates:
http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/PC_GBU_Product_Design_ISO_14K_Certificate.pdf
and

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

Standard Features and Configurable Components (availability may vary by country)

**HP Pro SFF 400 G9 Desktop PC**

| Eco-Label Certifications & declarations | This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:<br>• IT ECO declaration<br>• US ENERGY STAR®<br>• US Federal Energy Management Program (FEMP)<br>• EPEAT[?] Gold registered in the United States. See http://www.epeat.net for registration status in your country.<br>• TCO Certified<br>• China Energy Conservation Program (CECP)<br>• China State Environmental Protection Administration (SEPA)<br>• Taiwan Green Mark<br>• Korea Eco-label<br>• Japan PC Green label<br>• Commission Regulation (EC) No 617/2013 (ErP Lot 3) |
|---|---|
| **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. |

| Energy Consumption (in accordance with US ENERGY STAR® test method) | 115VAC, 60Hz | 230VAC, 50Hz | 100VAC, 60Hz |
|---|---|---|---|
| Normal Operation (Short idle) | 12.1240 W | 12.1460 W | 12.0990 W |
| Normal Operation (Long idle) | 10.3820 W | 10.4110 W | 10.3460 W |
| Sleep | 0.9410 W | 0.9380 W | 0.9420 W |
| Off | 0.7770 W | 0.7750 W | 0.7750 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.

| Heat Dissipation* | 115VAC, 60Hz | 230VAC, 50Hz | 100VAC, 60Hz |
|---|---|---|---|
| Normal Operation (Short idle) | 41.3428 W | 41.4179 W | 41.2576 W |
| Normal Operation (Long idle) | 35.4026 W | 35.5015 W | 35.2799 W |
| Sleep | 3.2088 W | 3.1986 W | 3.2122 W |
| Off | 2.6496 W | 2.6428 W | 2.6428 W |

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

| Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296) | Sound Power ($L_{WAd}$, bels) | Sound Pressure ($L_{pAm}$, decibels) |
|---|---|---|
| Typically Configured – Idle | 3.3 | 23 |
| Fixed Disk – Random writes | 3.4 | 24.1 |
| Optical Drive sequential reads | 3.2 | 23 |
| Longevity and | This product can be upgraded, possibly extending its useful life by several years.  Upgradeable |

## Standard Features and Configurable Components (availability may vary by country)

| | |
|---|---|
| Upgrading | features and/or components contained in the product may include:<br><br>• 2 DIMM memory slots<br>• Interchangeable M.2 PCIe NVME SSD & 2.5"?/3.5"? SATA HDD<br><br>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<br><br>Batteries used in the product do not contain:<br><br>Mercury greater than 1ppm by weight<br><br>Cadmium greater than 20ppm by weight<br><br><br>Battery size: CR2032 (coin cell)<br><br>Battery type: Lithium |
| **Additional Information** | • This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive  - 2011/65/EC.<br>• This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.<br>• This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).<br>• Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.<br>• This product contains a minimum of 35% post-consumer recycled (PCR) plastic (by wt.); including 10% ITE-derived post-consumer recycled plastic.*<br>• This product is 95.1% recycle-able when properly disposed of at end of life.<br><br>*Recycled plastic content percentage is based on the definition set in the IEEE 1680.1-2018 standard. |

| **Packaging Materials** (vary by country) | **External:** | PAPER/Corrugated | 1019g |
|---|---|---|---|
| | **Internal:** | PAPER/Molded pulp | 434g |
| | | PLASTIC/Polyethylene low density | 29g |

| | |
|---|---|
| **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):<br><br>• Asbestos<br>• Certain Azo Colorants<br>• Certain Brominated Flame Retardants – may not be used as flame retardants in plastics<br>• Cadmium<br>• Chlorinated Hydrocarbons<br>• Chlorinated Paraffins<br>• Formaldehyde<br>• Halogenated Diphenyl Methanes<br>• Lead carbonates and sulfates<br>• Lead and Lead compounds<br>• Mercuric Oxide Batteries<br>• Nickel – finishes must not be used on the external surface designed to be frequently handled or carried by the user.<br>• Ozone Depleting Substances<br>• Polybrominated Biphenyls (PBBs)<br>• Polybrominated Biphenyl Ethers (PBBEs)<br>• Polybrominated Biphenyl Oxides (PBBOs)<br>• Polychlorinated Biphenyl (PCB)<br>• Polychlorinated Terphenyls (PCT)<br>• Polyvinyl Chloride (PVC) – except for wires and cables, and certain retail packaging has |

## Standard Features and Configurable Components (availability may vary by country)

| | |
|---|---|
| | been voluntarily removed from most applications.<br>• Radioactive Substances<br>• Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO) |
| **Packaging Usage** | HP follows these guidelines to decrease the environmental impact of product packaging:<br><br>• Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.<br>• Eliminate the use of ozone-depleting substances (ODS) in packaging materials.<br>• Design packaging materials for ease of disassembly.<br>• Maximize the use of post-consumer recycled content materials in packaging materials.<br>• Use readily recyclable packaging materials such as paper and corrugated materials.<br>• Reduce size and weight of packages to improve transportation fuel efficiency.<br>• 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.<br>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:<br><br>Global Citizenship Report<br>http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html<br>Eco-label certifications<br>http://www8.hp.com/us/en/hp-information/environment/ecolabels.html<br>ISO 14001 certificates:<br>http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/PC_GBU_Product_Design_ISO_14K_Certificate.pdf<br>and<br><br>http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf |

### HP Pro Tower 400 G9 PCI Desktop PC

| | |
|---|---|
| **Eco-Label Certifications & declarations** | This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:<br>• IT ECO declaration<br><br>US ENERGY STAR®<br>• US Federal Energy Management Program (FEMP)<br>• EPEAT[?] Gold registered in the United States. See http://www.epeat.net for registration status in your country.<br>• TCO Certified<br>• China Energy Conservation Program (CECP)<br>• China State Environmental Protection Administration (SEPA)<br>• Taiwan Green Mark<br>• Korea Eco-label<br>• Japan PC Green label<br>• Commission Regulation (EC) No 617/2013 (ErP Lot 3) |
| **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. |

## Standard Features and Configurable Components (availability may vary by country)

| Energy Consumption (in accordance with US ENERGY STAR® test method) | 115VAC, 60Hz | 230VAC, 50Hz | 100VAC, 60Hz |
|---|---|---|---|
| Normal Operation (Short idle) | 12.6930 W | 12.6980 W | 12.6900 W |
| Normal Operation (Long idle) | 10.9580 W | 10.9770 W | 10.9590 W |
| Sleep | 0.9940 W | 0.9940 W | 0.9890 W |
| Off | 0.8030 W | 0.8020 W | 0.7990 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. | | |

| Heat Dissipation* | 115VAC, 60Hz | 230VAC, 50Hz | 100VAC, 60Hz |
|---|---|---|---|
| Normal Operation (Short idle) | 43.2831 W | 43.3002 W | 43.2729 W |
| Normal Operation (Long idle) | 37.3668 W | 37.4316 W | 37.3702 W |
| Sleep | 3.3895 W | 3.3895 W | 3.3725 W |
| Off | 2.7382 W | 2.7348 W | 2.7246 W |
| | **NOTE:** Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour. | | |

| Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296) | Sound Power ($L_{WAd}$, bels) | Sound Pressure ($L_{pAm}$, decibels) |
|---|---|---|
| Typically Configured – Idle | 3.1 | 21 |
| Fixed Disk – Random writes | 3.2 | 22 |
| Optical Drive - Sequential reads | 3.3 | 22 |

| 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:<br><br>• 2 DIMM memory slots<br>• Interchangeable M.2 PCIe NVME SSD & 2.5"?/3.5"? SATA HDD<br><br>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<br><br>Batteries used in the product do not contain:<br><br>Mercury greater than 1ppm by weight<br><br>Cadmium greater than 20ppm by weight<br><br>Battery size: CR2032 (coin cell)<br><br>Battery type: Lithium |
| Additional Information | • This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC.<br>• This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.<br>• This product is in compliance with California Proposition 65 (State of California; Safe |

## Standard Features and Configurable Components (availability may vary by country)

|  |  |  |  |
|---|---|---|---|
|  | Drinking Water and Toxic Enforcement Act of 1986).<br>• This product is in compliance with the IEEE 1680.1 (EPEAT) standard at the <Gold> level, see www.epeat.net<br>• Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.<br>• This product contains 44.4% post-consumer recycled plastic (by wt.)<br>• This product is 95.0% recycle-able when properly disposed of at end of life. |  |  |
| **Packaging Materials** (vary by country) | **External:** | PAPER/Corrugated | 1110 g |
|  |  | PAPER/Molded Pulp | 654 g |
|  | **Internal:** | PLASTIC/Polyethylene low density - LDPE | 32 g |
| **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):<br><br>• Asbestos<br>• Certain Azo Colorants<br>• Certain Brominated Flame Retardants – may not be used as flame retardants in plastics<br>• Cadmium<br>• Chlorinated Hydrocarbons<br>• Chlorinated Paraffins<br>• Formaldehyde<br>• Halogenated Diphenyl Methanes<br>• Lead carbonates and sulfates<br>• Lead and Lead compounds<br>• Mercuric Oxide Batteries<br>• Nickel – finishes must not be used on the external surface designed to be frequently handled or carried by the user.<br>• Ozone Depleting Substances<br>• Polybrominated Biphenyls (PBBs)<br>• Polybrominated Biphenyl Ethers (PBBEs)<br>• Polybrominated Biphenyl Oxides (PBBOs)<br>• Polychlorinated Biphenyl (PCB)<br>• Polychlorinated Terphenyls (PCT)<br>• Polyvinyl Chloride (PVC) – except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.<br>• Radioactive Substances<br>• Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO) |  |  |
| **Packaging Usage** | HP follows these guidelines to decrease the environmental impact of product packaging:<br><br>• Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.<br>• Eliminate the use of ozone-depleting substances (ODS) in packaging materials.<br>• Design packaging materials for ease of disassembly.<br>• Maximize the use of post-consumer recycled content materials in packaging materials.<br>• Use readily recyclable packaging materials such as paper and corrugated materials.<br>• Reduce size and weight of packages to improve transportation fuel efficiency.<br>• 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.<br><br>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: |  |  |

## Standard Features and Configurable Components (availability may vary by country)

| | |
|---|---|
| | Global Citizenship Report<br><br>http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html<br><br>Eco-label certifications<br><br>http://www8.hp.com/us/en/hp-information/environment/ecolabels.html<br><br>ISO 14001 certificates:<br><br>http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/PC_GBU_Product_Design_ISO_14K_Certificate.pdf<br><br>and<br><br>http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf |

### HP Pro Tower 480 G9 PCI Desktop PC

| Eco-Label Certifications & declarations | This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:<br>• IT ECO declaration<br>• US ENERGY STAR®<br>• US Federal Energy Management Program (FEMP)<br>• EPEAT[?] Gold registered in the United States. See http://www.epeat.net for registration status in your country.<br>• TCO Certified<br>• China Energy Conservation Program (CECP)<br>• China State Environmental Protection Administration (SEPA)<br>• Taiwan Green Mark<br>• Korea Eco-label<br>• Japan PC Green label<br>• Commission Regulation (EC) No 617/2013 (ErP Lot 3) | | |
|---|---|---|---|
| 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. | | |
| Energy Consumption (in accordance with US ENERGY STAR® test method) | **115VAC, 60Hz** | **230VAC, 50Hz** | **100VAC, 60Hz** |
| Normal Operation (Short idle) | Data available at mid of Dec | Data available at mid of Dec | Data available at mid of Dec |
| Normal Operation (Long idle) | Data available at mid of Dec | Data available at mid of Dec | Data available at mid of Dec |
| Sleep | Data available at mid of Dec | Data available at mid of Dec | Data available at mid of Dec |
| Off | Data available at mid of Dec | Data available at mid of Dec | Data available at mid of Dec |
| | **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. | | |
| **Heat Dissipation\*** | **115VAC, 60Hz** | **230VAC, 50Hz** | **100VAC, 60Hz** |
| Normal Operation (Short idle) | Data available at mid of Dec | Data available at mid of Dec | Data available at mid of Dec |
| Normal Operation (Long idle) | Data available at mid of Dec | Data available at mid of Dec | Data available at mid of Dec |
| Sleep | Data available at mid of Dec | Data available at mid of Dec | Data available at mid of Dec |

## Standard Features and Configurable Components (availability may vary by country)

| Off | Data available at mid of Dec | Data available at mid of Dec | Data available at mid of Dec |
|---|---|---|---|

| | **NOTE:** Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour. | | |
|---|---|---|---|
| **Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)** | Sound Power ($L_{WAd}$, bels) | | Sound Pressure ($L_{pAm}$, decibels) |
| Typically Configured – Idle | Data available at mid of Dec | | Data available at mid of Dec |
| Fixed Disk – Random writes | Data available at mid of Dec | | Data available at mid of Dec |
| 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:<br><br>• 2 DIMM memory slots<br>• Interchangeable M.2 PCIe NVME SSD & 2.5"?/3.5"? SATA HDD<br><br>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<br><br>Batteries used in the product do not contain:<br><br>Mercury greater than 1ppm by weight<br><br>Cadmium greater than 20ppm by weight<br><br><br>Battery size: CR2032 (coin cell)<br><br>Battery type: Lithium | | |
| **Additional Information** | • This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC.<br>• This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.<br>• This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).<br>• This product is in compliance with the IEEE 1680.1 (EPEAT) standard at the <Gold> level, see www.epeat.net<br>• Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.<br>• This product contains 44.4% post-consumer recycled plastic (by wt.)<br>• This product is 95.0% recycle-able when properly disposed of at end of life. | | |
| **Packaging Materials** (vary by country) | **External:** | PAPER/Corrugated | 1110 g |
| | | PAPER/Molded Pulp | 654 20 g |
| | **Internal:** | PLASTIC/Polyethylene low density - LDPE | 32 g |
| **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):<br><br>• Asbestos<br>• Certain Azo Colorants<br>• Certain Brominated Flame Retardants – may not be used as flame retardants in plastics<br>• Cadmium<br>• Chlorinated Hydrocarbons<br>• Chlorinated Paraffins<br>• Formaldehyde<br>• Halogenated Diphenyl Methanes | | |

## Standard Features and Configurable Components (availability may vary by country)

|  |  |
|---|---|
|  | <ul><li>Lead carbonates and sulfates</li><li>Lead and Lead compounds</li><li>Mercuric Oxide Batteries</li><li>Nickel – finishes must not be used on the external surface designed to be frequently handled or carried by the user.</li><li>Ozone Depleting Substances</li><li>Polybrominated Biphenyls (PBBs)</li><li>Polybrominated Biphenyl Ethers (PBBEs)</li><li>Polybrominated Biphenyl Oxides (PBBOs)</li><li>Polychlorinated Biphenyl (PCB)</li><li>Polychlorinated Terphenyls (PCT)</li><li>Polyvinyl Chloride (PVC) – except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.</li><li>Radioactive Substances</li><li>Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)</li></ul> |
| **Packaging Usage** | HP follows these guidelines to decrease the environmental impact of product packaging:<br><ul><li>Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.</li><li>Eliminate the use of ozone-depleting substances (ODS) in packaging materials.</li><li>Design packaging materials for ease of disassembly.</li><li>Maximize the use of post-consumer recycled content materials in packaging materials.</li><li>Use readily recyclable packaging materials such as paper and corrugated materials.</li><li>Reduce size and weight of packages to improve transportation fuel efficiency.</li><li>Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.</li></ul> |
| **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.<br><br>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:<br><br><br>Global Citizenship Report<br><br>http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html<br><br>Eco-label certifications<br><br>http://www8.hp.com/us/en/hp-information/environment/ecolabels.html<br><br>ISO 14001 certificates:<br><br>http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/ PC_GBU_Product_Design_ISO_14K_Certificate.pdf<br><br>and<br><br>http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf |

### HP ProOne 440 23.8 inch G9 All-in-One Desktop PC

| | |
|---|---|
| **Eco-Label Certifications & declarations** | This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:<br><ul><li>IT ECO declaration</li></ul> |

## Standard Features and Configurable Components (availability may vary by country)

- 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.
- TCO Certified
- China Energy Conservation Program (CECP)
- China State Environmental Protection Administration (SEPA)
- Taiwan Green Mark
- Korea Eco-label
- Japan PC Green label
- Commission Regulation (EC) No 617/2013 (ErP Lot 3)

| 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"?. | | |
|---|---|---|---|
| **Energy Consumption (in accordance with US ENERGY STAR® test method)** | **115VAC, 60Hz** | **230VAC, 50Hz** | **100VAC, 60Hz** |
| Normal Operation (Short idle) | 14.4900 W | 14.5100 W | 14.4700 W |
| Normal Operation (Long idle) | 1.5300 W | 1.5300 W | 1.5100 W |
| Sleep | 1.5100 W | 1.5100 W | 1.5100 W |
| Off | 0.8900 W | 0.8900 W | 0.8900 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. | | |
| **Heat Dissipation*** | **115VAC, 60Hz** | **230VAC, 50Hz** | **100VAC, 60Hz** |
| Normal Operation (Short idle) | 49.6 BTU/hr | 49.6 BTU/hr | 49.5 BTU/hr |
| Normal Operation (Long idle) | 5.2 BTU/hr | 5.2 BTU/hr | 5.2 BTU/hr |
| Sleep | 5.2 BTU/hr | 5.2 BTU/hr | 5.2 BTU/hr |
| Off | 3 BTU/hr | 3 BTU/hr | 3 BTU/hr |
| | **NOTE:** Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour. | | |
| **Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)** | Sound Power ($L_{WAd}$, bels) | | Sound Pressure ($L_{pAm}$, decibels) |
| Typically Configured – Idle | 2.8 | | 15 |
| Fixed Disk – Random writes | 2.8 | | 15 |
| Optical Drive – Sequential reads | 4.7 | | 36.0 |
| 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:<br><br>- 2 SODIMM memory slots<br>- Interchangeable 2.5"? SATA HDD<br><br>Spare parts are available throughout the warranty period and or for up to "5"? years after the end of production. | | |

## Standard Features and Configurable Components (availability may vary by country)

| | |
|---|---|
| Batteries | This battery(s) in this product comply with EU Directive 2006/66/EC |
| | Batteries used in the product do not contain: |
| | Mercury greater than 1ppm by weight |
| | Cadmium greater than 20ppm by weight |
| | Battery size: CR2032 (coin cell) |
| | Battery type: Lithium |
| **Additional Information** | <ul><li>This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC.</li><li>This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.</li><li>This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).</li><li>Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.</li><li>This product contains a minimum of 50% post-consumer recycled (PCR) plastic (by wt.); including 10% ITE-derived post-consumer recycled plastic.*</li><li>This product is 95.1% recycle-able when properly disposed of at end of life.</li></ul>*Recycled plastic content percentage is based on the definition set in the IEEE 1680.1-2018 standard. |

| **Packaging Materials** (vary by country) | **External:** | PAPER/Corrugated | 1605 g |
|---|---|---|---|
| | **Internal:** | PLASTIC/Polyethylene Expanded - EPE | 683 g |
| | | PLASTIC/Polyethylene low density - LDPE | 42 g |

| | |
|---|---|
| **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): <ul><li>Asbestos</li><li>Certain Azo Colorants</li><li>Certain Brominated Flame Retardants – may not be used as flame retardants in plastics</li><li>Cadmium</li><li>Chlorinated Hydrocarbons</li><li>Chlorinated Paraffins</li><li>Formaldehyde</li><li>Halogenated Diphenyl Methanes</li><li>Lead carbonates and sulfates</li><li>Lead and Lead compounds</li><li>Mercuric Oxide Batteries</li><li>Nickel – finishes must not be used on the external surface designed to be frequently handled or carried by the user.</li><li>Ozone Depleting Substances</li><li>Polybrominated Biphenyls (PBBs)</li><li>Polybrominated Biphenyl Ethers (PBBEs)</li><li>Polybrominated Biphenyl Oxides (PBBOs)</li><li>Polychlorinated Biphenyl (PCB)</li><li>Polychlorinated Terphenyls (PCT)</li><li>Polyvinyl Chloride (PVC) – except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.</li><li>Radioactive Substances</li><li>Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)</li></ul> |
| **Packaging Usage** | HP follows these guidelines to decrease the environmental impact of product packaging: <ul><li>Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.</li><li>Eliminate the use of ozone-depleting substances (ODS) in packaging materials.</li></ul> |

## Standard Features and Configurable Components (availability may vary by country)

|  |  |
|---|---|
|  | • Design packaging materials for ease of disassembly.<br>• Maximize the use of post-consumer recycled content materials in packaging materials.<br>• Use readily recyclable packaging materials such as paper and corrugated materials.<br>• Reduce size and weight of packages to improve transportation fuel efficiency.<br>• 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.<br>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.<br>Global Citizenship Report<br>http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html<br>Eco-label certifications<br>http://www8.hp.com/us/en/hp-information/environment/ecolabels.html<br>ISO 14001 certificates:<br>http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/PC_GBU_Product_Design_ISO_14K_Certificate.pdf<br>and<br><br>http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf |

## SERVICE AND SUPPORT

On-site Warranty[1]: One-year (1-1-1) limited warranty delivers one year of on-site, next business day[2] service for parts and labor support. Service offers terms up to 5 years by choosing an optional HP Care Pack. To choose the right level of service for your HP product, visit HP Care Pack Central: http://www.hp.com/go/cpc.[3]

1. Terms and conditions may vary by country. Certain restrictions and exclusions apply. Other warranty variations may be offered in your region.
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.
3. 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. 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.

Technical Specifications – Processors

## PROCESSORS

**12<sup>th</sup> Generation Intel® 12<sup>th</sup> Generation Core™ Processors[1]**

All HP ProDesk & ProOne 400 Business PC models featuring this technology include processors that are part of the Intel® Stable Image Platform Program (SIPP) designed to ensure the stability promise inherent in the value proposition of the HP ProDesk and ProOne 400 Business PC.

Intel® Advanced Management Technology (AMT)[1] v16 – An advanced set of remote management features and functionality which provides network administrators the latest and most effective tools to remotely discover, heal, and protect networked client systems regardless of the system's health or power state. AMT 16 includes the following advanced management functions:

- Support for configuration of Intel AMT 16.0 capabilities
- No reset after provisioning
- Support for Intel Enterprise Digital Fence
- The Platform Discovery Utility can now discover these additional Intel products:

    o   Intel Identity Protection Technology with One Time Password

    o   Public Key Infrastructure

    o   Multi Factor Authentication

- Profile Editor and Profile Editor Plugin Interface
- Required Permissions for Solutions Framework

1. Intel® Active Management Technology requires an Intel® AMT-enabled chipset, network hardware and software, as well as connection with a power source and a corporate network connection. Setup requires configuration by the purchaser and may require scripting with the management console or further integration into existing security frameworks to enable certain functionality. It may also require modifications of implementation of new business processes.

Technical Specifications - Display Panel Specifications

## DISPLAY PANEL SPECIFICATIONS

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

**HP ProOne 440 23.8 inch G9 All-in-One Desktop PC**

**23.8" diagonal IPS widescreen WLED backlit anti-glare LCD (1920 x 1080)**
**Projected Capacitive Touch supports up to 10 touch-points**
Support HW low blue light feature

| | |
|---|---|
| **Type** | IPS WLED Backlit LCD |
| **Active area (mm)** | 527.04 x 296.46 |
| **Native Resolution (HxV)** | 1920 x 1080 |
| **Refresh Rate** | 60 Hz @ 1920 x 1080 |
| **Aspect ratio** | 16:9 |
| **Pixel pitch (HxV)(mm)** | 0.2745 x 0.2745 |
| **Contrast ratio** | 1000:1 |
| **Brightness*** | 300nits* |
| **Viewing angle (HxV)** | 178° x 178° |
| **Backlight lamp life (to half brightness)** | 30,000 hours minimum |
| **Color support** | Up to 16.7 million colors with 8 Bit(6 Bit + FRC) |
| **Color gamut** | sRGB 99% |
| **Anti-glare** | Yes |
| **Response Time** | 14ms |
| **Default color temperature** | Warm (6500K) |

*Actual brightness will be lower with touchscreen

**23.8" diagonal IPS widescreen WLED backlit anti-glare LCD (1920 x 1080) non-touch**
Support HW low blue light feature

| | |
|---|---|
| **Type** | IPS WLED Backlit LCD |
| **Active area (mm)** | 527.04 x 296.46 |
| **Native Resolution (HxV)** | 1920 x 1080 |
| **Refresh Rate** | 60 Hz @ 1920 x 1080 |
| **Aspect ratio** | 16:9 |
| **Pixel pitch (HxV)(mm)** | 0.2745 x 0.2745 |
| **Contrast ratio** | 1000:1 |
| **Brightness*** | 250nits* |
| **Viewing angle (HxV)** | 178° x 178° |
| **Backlight lamp life (to half brightness)** | 30,000 hours minimum |
| **Color support** | Up to 16.7 million colors with 8 Bit(6 Bit + FRC) |
| **Color gamut** | NTSC 72% |
| **Anti-glare** | Yes |
| **Response Time** | 14ms |
| **Default color temperature** | Warm (6500K) |

Technical Specifications - Display Panel Specifications

*Actual brightness will be lower with touchscreen

Technical Specifications - All-in-One Stand Specifications

## ALL-IN-ONE STAND SPECIFICATIONS

### HP ProOne 440 23.8 inch G9 All-in-One Desktop PC

| Cantilever Stand (Fixed Height Tilt Stand) | Tilt Angle | -5° to +20° |
|---|---|---|
| | Rotation (Swivel) | None |
| | Pivot | None |



| Adjustable Height Stand | Height Adjustment (Landscape Mode) | 5.12 in / 130mm |
|---|---|---|
| | Height Adjustment (Portrait Mode) | N/A |
| | Tilt Angle | -5° to +20° |
| | Rotation (Swivel) | ±45° |
| | Pivot | None |

Technical Specifications - All-in-One Stand Specifications

## Technical Specifications - All-in-One Stand Specifications

| | | |
|---|---|---|
| **No Stand**<br>**(VESA COVER with EPS Holder)** | **Tilt Angle** | None |
| | **Rotation (Swivel)** | None |
| | **Pivot** | None |
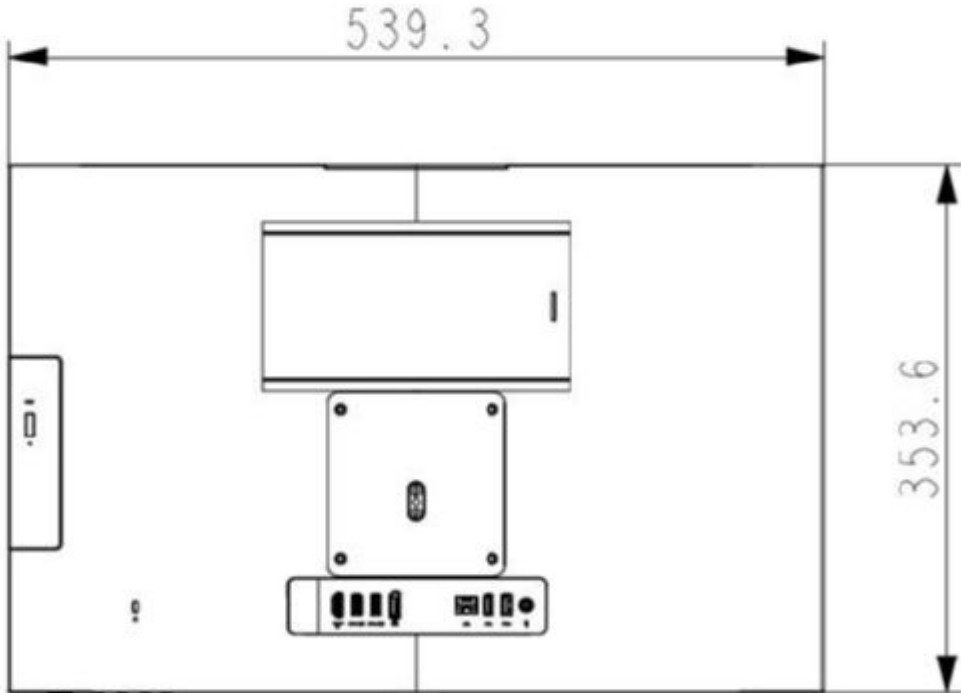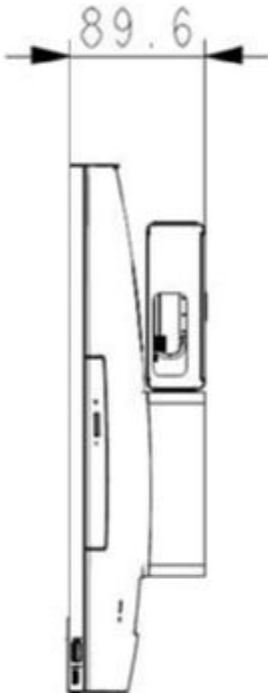
89.6

539.3

353.6

| | | |
|---|---|---|
| **Adjustable Height Stand** | **Height Adjustment (Landscape Mode)** | 5.12 in / 130mm |
| | **Height Adjustment (Portrait Mode)** | N/A |
| | **Tilt Angle** | -5° to +20° |
| | **Rotation (Swivel)** | ±45° |
| | **Pivot** | None |

Technical Specifications – Graphics

## GRAPHICS

**HP Pro Mini 400 G9 Desktop PC**
Intel® HD Graphics (integrated)

| | |
|---|---|
| **VGA Controller** | Integrated |
| **DisplayPort™** | Multimode capable; supports HDCP, Display Port Audio (2 streams), HBR2 link rates and Multi-Stream Technology for a maximum of 4 displays connected to any output controlled by Intel® Graphics |
| **HDMI (optional)** | Supports HDMI 2.1 features |
| | Supports HDCP 2.3 |
| | Supports audio over HDMI |
| **VGA (optional)** | VGA output |
| **USB-C® DP Alt Mode (optional)** | DisplayPort™ over the optional USB-C® module |
| **Memory** | The actual amount of maximum graphics memory can be >4GB. System 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 Color Depth** | up to 16 bits/color |
| **Graphics/Video API Support** | HEVC 10b Enc/12b Dec HW |
| | VP9 12b Dec HW |
| | HDR |
| | Rec. 2020 |
| | DX12 |
| **Max resolution (VGA)** | 2048 x 1536@60Hz |
| **Max resolution (DP)** | 4096 x 2160@60Hz |
| **Max resolution (HDMI)** | 4096 x 2160@60Hz |
| **Max resolution (option VGA)** | 2048 x 1536p, 60Hz |
| **Max resolution (option DP)** | 5120 x 2160p, 60Hz |
| **Max resolution (option HDMI)** | 3840 x 2160p, 60Hz |

**HP Pro SFF 400 G9 Desktop PC**
Intel® HD Graphics (integrated)

| | |
|---|---|
| **VGA Controller** | Integrated |
| **DisplayPort™** | Multimode capable; supports HDCP, Display Port Audio (2 streams), Onboard support HBR2 link rates/option DP support to HBR3 and Multi-Stream Technology for a maximum of 4-displays connected to any output controlled by Intel® Graphics |
| **HDMI (onboard / optional)** | Supports HDMI 2.1 features (onboard HDMI support HDMI1.4; Option HDMI support HDMI 2.1) |
| | Supports HDCP 2.3 (Support HDCP 1.4/2.3) |
| | Supports audio over HDMI |
| **VGA (optional)** | VGA output |
| **USB-C® DP Alt Mode (optional)** | DisplayPort™ over the optional USB-C® module (Support DP1.4 HBR2) |
| **Memory** | The actual amount of maximum graphics memory can be >4GB. System 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 Color Depth** | up to 16 bits/color |
| **Graphics/Video API Support** | HEVC 10b Enc/12b Dec HW |
| | VP9 12b Dec HW a AV1 decode support 8/10b, 4:2:0 |
| | HDR |
| | Rec. 2020 |
| | DX12 |
| **Max. Resolution (HDMI)** | 1920 x 1080@60Hz |
| **Max. Resolution (DP)** | 4096 x 2160@60Hz |
| **Max. Resolution (Option VGA)** | 2048 x 1536@60Hz |
| **Max. Resolution (Option HDMI)** | 3840 x 2160@60Hz |
| **Max. Resolution (Option DP)** | 5120 x 2160p@60Hz |

# QuickSpecs

## Technical Specifications – Graphics

### HP Pro Tower 400 G9 PCI Desktop PC

Intel® UHD Graphics (integrated)

| | |
|---|---|
| **VGA Controller** | Integrated |
| **DisplayPort™** | Multimode capable; supports HDCP, Display Port Audio (2 streams), Onboard support HBR2 link rates/option DP support to HBR3 and Multi-Stream Technology for a maximum of 4-displays connected to any output controlled by Intel® Graphics |
| **HDMI (onboard / optional)** | Supports HDMI 2.1 features (onboard HDMI support HDMI1.4; Option HDMI support HDMI 2.1) Supports HDCP 2.3 (Support HDCP 1.4/2.3) Supports audio over HDMI |
| **VGA (optional)** | VGA output |
| **USB-C® DP Alt Mode (optional)** | DisplayPort™ over the optional USB-C® module (Support DP1.4 HBR2) |
| **Memory** | The actual amount of maximum graphics memory can be >4GB. System 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 Color Depth** | up to 16 bits/color |
| **Graphics/Video API Support** | HEVC 10b Enc/12b Dec HW |
| | VP9 12b Dec HW a AV1 decode support 8/10b, 4:2:0 HDR Rec. 2020 DX12 |
| **Max. Resolution (HDMI)** | 1920 x 1080@60Hz |
| **Max. Resolution (DP)** | 3840 x 2160@60Hz |
| **Max. Resolution (Option VGA)** | 2048 x 1536@60Hz |
| **Max. Resolution (Option HDMI)** | 3840 x 2160@60Hz |
| **Max. Resolution (Option DP)** | 5120 x 2280@60Hz |

### AMD Radeon™ 6300M with 2 GB GDDR6 Graphics

| | |
|---|---|
| **Memory** | 2 GB 64-bit wide frame buffer operating at 1125MHz. |
| **Controller Clock Speed** | AMD Radeon™ 6300M GPU operating at 1024 MHz |
| **Architecture** | Hybrid Graphics AMD GPU uses Intel graphics controller for display control |
| **Bus Connection** | PCIE 4.0 x4 |
| **Graphics /API support** | DIRECTX 12, Open GL 4.6, Open CL2.0, UVD, Mantle, AMD LiquidVR™ |
| **Display support** | Same as for the Intel integrated graphics solution |

### NVIDIA® Quadro T400 2GB Graphics Card

| | |
|---|---|
| **Engine Clock** | 2100 MHz |
| **Memory Clock** | 5001 MHz |
| **Memory Size (width)** | 2GB (64-bit) |
| **Memory Type** | 256M x 16 GDDR6 |
| **Max. Resolution (DP)** | 7680x4320@120Hz |
| **Multi Display Support** | 4 displays |
| **HDCP Compliance** | Yes |
| **Rear I/O connectors (bracket)** | mDPx3 |
| **Cooling (active/passive)** | Active fan-sink (Active cooling with dynamic speed) |
| **Total power consumption (W)** | 30W |
| **PCB form-factor with bracket** | LP PCB with LP bracket |

## Technical Specifications – Graphics

**NVIDIA® T400 4GB Graphics Card**

| | |
|---|---|
| **Engine Clock** | 2100 MHz |
| **Memory Clock** | 5001 MHz |
| **Memory Size (width)** | 4GB (64-bit) |
| **Memory Type** | 512M x 16 GDDR6 |
| **Max. Resolution (DP)** | 7680x4320@120Hz |
| **Multi Display Support** | 4 displays |
| **HDCP Compliance** | Yes |
| **Rear I/O connectors (bracket)** | mDPx3 |
| **Cooling (active/passive)** | Active fan-sink (Active cooling with dynamic speed) |
| **Total power consumption (W)** | 30W |
| **PCB form-factor with bracket** | LP PCB with LP bracket |

Technical Specifications – Storage

## STORAGE

### 500GB 7200RPM 3.5in SATA HDD

| | |
|---|---|
| **Capacity** | 500GB |
| **Rotational Speed** | 7,200 rpm |
| **Interface** | SATA 6.0 Gb/s |
| **Buffer Size** | 32MB |
| **Logical Blocks** | 976,773,168 |
| **Seek Time** | 11 ms (Average) |
| **Height** | 1in/2.54cm |
| **Width** | Media diameter: 3.5 in/8.89 cm<br>Physical size: 4 in/10.2 cm |
| **Operating Temperature** | 41° to 131° F (5° to 55° C) |

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

### 1TB 7200RPM 3.5in SATA HDD

| | |
|---|---|
| **Capacity** | 1TB |
| **Rotational Speed** | 7,200 rpm |
| **Interface** | SATA 6 Gb/s |
| **Buffer Size** | 64MB |
| **Logical Blocks** | 1,953,525,168 |
| **Seek Time** | 11 ms (Average) |
| **Height** | 1in/2.54cm |
| **Width (nominal)** | Media diameter: 3.5 in/8.89 cm<br>Physical size: 4 in/10.2 cm |
| **Operating Temperature** | 41° to 131° F (5° to 55° C) |

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

### 2TB 7200RPM 3.5in SATA HDD

| | |
|---|---|
| **Capacity** | 2TB |
| **Rotational Speed** | 7,200 rpm |
| **Interface** | SATA 6 Gb/s |
| **Buffer Size** | 128MB |
| **Logical Blocks** | 3,907,050,336 |
| **Seek Time** | 11 ms (Average) |
| **Height** | 1.028in/26.11mm |
| **Width (nominal)** | Media diameter: 3.5 in/8.89 cm<br>Physical size: 4 in/10.2 cm |
| **Operating Temperature** | 41° to 131° F (5° to 55° C) |

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

## Technical Specifications – Storage

### 500GB 7200RPM 2.5in SATA HDD

| | |
|---|---|
| **Capacity** | 500GB |
| **Rotational Speed** | 7,200 rpm |
| **Interface** | SATA 6 Gb/s |
| **Buffer Size** | Up to 128MB |
| **Logical Blocks** | 976,773,168 |
| **Seek Time** | 12 ms (Average) |
| **Height** | 0.283in/7.2mm (Max) |
| **Width (nominal)** | 2.75 in/70 mm (nominal) |
| **Operating Temperature** | 41° to 131° F (5° to 55° C) |

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

### 1TB 7200RPM 2.5in SATA HDD

| | |
|---|---|
| **Capacity** | 1TB |
| **Rotational Speed** | 7,200 rpm |
| **Interface** | SATA 6 Gb/s |
| **Buffer Size** | Up to 128MB |
| **Logical Blocks** | 1,953,525,168 |
| **Seek Time** | 12 ms (Average) |
| **Height** | 0.283 in/7.2 mm (Max) |
| **Width (nominal)** | 2.75 in/70 mm (nominal) |
| **Operating Temperature** | 41° to 131° F (5° to 55° C) |

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

### 1TB 5400RPM 2.5in SATA HDD

| | |
|---|---|
| **Capacity** | 1TB |
| **Rotational Speed** | 5,400 rpm |
| **Interface** | SATA 6 Gb/s |
| **Buffer Size** | Up to 128MB |
| **Logical Blocks** | 1,953,525,168 |
| **Seek Time** | 12ms (Average) |
| **Height** | 0.283in/7.2mm (Max.) |
| **Width (nominal)** | 2.75in/70mm (nominal) |
| **Operating Temperature** | 41° to 131° F (5° to 55° C) |

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

QuickSpecs

## Technical Specifications – Storage

### 2TB 5400RPM 2.5in SATA HDD

| | |
|---|---|
| **Capacity** | 2TB |
| **Rotational Speed** | 5,400 rpm |
| **Interface** | SATA 6 Gb/s |
| **Buffer Size** | 128MB |
| **Logical Blocks** | 3,907,050,336 |
| **Seek Time** | 12 ms (Average) |
| **Height** | 0.374in/9.5mm (nominal) |
| **Width (nominal)** | 2.75in/70mm (nominal) |
| **Operating Temperature** | 41° to 131° F (5° to 55° C) |

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

### 500GB 7200RPM 2.5in Self Encrypted Federal Information Processing Standard SATA HDD

| | |
|---|---|
| **Capacity** | 500GB |
| **Architecture** | Self-Encrypting (SED) Solid State Drive with SATA interface |
| **Interface** | SATA 6 Gb/s |
| **Buffer Size** | 128MB |
| **Logical Blocks** | 976,773,168 |
| **Seek Time** | 12 ms (Average) |
| **Height** | 0.283in/7.2mm (Max.) |
| **Width** | 2.75in/70mm (nominal) |
| **Operating Temperature** | 41° to 131° F (5° to 55° C) |

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

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

| | |
|---|---|
| **Drive Weight** | < 10g |
| **Capacity** | 256 GB |
| **Height** | 2.3 mm |
| **Length** | 80 mm |
| **Width** | 22 mm |
| **Interface** | PCIe NVMe |
| **Maximum Sequential Read** | 3200 MB/s ±20% |
| **Maximum Sequential Write** | 2000 MB/s ±20% |
| **Logical Blocks** | 500,118,192 |
| **Operating Temperature** | 0° to 70°C (32° to 158°F) [ambient temp] |
| **Features** | TRIM; L1.2 |

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

## Technical Specifications – Storage

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

| | |
|---|---|
| **Drive Weight** | < 10g |
| **Capacity** | 512 GB |
| **Height** | 2.3 mm |
| **Length** | 80 mm |
| **Width** | 22 mm |
| **Interface** | PCIe NVMe |
| **Maximum Sequential Read** | 3200 MB/s ±20% |
| **Maximum Sequential Write** | 3200 MB/s ±20% |
| **Logical Blocks** | 1,000,215,216 |
| **Operating Temperature** | 0° to 70°C (32° to 158°F) [ambient temp] |
| **Features** | TRIM; L1.2 |

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

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

| | |
|---|---|
| **Drive Weight** | < 10g |
| **Capacity** | 1 TB |
| **Height** | 2.3 mm |
| **Length** | 80 mm |
| **Width** | 22 mm |
| **Interface** | PCIe NVMe |
| **Maximum Sequential Read** | 3200 MB/s ±20% |
| **Maximum Sequential Write** | 3200 MB/s ±20% |
| **Logical Blocks** | 2,000,409,264 |
| **Operating Temperature** | 0° to 70°C (32° to 158°F) [ambient temp] |
| **Features** | TRIM; L1.2 |

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

### 256GB M.2 2280 PCIe NVMe Three Layer Cell SSD

| | |
|---|---|
| **Drive Weight** | < 10g |
| **Capacity** | 256 GB |
| **Height** | 2.3 mm |
| **Length** | 80 mm |
| **Width** | 22 mm |
| **Interface** | PCIE Gen4x4 |
| **Maximum Sequential Read** | 4000 MB/s ±20% |
| **Maximum Sequential Write** | 2000 MB/s ±20% |
| **Logical Blocks** | 500,118,192 |
| **Operating Temperature** | 0° to 70°C (32° to 158°F) [ambient temp] |
| **Features** | TRIM; L1.2; Pyrite 2.0 |

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

## Technical Specifications – Storage

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

| | |
|---|---|
| **Drive Weight** | < 10g |
| **Capacity** | 512 GB |
| **Height** | 2.3 mm |
| **Length** | 80 mm |
| **Width** | 22 mm |
| **Interface** | PCIE Gen4x4 |
| **Maximum Sequential Read** | 6400 MB/s ±20% |
| **Maximum Sequential Write** | 3500 MB/s ±20% |
| **Logical Blocks** | 1,000,215,216 |
| **Operating Temperature** | 0° to 70°C (32° to 158°F) [ambient temp] |
| **Features** | TRIM; L1.2; Pyrite 2.0 |

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

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

| | |
|---|---|
| **Drive Weight** | < 10g |
| **Capacity** | 1 TB |
| **Height** | 2.3 mm |
| **Length** | 80 mm |
| **Width** | 22 mm |
| **Interface** | PCIE Gen4x4 |
| **Maximum Sequential Read** | 6400 MB/s ±20% |
| **Maximum Sequential Write** | 5000 MB/s ±20% |
| **Logical Blocks** | 2,000,409,264 |
| **Operating Temperature** | 0° to 70°C (32° to 158°F) [ambient temp] |
| **Features** | TRIM; L1.2; Pyrite 2.0 |

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

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

| | |
|---|---|
| **Drive Weight** | < 10g |
| **Capacity** | 2 TB |
| **Height** | 2.3 mm |
| **Length** | 80 mm |
| **Width** | 22 mm |
| **Interface** | PCIE Gen4x4 |
| **Maximum Sequential Read** | 6400 MB/s ±20% |
| **Maximum Sequential Write** | 5000 MB/s ±20% |
| **Logical Blocks** | 4,000,797,360 |
| **Operating Temperature** | 0° to 70°C (32° to 158°F) [ambient temp] |
| **Features** | TRIM; L1.2; Pyrite 2.0 |

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

## Technical Specifications – Storage

### 256GB M.2 2280 PCIe NVMe Self Encrypted OPAL2 Three Layer Cell SSD

| | |
|---|---|
| **Drive Weight** | < 10g |
| **Capacity** | 256 GB |
| **Height** | 2.3 mm |
| **Length** | 80 mm |
| **Width** | 22 mm |
| **Interface** | PCIE Gen4x4 |
| **Maximum Sequential Read** | 4000 MB/s ±20% |
| **Maximum Sequential Write** | 2000 MB/s ±20% |
| **Logical Blocks** | 500,118,192 |
| **Operating Temperature** | 0° to 70°C (32° to 158°F) [ambient temp] |
| **Features** | TRIM; L1.2; TCG Opal 2.0 |

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

### 512GB M.2 2280 PCIe NVMe Self Encrypted OPAL2 Three Layer Cell SSD

| | |
|---|---|
| **Drive Weight** | < 10g |
| **Capacity** | 512 GB |
| **Height** | 2.3 mm |
| **Length** | 80 mm |
| **Width** | 22 mm |
| **Interface** | PCIE Gen4x4 |
| **Maximum Sequential Read** | 6400 MB/s ±20% |
| **Maximum Sequential Write** | 3500 MB/s ±20% |
| **Logical Blocks** | 1,000,215,216 |
| **Operating Temperature** | 0° to 70°C (32° to 158°F) [ambient temp] |
| **Features** | TRIM; L1.2; TCG Opal 2.0 |

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

### HP 9.5mm Slim DVD-ROM Drive

| | |
|---|---|
| **Height** | 9.5 mm height |
| **Orientation** | Either horizontal or vertical |
| **Interface type** | SATA/ATAPI |
| **Dimensions (W x H x D)** | 5.04 x 0.37 x 5.0 in (128 x 9.5 x 127 mm) without bezel |
| **Weight (max)** | Up to 0.31 lb (140g) without bezel |
| **Read Speeds** | DVD+R/-R/+RW/<br>-RW/+R DL /-R DL Up to 8X<br>DVD-ROM Up to 8X<br>CD-ROM, CD-R Up to 24X<br>CD-RW Up to 24X |
| **Access time (typical reads, including settling)** | Random: DVD-ROM: 170 ms (typical), CD-ROM: 170 ms (typical)<br>Full stroke: DVD-ROM: 320 ms (typical), CD-ROM: 320 ms (typical) |

## Technical Specifications – Storage

| | |
|---|---|
| **Power** | Source Slimline SATA DC power receptacle<br>DC Power Requirement 5 VDC ± 5%-100 mV ripple p-p<br>DC Current 5 VDC (< 1000 mA typical, 1600 mA maximum) |
| **Environmental conditions (operating - non-condensing)** | Temperature 41° to 122° F (5° to 50° C)<br>Relative Humidity 10% to 80%<br>Maximum Wet Bulb Temperature 84° F (29° C) |

**HP 9.5mm Slim DVD Writer Drive**

| | |
|---|---|
| **Height** | 9.5 mm height |
| **Orientation** | Either horizontal or vertical |
| **Interface type** | SATA/ATAPI |
| **Disc recording capacity** | Up to 8.5 GB DL or 4.7 GB standard |
| **Dimensions (W x H x D)** | 5.04 x 0.37 x 5.0 in (128 x 9.5 x 127 mm) without bezel |
| **Weight (max)** | 0.31 lb (140 g) Without bezel |
| **Write Speeds** | DVD-R DL - Up to 6X<br>DVD+R - Up to 8X<br>DVD+RW - Up to 8X<br>DVD+R DL - Up to 6X<br>DVD-R - Up to 8X<br>DVD-RW - Up to 6X<br>CD-R - Up to 24X<br>CD-RW - Up to 10X |
| **Read Speeds** | DVD-RW, DVD+RW - Up to 8X<br>DVD-R DL, DVD+R DL - Up to 8X<br>DVD+R, DVD-R - Up to 8X<br>DVD-ROM DL, DVD-ROM - Up to 8X<br>CD-ROM, CD-R - Up to 24X<br>CD-RW - Up to 24X |
| **Access time (typical reads, including settling)** | Random DVD-ROM: 170 ms (typical), CD-ROM: 170 ms (typical)<br>Full Stroke DVD-ROM: 320 ms (typical), CD-ROM: 320 ms (typical)<br>Stop Time 6 seconds (typical) |
| **Power** | Source Slimline SATA DC power receptacle<br>DC Power Requirement 5 VDC ± 5%-100 mV ripple p-p<br>DC Current 5 VDC (< 1000 mA typical, 1600 mA maximum) |
| **Environmental conditions (operating - non-condensing)** | Temperature 41° to 122° F (5° to 50° C)<br>Relative Humidity 10% to 80%<br>Maximum Wet Bulb Temperature 84° F (29° C) |

## Technical Specifications – Storage

**HP 9.5mm Slim Blu-Ray Writer Drive**

| | |
|---|---|
| **Height** | 9.5 mm height |
| **Orientation** | Either horizontal or vertical |
| **Interface type** | SATA/ATAPI |
| **Disc recording capacity** | Up to 128 GB QL, 100 GB TL, 50 GB DL or 25 GB standard SL |
| **Dimensions (W x H x D)** | 5.04 x 0.37 x 5.0 in (128 x 9.5 x 127 mm) without bezel |
| **Weight (max)** | 0.29 lb (132 g) |
| **Write Speeds** | BD-R SL/DL Up to 6X<br>BD-R TL/QL Up to 4X<br>BD-RE Up to 2X<br>DVD-R Up to 8X<br>DVD-RW Up to 6X<br>DVD+R Up to 8X<br>DVD+RW Up to 8X<br>DVD-RAM Up to 5X<br>CD-R Up to 24X<br>CD-RW Up to 10X |
| **Read Speeds** | BD-ROM Up to 6X<br>BD-R Up to 6X<br>BD-RE SL/DL Up to 6X<br>BD-RE TL Up to 4X<br>DVD-ROM Up to 8X<br>DVD-R Up to 8X<br>DVD-RW Up to 8X<br>DVD+R Up to 8X<br>DVD+RW Up to 8X<br>BDMV (AACS Compliant Disc)<br>Up to 6x/2x (Read/Play)<br>DVD-RAM Up to 5x<br>DVD-Video (CSS Compliant Disc)<br>Up to 8x/4x (Read/Play)<br>CD-R/RW/ROM Up to 24x<br>CD-DA (DAE) Up to 24X/10X (Read/Play) |
| **Access time (typical reads, including settling)** | Random BD-ROM: 205 ms (typical), DVD-ROM: 185 ms (typical), CD-ROM: 165 ms (typical)<br>Full Stroke BD-ROM: 350 ms (typical), DVD-ROM: 345 ms (typical), CD-ROM: 340 ms (typical) |
| **Power** | Source Slimline SATA DC power receptacle<br>DC Power Requirement 5 VDC ± 5%-100 mV ripple p-p<br>DC Current 5 VDC -1200 mA typical, 2000 mA maximum |
| **Environmental conditions (operating - non-condensing)** | Temperature 41° to 122° F (5° to 50° C)<br>Relative Humidity 10% to 80%<br>Maximum Wet Bulb Temperature 84° F (29° C) |

Technical Specifications – Networking

## NETWORKING AND COMMUNICATIONS

| Intel® I219-LM 1 Gigabit Network Connection LOM (vPro) | |
|---|---|
| **Connector** | RJ-45 |
| **System Interface** | PCI (Intel proprietary) + SMBus |
| **Data rates supported** | 10 Mbit/s operation (10BASE-T; IEEE 802.3i; IEEE 802.3 clauses 13-14)<br>100 Mbit/s operation (100BASE-TX; IEEE 802.3u; IEEE 802.3 clauses 21-30)<br>1000 Mbit/s operation (1000BASE-T; IEEE 802.3ab; IEEE 8023 clauses 40)<br>Auto-Negotiation (Automatic Speed Selection)<br>Full Duplex Operation at all Speeds, Half Duplex operation at 10 and 100 Mbit/s |
| **IEEE Compliance** | IEEE 802.1p QoS (Quality of Service) Support<br>IEEE 802.1q VLAN support<br>IEEE 802.3x Flow Control (IEEE 802.3 clauses 31-32; configurable)<br>IEEE 802.3az EEE (Energy Efficient Ethernet) |
| **Performance** | TCP/IP/UDP Checksum Offload (configurable)<br>Protocol Offload (ARP & NS)<br>Large send offload and Giant send offload<br>Receiving Side Scaling (Hash Mode Only)<br>Jumbo Frame 9K |
| **Power consumption** | Cable Disconnection: 25mW<br>100Mbps Full Run: 450mW<br>1000bp Full Run: 1000mW<br>WoL Enable (S3/S4/S5): 50mW<br>WoL Disable (S3/S4/S5): 25mW |
| **Power Management** | ACPI compliant – multiple power modes<br>Situation-sensitive features reduce power consumption<br>Advanced link down power saving for reducing link down power consumption |
| **Management Interface** | Auto MDI/MDIX Crossover cable detection |
| **IT Manageability** | Wake-on-LAN from modern standby or sleep state (Magic Packet and Microsoft Wake-Up Frame);<br>Wake-on-LAN from off (Magic Packet only)<br>PXE 2.1 Remote Boot<br>Statistics Gathering (SNMP MIB II, Ethernet-like MIB, Ethernet MIB (802.3x, clause 30))<br>Comprehensive diagnostic and configuration software suite<br>Virtual Cable Doctor for Ethernet cable status |
| **Security & Manageability** | Intel® vPro™ support with appropriate Intel® chipset components |

| Intel® I225-LM 2.5 Gigabit Network Connection LOM (non-vPro) | |
|---|---|
| **Connector** | RJ-45 |
| **System Interface** | PCI (Intel proprietary) + SMBus |
| **Data rates supported** | 1. 10 Mbit/s operation (10BASE-T; IEEE 802.3i; IEEE 802.3 clauses 13-14)<br>2. 100 Mbit/s operation (100BASE-TX; IEEE 802.3u; IEEE 802.3 clauses 21-30)<br>3. 1000 Mbit/s operation (1000BASE-T; IEEE 802.3ab; IEEE 802.3 clauses 40)<br>4. 2.5 Gbit/s operation (2.5GBASE-T; IEEE 802.3bz Clause 126)<br>5. Auto-Negotiation (Automatic Speed Selection)<br>Full Duplex Operation at all Speeds, Half Duplex operation at 10, 100 & 1000 Mbit/s |
| **IEEE Compliance** | IEEE 802.1p QoS (Quality of Service) Support<br>IEEE 802.1q VLAN support<br>IEEE 802.3x Flow Control (IEEE 802.3 clauses 31-32; configurable)<br>IEEE 802.3az EEE (Energy Efficient Ethernet)<br>IEEE 802.3i 10BASE-T<br>IEEE 802.3u 100BASE-TX<br>IEEE 802.3ab 1000BAE-T<br>IEEE 802.3bz 2.5GBASE-T |

## Technical Specifications – Networking

| | |
|---|---|
| | WPA3 certification<br>IEEE 802.11i<br>WAPI |
| **Network Architecture Models** | Ad-hoc (Peer to Peer)<br><br>Infrastructure (Access Point Required) |
| **Roaming** | IEEE 802.11 compliant roaming between access points |
| **Output Power[3]** | 802.11b: +14dBm minimum<br>802.11g: +12dBm minimum<br>802.11a: +12dBm minimum<br>802.11n HT20(2.4GHz): +12dBm minimum<br>802.11n HT40(2.4GHz): +12dBm minimum<br>802.11n HT20(5GHz): +10dBm minimum<br>802.11n HT40(5GHz): +10dBm minimum<br>802.11ac VHT80(5GHz): +10dBm minimum |
| **Power Consumption** | Transmit mode 2.0 W<br>Receive mode 1.6 W<br>Idle mode (PSP) 180 mW (WLAN Associated)<br>Idle mode 50 mW (WLAN unassociated)<br>Connected Standby   10mW<br>Radio disabled 8 mW |
| **Power Management** | ACPI and PCI Express compliant power management<br>802.11 compliant power saving mode |
| **Receiver Sensitivity[4]** | 802.11b, 1Mbps: -93.5dBm maximum<br>802.11b, 11Mbps: -84dBm maximum<br>802.11a/g, 6Mbps: -86dBm maximum<br>802.11a/g, 54Mbps: -72dBm maximum<br>802.11n, MCS07: -67dBm maximum<br>802.11n, MCS15: -64dBm maximum<br>802.11ac, MCS0: -84dBm maximum<br>802.11ac, MCS9: -59dBm maximum |
| **Antenna type** | High efficiency antenna.<br>One embedded dual band 2.4/5 GHz antenna is provided to the card to support WLAN communications and Bluetooth communications |
| **Form Factor** | PCI-Express M.2 MiniCard |
| **Dimensions** | Type 2230: 2.3 x 22.0 x 30.0 mm |
| **Weight** | Type 2230: 2.8g |
| **Operating Voltage** | 3.3v +/- 9% |
| **Temperature** | Operating: 14° to 158° F (−10° to 70° C)<br>Non-operating: −40° to 176° F (−40° to 80° C) |
| **Humidity** | Operating: 10% to 90% (non-condensing)<br>Non-operating: 5% to 95% (non-condensing) |
| **Altitude** | Operating: 0 to 10,000 ft (3,048 m)<br>Non-operating: 0 to 50,000 ft (15,240 m) |
| **LED Activity** | LED Amber – Radio OFF;<br>LED OFF – Radio ON |

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

| | |
|---|---|
| **Bluetooth® Specification** | 4.0/4.1/4.2 Compliant |
| **Frequency Band** | 2402 to 2480 MHz |
| **Number of Available Channels** | Legacy: 0~79 (1 MHz/CH)<br>BLE: 0~39 (2 MHz/CH) |
| **Data Rates and Throughput** | Legacy: 3 Mbps data rate; throughput up to 2.17 Mbps<br>BLE: 1 Mbps data rate; throughput up to 0.2 Mbps<br>Legacy: Synchronous Connection Oriented links up to 3, 64 kbps, voice channels<br>Legacy: Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or |

## Technical Specifications – Networking

| | |
|---|---|
| | 864 kbps symmetric (3-EV5) |
| | The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 4 dBm for BR and EDR. |
| | Peak (Tx) 330 mW |
| | Peak (Rx) 230 mW |
| | Selective Suspend 17 mW |
| **Transmit Power** | USB 2.0 compliant |
| **Power Consumption** | Microsoft Windows Bluetooth Software |
| **Bluetooth® Software Supported Link Topology** | Microsoft Windows ACPI, and USB Bus Support |
| **Power Management** | FCC (47 CFR) Part 15C, Section 15.247 & 15.249 |
| **Certifications** | 4.0/4.1/4.2 Compliant |
| **Power Management** | ETS 300 328, ETS 300 826 |
| **Certifications** | Low Voltage Directive IEC950<br><br>UL, CSA, and CE Mark |
| **Bluetooth Profiles Supported** | BT4.1-ESR 5/6/7 Compliance<br>LE Link Layer Ping<br>LE Dual Mode<br>LE Link Layer<br>LE Low Duty Cycle Directed Advertising<br>LE L2CAP Connection Oriented Channels<br>Train Nudging & Interlaced Scan<br>BT4.2 ESR08 Compliance<br>LE Secure Connection- Basic/Full<br>LE Privacy 1.2 –Link Layer Privacy<br>LE Privacy 1.2 –Extended Scanner Filter Policies<br>LE Data Packet Length Extension<br>FAX Profile (FAX)<br>Basic Imaging Profile (BIP)2<br>Headset Profile (HSP)<br>Hands Free Profile (HFP)<br>Advanced Audio Distribution Profile (A2DP) |

1. Wi-Fi 5 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 5 (802.11 ac) is backwards compatible with prior 802.11 specs.
3. Check latest software/driver release for updates on supported security features.
3. 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.
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).

| **Realtek RTL8852AE 802.11ax 2x2 Wi-Fi + BT5.2 (802.11ax 2x2, supporting gigabit data rate)[1]** | |
|---|---|
| **Wireless LAN Standards** | IEEE 802.11a<br>IEEE 802.11b<br>IEEE 802.11g<br>IEEE 802.11n<br>IEEE 802.11ac<br>IEEE 802.11ax<br>IEEE 802.11d<br>IEEE 802.11e<br>IEEE 802.11h<br>IEEE 802.11i |

## Technical Specifications – Networking

| | |
|---|---|
| | IEEE 802.11k<br>IEEE 802.11r<br>IEEE 802.11v |
| **Interoperability** | Wi-Fi certified modules |
| **Frequency Band** | 802.11b/g/n/ax<br>2.402 – 2.482 GHz<br>802.11a/n/ac/ax<br>4.9 – 4.95 GHz (Japan)<br>5.15 – 5.25 GHz<br>5.25 – 5.35 GHz<br>5.47 – 5.725 GHz<br>5.825 – 5.850 GHz |
| **Data Rates** | 802.11b: 1, 2, 5.5, 11 Mbps<br>802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps<br>802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps<br>802.11n: max 300Mbps<br>802.11ac: max 866.7Mbps<br>802.11ax: max 1201Mbps |
| **Modulation** | Direct Sequence Spread Spectrum<br>BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM |
| **Security**[2] | IEEE and WiFi certified 64 / 128 bit WEP encryption for a/b/g mode only<br>AES-CCMP: 128 bit in hardware<br>802.1x authentication<br>WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.<br>WPA2 certification<br>WPA3 certification<br>IEEE 802.11i<br>WAPI |
| **Network Architecture Models** | Ad-hoc (Peer to Peer)<br><br>Infrastructure (Access Point Required) |
| **Roaming** | IEEE 802.11 compliant roaming between access points |
| **Output Power**[3] | 802.11b: +18.5dBm minimum<br>802.11g: +17.5dBm minimum<br>802.11a: +18.5dBm minimum<br>802.11n HT20(2.4GHz): +15.5dBm minimum<br>802.11n HT40(2.4GHz): +14.5dBm minimum<br>802.11n HT20(5GHz): +15.5dBm minimum<br>802.11n HT40(5GHz): +14.5dBm minimum<br>802.11ac VHT80(5GHz): +11.5dBm minimum<br>802.11ax HE40(2.4GHz): +10dBm minimum<br>802.11ax HE80(5GHz): +10dBm minimum |
| **Power Consumption** | Transmit mode:2.5 W<br>Receive mode:2 W<br>Idle mode (PSP): 180 mW (WLAN Associated)<br>Idle mode:50 mW (WLAN unassociated)<br>Connected Standby/Modern Standby: 10mW<br>Radio disabled: 8 mW |
| **Power Management** | ACPI and PCI Express compliant power management<br>802.11 compliant power saving mode |
| **Receiver Sensitivity**[4] | 802.11b, 1Mbps: -93.5dBm maximum<br>802.11b, 11Mbps: -84dBm maximum<br>802.11a/g, 6Mbps: -86dBm maximum<br>802.11a/g, 54Mbps: -72dBm maximum<br>802.11n, MCS07: -67dBm maximum<br>802.11n, MCS15: -64dBm maximum<br>802.11ac, MCS0: -84dBm maximum<br>802.11ac, MCS9: -59dBm maximum |

## Technical Specifications – Networking

| | |
|---|---|
| | 802.11ax, MCS11(HE40): -57dBm maximum |
| | 802.11ax, MCS11(HE80): -54dBm maximum |
| **Antenna type** | 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 |
| **Form Factor** | PCI-Express M.2 MiniCard |
| **Dimensions** | 1. Type 2230: 2.3 x 22.0 x 30.0 mm |
| | 2. Type 1216: 1.67 x 12.0 x 16.0 mm |
| **Weight** | 1. Type 2230: 2.8g |
| | 2. Type 126: 1.3g |
| **Operating Voltage** | 3.3v +/- 9% |
| **Temperature** | Operating: 14° to 158° F (−10° to 70° C) |
| | Non-operating: −40° to 176° F (−40° to 80° C) |
| **Humidity** | Operating: 10% to 90% (non-condensing) |
| | Non-operating: 5% to 95% (non-condensing) |
| **Altitude** | Operating: 0 to 10,000 ft (3,048 m) |
| | Non-operating: 0 to 50,000 ft (15,240 m) |
| **LED Activity** | LED Amber – Radio OFF; |
| | LED OFF – Radio ON |

### HP Integrated Module with Bluetooth 4.0/4.1/4.2/5.0/5.1/5.2 Wireless Technology

| | |
|---|---|
| **Bluetooth® Specification** | 4.0/4.1/4.2/5.0/5.1/5.2 Compliant |
| **Frequency Band** | 2402 to 2480 MHz |
| **Number of Available Channels** | Legacy: 0~79 (1 MHz/CH) |
| | BLE: 0~39 (2 MHz/CH) |
| **Data Rates and Throughput** | Legacy: 3 Mbps data rate; throughput up to 2.17 Mbps |
| | BLE: 1 Mbps data rate; throughput up to 0.2 Mbps |
| | Legacy: Synchronous Connection Oriented links up to 3, 64 kbps, voice channels |
| | Legacy: Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5) |
| **Transmit Power** | The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 4 dBm for BR and EDR. |
| **Power Consumption** | Peak (Tx): 330 mW |
| | Peak (Rx): 230 mW |
| | Selective Suspend: 17 mW |
| **Bluetooth® Software Supported Link Topology** | Microsoft Windows Bluetooth Software |
| **Power Management** | Microsoft Windows ACPI, and USB Bus Support |
| **Certifications** | FCC (47 CFR) Part 15C, Section 15.247 & 15.249 |
| **Power Management** | ETS 300 328, ETS 300 826 |
| **Certifications** | Low Voltage Directive IEC950 |
| | UL, CSA, and CE Mark |
| **Bluetooth Profiles Supported** | 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 |

## Technical Specifications – Networking

|  | 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 |

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.
2. Check latest software/driver release for updates on supported security features.
3. 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.
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).

| **Realtek RTL8852BE 802.11ax 2x2 Wi-Fi + BT5.3 (802.11ax 2x2, supporting gigabit data rate)[1]** | |
|---|---|
| **Wireless LAN Standards** | IEEE 802.11a<br>IEEE 802.11b<br>IEEE 802.11g<br>IEEE 802.11n<br>IEEE 802.11ac<br>IEEE 802.11ax<br>IEEE 802.11d<br>IEEE 802.11e<br>IEEE 802.11h<br>IEEE 802.11i<br>IEEE 802.11k<br>IEEE 802.11r<br>IEEE 802.11v |
| **Interoperability** | Wi-Fi certified modules |
| **Frequency Band** | 802.11b/g/n/ax<br>2.402 – 2.482 GHz<br>802.11a/n/ac/ax<br>4.9 – 4.95 GHz (Japan)<br>5.15 – 5.25 GHz<br>5.25 – 5.35 GHz<br>5.47 – 5.725 GHz<br>5.825 – 5.850 GHz |
| **Data Rates** | 802.11b: 1, 2, 5.5, 11 Mbps<br>802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps<br>802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps<br>802.11n: max 300Mbps<br>802.11ac: max 866.7Mbps<br>802.11ax: max 1201Mbps |
| **Modulation** | Direct Sequence Spread Spectrum<br>BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM |
| **Security[2]** | IEEE and WiFi certified 64 / 128 bit WEP encryption for a/b/g mode only<br>AES-CCMP: 128 bit in hardware |

## Technical Specifications – Networking

|  |  |
|---|---|
|  | 802.1x authentication<br>WPA, WPA2:  802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.<br>WPA2 certification<br>WPA3 certification<br>IEEE 802.11i<br>WAPI |
| **Network Architecture Models** | Ad-hoc (Peer to Peer)<br><br>Infrastructure (Access Point Required) |
| **Roaming** | IEEE 802.11 compliant roaming between access points |
| **Output Power[3]** | 802.11b: +18.5dBm minimum<br>802.11g: +17.5dBm minimum<br>802.11a: +18.5dBm minimum<br>802.11n HT20(2.4GHz): +15.5dBm minimum<br>802.11n HT40(2.4GHz): +14.5dBm minimum<br>802.11n HT20(5GHz): +15.5dBm minimum<br>802.11n HT40(5GHz): +14.5dBm minimum<br>802.11ac VHT80(5GHz): +11.5dBm minimum<br>802.11ax HE40(2.4GHz): +10dBm minimum<br>802.11ax HE80(5GHz): +10dBm minimum |
| **Power Consumption** | Transmit mode:2.5 W<br>Receive mode:2 W<br>Idle mode (PSP): 180 mW (WLAN Associated)<br>Idle mode:50 mW (WLAN unassociated)<br>Connected Standby/Modern Standby: 10mW<br>Radio disabled: 8 mW |
| **Power Management** | ACPI and PCI Express compliant power management<br>802.11 compliant power saving mode |
| **Receiver Sensitivity[4]** | 802.11b, 1Mbps: -93.5dBm maximum<br>802.11b, 11Mbps: -84dBm maximum<br>802.11a/g, 6Mbps: -86dBm maximum<br>802.11a/g, 54Mbps: -72dBm maximum<br>802.11n, MCS07: -67dBm maximum<br>802.11n, MCS15: -64dBm maximum<br>802.11ac, MCS0: -84dBm maximum<br>802.11ac, MCS9: -59dBm maximum<br>802.11ax, MCS11(HE40): -57dBm maximum<br>802.11ax, MCS11(HE80): -54dBm maximum |
| **Antenna type** | High efficiency antenna with spatial diversity, mounted in the display enclosure<br><br>Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications |
| **Form Factor** | PCI-Express M.2 MiniCard |
| **Dimensions** | 1. Type 2230: 2.3 x 22.0 x 30.0 mm<br>2. Type 1216: 1.67 x 12.0 x 16.0 mm |
| **Weight** | 1. Type 2230: 2.8g<br>2. Type 126: 1.3g |
| **Operating Voltage** | 3.3v +/- 9% |
| **Temperature** | Operating: 14° to 158° F (−10° to 70° C)<br>Non-operating: −40° to 176° F (−40° to 80° C) |
| **Humidity** | Operating: 10% to 90% (non-condensing)<br>Non-operating: 5% to 95% (non-condensing) |
| **Altitude** | Operating: 0 to 10,000 ft (3,048 m)<br>Non-operating: 0 to 50,000 ft (15,240 m) |
| **LED Activity** | LED Amber – Radio OFF;<br>LED OFF – Radio ON |

**HP Integrated Module with Bluetooth 4.0/4.1/4.2/5.0/5.1/5.2/5.3 Wireless Technology**

## Technical Specifications – Networking

| | |
|---|---|
| **Bluetooth® Specification** | 4.0/4.1/4.2/5.0/5.1/5.2/5.3 Compliant |
| **Frequency Band** | 2402 to 2480 MHz |
| **Number of Available Channels** | Legacy: 0~79 (1 MHz/CH)<br>BLE: 0~39 (2 MHz/CH) |
| **Data Rates and Throughput** | Legacy: 3 Mbps data rate; throughput up to 2.17 Mbps<br>BLE: 1 Mbps data rate; throughput up to 0.2 Mbps<br>Legacy: Synchronous Connection Oriented links up to 3, 64 kbps, voice channels<br>Legacy: Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5) |
| **Transmit Power** | The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 4 dBm for BR and EDR. |
| **Power Consumption** | Peak (Tx): 330 mW<br><br>Peak (Rx): 230 mW<br><br>Selective Suspend: 17 mW |
| **Electrical Interface** | Microsoft Windows Bluetooth Software |
| **Bluetooth® Software Supported Link Topology** | Microsoft Windows ACPI, and USB Bus Support |
| **Power Management** | FCC (47 CFR) Part 15C, Section 15.247 & 15.249 |
| **Certifications** | ETS 300 328, ETS 300 826<br><br>Low Voltage Directive IEC950<br><br>UL, CSA, and CE Mark<br>Peak (Tx): 330 mW<br><br>Peak (Rx): 230 mW<br><br>Selective Suspend: 17 mW |
| **Power Management**<br><br>**Certifications** | Microsoft Windows Bluetooth Software |
| **Bluetooth Profiles Supported** | BT4.1-ESR 5/6/7 Compliance<br>LE Link Layer Ping<br>LE Dual Mode<br>LE Link Layer<br>LE Low Duty Cycle Directed Advertising<br>LE L2CAP Connection Oriented Channels<br>Train Nudging & Interlaced Scan<br>BT4.2 ESR08 Compliance<br>LE Secure Connection- Basic/Full<br>LE Privacy 1.2 –Link Layer Privacy<br>LE Privacy 1.2 –Extended Scanner Filter Policies<br>LE Data Packet Length Extension<br>FAX Profile (FAX)<br>Basic Imaging Profile (BIP)2<br>Headset Profile (HSP)<br>Hands Free Profile (HFP)<br>Advanced Audio Distribution Profile (A2DP)<br>BT5.1<br>ESR9/10 Compliance<br>LE Advertisement Extensions<br>Channel Selection Algo<br>Limited High Duty Cycle Non-Connectable Advertising<br>2Mbps LE<br>LE Long Range |

## Technical Specifications – Networking

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.
2. Check latest software/driver release for updates on supported security features.
3. 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.
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).

| Intel AX211 Wi-Fi 6E +BT 5.3 M.2 160MHz CNVi WW WLAN[1] | |
|---|---|
| Wireless LAN Standards | IEEE 802.11a<br>IEEE 802.11b<br>IEEE 802.11g<br>IEEE 802.11n<br>IEEE 802.11ac<br>IEEE 802.11ax<br>IEEE 802.11d<br>IEEE 802.11e<br>IEEE 802.11h<br>IEEE 802.11i<br>IEEE 802.11k<br>IEEE 802.11r<br>IEEE 802.11v |
| Interoperability | Wi-Fi certified |
| Frequency Band | 802.11b/g/n/ax<br>2.402 – 2.482 GHz<br>802.11a/n/ac/ax<br>4.9 – 4.95 GHz (Japan)<br>5.15 – 5.25 GHz<br>5.25 – 5.35 GHz<br>5.47 – 5.725 GHz<br>5.825 – 5.850 GHz<br>5.955 – 6.415 GHz<br>6.435 – 6.515 GHz<br>6.535 – 6.875 GHz<br>6.895 – 7.115 GHz |
| Data Rates | 802.11b: 1, 2, 5.5, 11 Mbps<br>802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps<br>802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps<br>802.11n: max 300Mbps<br>802.11ac: 1733Mbps<br>802.11ax: max 2.4Gbps |
| Modulation | Direct Sequence Spread Spectrum<br><br>OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM |
| Security[2] | IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only<br>AES-CCMP: 128 bit in hardware<br>802.1x authentication<br>WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.<br>WPA2 certification<br>WPA3 certification<br>IEEE 802.11i<br>WAPI |
| Network Architecture Models | Ad-hoc (Peer to Peer)<br><br>Infrastructure (Access Point Required) |

## Technical Specifications – Networking

| | |
|---|---|
| **Roaming** | IEEE 802.11 compliant roaming between access points |
| **Output Power[3]** | 802.11b: +17dBm minimum<br>802.11g: +16dBm minimum<br>802.11a: +17dBm minimum<br>802.11n HT20(2.4GHz): +14dBm minimum<br>802.11n HT40(2.4GHz): +13dBm minimum<br>802.11n HT20(5GHz): +14dBm minimum<br>802.11n HT40(5GHz): +13dBm minimum<br>802.11ac VHT80(5GHz): +10dBm minimum<br>802.11ac VHT160(5GHz): +10dBm minimum<br>802.11ax HE40(2.4GHz): +12dBm minimum<br>802.11ax HE80(5GHz): +10dBm minimum<br>802.11ax HE160(5GHz): +10dBm minimum |
| **Power Consumption** | Transmit mode 2.0 W<br>Receive mode 1.6 W<br>Idle mode (PSP) 180 mW (WLAN Associated)<br>Idle mode 50 mW (WLAN unassociated)<br>Connected Standby  10mW<br>Radio disabled 8 mW |
| **Power Management** | ACPI and PCI Express compliant power management<br>802.11 compliant power saving mode |
| **Receiver Sensitivity[4]** | 802.11b, 1Mbps: -93.5dBm maximum<br>802.11b, 11Mbps: -84dBm maximum<br>802.11a/g, 6Mbps: -86dBm maximum<br>802.11a/g, 54Mbps: -72dBm maximum<br>802.11n, MCS07: -67dBm maximum<br>802.11n, MCS15: -64dBm maximum<br>802.11ac, MCS0(VHT80): -84dBm maximum<br>802.11ac, MCS9(VHT80): -59dBm maximum<br>802.11ac, MCS9(VHT160): -58.5dBm maximum<br>802.11ax, MCS11(HE40): -57dBm maximum<br>802.11ax, MCS11(HE80): -54dBm maximum<br>802.11ax, MCS11(HE160): -53.5dBm maximum |
| **Antenna type** | High efficiency antenna with spatial diversity, mounted in the display enclosure<br><br>Two embedded dual band 2.4/5/6 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications |
| **Form Factor** | PCI-Express M.2 MiniCard |
| **Dimensions** | 1. Type 2230: 2.3 x 22.0 x 30.0 mm<br>2. Type 1216: 1.67 x 12.0 x 16.0 mm |
| **Weight** | 1. Type 2230: 2.8g<br>2. Type 1216: 1.3g |
| **Operating Voltage** | 3.3v +/- 9% |
| **Temperature** | Operating: 14° to 158° F (−10° to 70° C)<br>Non-operating: −40° to 176° F (−40° to 80° C) |
| **Humidity** | Operating: 10% to 90% (non-condensing)<br>Non-operating: 5% to 95% (non-condensing) |
| **Altitude** | Operating: 0 to 10,000 ft (3,048 m)<br>Non-operating: 0 to 50,000 ft (15,240 m) |
| **LED Activity** | LED Amber – Radio OFF; LED OFF – Radio ON |

### HP Integrated Module with Bluetooth 4.0/4.1/4.2/5.0/5.1/5.2/5.3 Wireless Technology

| | |
|---|---|
| **Bluetooth® Specification** | 4.0/4.1/4.2/5.0/5.1/5.2/5.3 Compliant |
| **Frequency Band** | 2402 to 2480 MHz |
| **Number of Available Channels** | Legacy: 0~79 (1 MHz/CH)<br>BLE: 0~39 (2 MHz/CH) |

## Technical Specifications – Networking

| | |
|---|---|
| **Data Rates and Throughput** | Legacy: 3 Mbps data rate; throughput up to 2.17 Mbps<br>BLE: 1 Mbps data rate; throughput up to 0.2 Mbps<br>Legacy: Synchronous Connection Oriented links up to 3, 64 kbps, voice channels<br>Legacy: Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5) |
| **Transmit Power** | The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 9.5 dBm for BR and EDR. |
| **Power Consumption** | Peak (Tx): 330 mW<br><br>Peak (Rx): 230 mW<br><br>Selective Suspend: 17 mW |
| **Bluetooth® Software Supported Link Topology** | Microsoft Windows Bluetooth Software |
| **Power Management** | Microsoft Windows ACPI, and USB Bus Support |
| **Certifications** | FCC (47 CFR) Part 15C, Section 15.247 & 15.249 |
| **Power Management Certifications** | ETS 300 328, ETS 300 826<br><br>Low Voltage Directive IEC950<br><br>UL, CSA, and CE Mark |
| **Bluetooth Profiles Supported** | BT4.1-ESR 5/6/7 Compliance<br>LE Link Layer Ping<br>LE Dual Mode<br>LE Link Layer<br>LE Low Duty Cycle Directed Advertising<br>LE L2CAP Connection Oriented Channels<br>Train Nudging & Interlaced Scan<br>BT4.2 ESR08 Compliance<br>LE Secure Connection- Basic/Full<br>LE Privacy 1.2 –Link Layer Privacy<br>LE Privacy 1.2 –Extended Scanner Filter Policies<br>LE Data Packet Length Extension<br>FAX Profile (FAX)<br>Basic Imaging Profile (BIP)2<br>Headset Profile (HSP)<br>Hands Free Profile (HFP)<br>Advanced Audio Distribution Profile (A2DP)<br>BT5.3<br>ESR9/10 Compliance<br>LE Advertisement Extensions<br>Channel Selection Algo<br>Limited High Duty Cycle Non-Connectable Advertising<br>2Mbps LE<br>LE Long Range |

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.
2. Check latest software/driver release for updates on supported security features.
3. 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.
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).

| **Intel AX211 Wi-Fi 6E +BT 5.3 M.2 vPro 160MHz CNVi WW WLAN[1]** | |
|---|---|
| **Wireless LAN Standards** | IEEE 802.11a<br>IEEE 802.11b<br>IEEE 802.11g |

## Technical Specifications – Networking

| | |
|---|---|
| | IEEE 802.11n<br>IEEE 802.11ac<br>IEEE 802.11ax<br>IEEE 802.11d<br>IEEE 802.11e<br>IEEE 802.11h<br>IEEE 802.11i<br>IEEE 802.11k<br>IEEE 802.11r<br>IEEE 802.11v |
| **Interoperability** | Wi-Fi certified |
| **Frequency Band** | 802.11b/g/n/ax<br>2.402 – 2.482 GHz<br>802.11a/n/ac/ax<br>4.9 – 4.95 GHz (Japan)<br>5.15 – 5.25 GHz<br>5.25 – 5.35 GHz<br>5.47 – 5.725 GHz<br>5.825 – 5.850 GHz<br>5.955 – 6.415 GHz<br>6.435 – 6.515 GHz<br>6.535 – 6.875 GHz<br>6.895 – 7.115 GHz |
| **Data Rates** | 802.11b: 1, 2, 5.5, 11 Mbps<br>802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps<br>802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps<br>802.11n: max 300Mbps<br>802.11ac: 1733Mbps<br>802.11ax: max 2.4Gbps |
| **Modulation** | Direct Sequence Spread Spectrum<br>OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM<br>, 1024QAM |
| **Security[2]** | IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only<br>AES-CCMP: 128 bit in hardware<br>802.1x authentication<br>WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.<br>WPA2 certification<br>WPA3 certification<br>IEEE 802.11i<br>WAPI |
| **Network Architecture Models** | Ad-hoc (Peer to Peer)<br>Infrastructure (Access Point Required) |
| **Roaming** | IEEE 802.11 compliant roaming between access points |
| **Output Power[3]** | 802.11b: +17dBm minimum<br>802.11g: +16dBm minimum<br>802.11a: +17dBm minimum<br>802.11n HT20(2.4GHz): +14dBm minimum<br>802.11n HT40(2.4GHz): +13dBm minimum<br>802.11n HT20(5GHz): +14dBm minimum<br>802.11n HT40(5GHz): +13dBm minimum<br>802.11ac VHT80(5GHz): +10dBm minimum<br>802.11ac VHT160(5GHz): +10dBm minimum<br>802.11ax HE40(2.4GHz): +12dBm minimum<br>802.11ax HE80(5GHz): +10dBm minimum<br>802.11ax HE160(5GHz): +10dBm minimum |

## Technical Specifications – Networking

| | |
|---|---|
| **Power Consumption** | Transmit mode 2.0 W<br>Receive mode 1.6 W<br>Idle mode (PSP) 180 mW (WLAN Associated)<br>Idle mode 50 mW (WLAN unassociated)<br>Connected Standby    10mW<br>Radio disabled 8 mW |
| **Power Management** | ACPI and PCI Express compliant power management<br>802.11 compliant power saving mode |
| **Receiver Sensitivity[4]** | 802.11b, 1Mbps: -93.5dBm maximum<br>802.11b, 11Mbps: -84dBm maximum<br>802.11a/g, 6Mbps: -86dBm maximum<br>802.11a/g, 54Mbps: -72dBm maximum<br>802.11n, MCS07: -67dBm maximum<br>802.11n, MCS15: -64dBm maximum<br>802.11ac, MCS0(VHT80): -84dBm maximum<br>802.11ac, MCS9(VHT80): -59dBm maximum<br>802.11ac, MCS9(VHT160): -58.5dBm maximum<br>802.11ax, MCS11(HE40): -57dBm maximum<br>802.11ax, MCS11(HE80): -54dBm maximum<br>802.11ax, MCS11(HE160): -53.5dBm maximum |
| **Antenna type** | High efficiency antenna with spatial diversity, mounted in the display enclosure<br><br>Two embedded dual band 2.4/5/6 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications |
| **Form Factor** | PCI-Express M.2 MiniCard |
| **Dimensions** | 1. Type 2230: 2.3 x 22.0 x 30.0 mm<br>2. Type 1216: 1.67 x 12.0 x 16.0 mm |
| **Weight** | 1. Type 2230: 2.8g<br>2. Type 1216: 1.3g |
| **Operating Voltage** | 3.3v +/- 9% |
| **Temperature** | Operating: 14° to 158° F (−10° to 70° C)<br>Non-operating: −40° to 176° F (−40° to 80° C) |
| **Humidity** | Operating: 10% to 90% (non-condensing)<br>Non-operating: 5% to 95% (non-condensing) |
| **Altitude** | Operating: 0 to 10,000 ft (3,048 m)<br>Non-operating: 0 to 50,000 ft (15,240 m) |
| **LED Activity** | LED Amber – Radio OFF; LED OFF – Radio ON |

### HP Integrated Module with Bluetooth 4.0/4.1/4.2/5.0/5.1/5.2/5.3 Wireless Technology

| | |
|---|---|
| **Bluetooth® Specification** | 4.0/4.1/4.2/5.0/5.1/5.2/5.3 Compliant |
| **Frequency Band** | 2402 to 2480 MHz |
| **Number of Available Channels** | Legacy: 0~79 (1 MHz/CH)<br>BLE: 0~39 (2 MHz/CH) |
| **Data Rates and Throughput** | Legacy: 3 Mbps data rate; throughput up to 2.17 Mbps<br>BLE: 1 Mbps data rate; throughput up to 0.2 Mbps<br>Legacy: Synchronous Connection Oriented links up to 3, 64 kbps, voice channels<br>Legacy: Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5) |
| **Transmit Power** | The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 9.5 dBm for BR and EDR. |
| **Power Consumption** | Peak (Tx): 330 mW<br><br>Peak (Rx): 230 mW<br><br>Selective Suspend: 17 mW |
| **Bluetooth® Software Supported Link Topology** | Microsoft Windows Bluetooth Software |

## Technical Specifications – Networking

| | |
|---|---|
| **Power Management** | Microsoft Windows ACPI, and USB Bus Support |
| **Certifications** | FCC (47 CFR) Part 15C, Section 15.247 & 15.249 |
| **Power Management Certifications** | ETS 300 328, ETS 300 826<br><br>Low Voltage Directive IEC950<br><br>UL, CSA, and CE Mark |
| **Bluetooth Profiles Supported** | BT4.1-ESR 5/6/7 Compliance<br>LE Link Layer Ping<br>LE Dual Mode<br>LE Link Layer<br>LE Low Duty Cycle Directed Advertising<br>LE L2CAP Connection Oriented Channels<br>Train Nudging & Interlaced Scan<br>BT4.2 ESR08 Compliance<br>LE Secure Connection- Basic/Full<br>LE Privacy 1.2 –Link Layer Privacy<br>LE Privacy 1.2 –Extended Scanner Filter Policies<br>LE Data Packet Length Extension<br>FAX Profile (FAX)<br>Basic Imaging Profile (BIP)2<br>Headset Profile (HSP)<br>Hands Free Profile (HFP)<br>Advanced Audio Distribution Profile (A2DP)<br>BT5.3<br>ESR9/10 Compliance<br>LE Advertisement Extensions<br>Channel Selection Algo<br>Limited High Duty Cycle Non-Connectable Advertising<br>2Mbps LE<br>LE Long Range |

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.
2. Check latest software/driver release for updates on supported security features.
3. 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.
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).

Technical Specifications – Input/Output Devices

## I/O DEVICES

| HP Business Slim Standalone USB/PS2 Wired Keyboard | | |
|---|---|---|
| **Physical Characteristics** | Keys | 104, 105, 106, 107, 109 layout (depending upon country) |
| | Dimensions (L x W x H) | 171.97 x 68.35 x 8.27 in (436.8± 1.5 x 137.6± 1.0 x 21.0± 1.0 cm) |
| | Weight | 1.32 lb (0.6± 0.08 kg) |
| **Electrical** | Operating voltage | 4.4-5.25VDC |
| | Power consumption | 50-mA maximum (with 5 VDC power supplied and three LEDs ON)/ |
| | System interface | USB or PS/2 |
| | ESD | Contact Discharge: 2, 4,6,8KV<br>Air Discharge: 2, 4, 8,10,12.5KV |
| | EMI – RFI | Conforms to FCC rules for a Class B computing device |
| **Mechanical** | Keycaps | Low-profile design |
| | Switch actuation | 60±12.5g 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) |
| **Environmental** | Acoustics | 43-dBA maximum sound pressure level |
| | Operating temperature | 50° to 122° F (10° to 50° C) |
| | Non-operating temperature | Minus 30 degress to 60 degress Celsius |
| | 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 |
| | 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 |
| **Approvals** | UL, FCC, CE Mark, TUV GS, VCCI, BSMI, RCM, KCC | |
| **Ergonomic compliance** | ANSI HFS 100, ISO 9241-4, and TUVGS | |

## Technical Specifications – Input/Output Devices

| HP USB Business Slim Wired SmartCard CCID Keyboard | | |
|---|---|---|
| Physical Characteristics | Keys | 104, 105, 109 layout (depending upon country) |
| | Dimensions (L x W x H) | 17.34 x 5.68 x 0.78in (440.6 x 144.5 x 1.98 cm) |
| | Weight | 1.32 lb (598g) |
| Electrical | Operating voltage | 5 VDC, +/-5% |
| | Power consumption | 100mA (All LED on) |
| | System interface | USB Type A plug connector |
| | ESD | Contact Discharge: 8 KV Air Discharge: 12.5 KV |
| | EMI - RFI | Conforms to FCC rules for a Class B computing device |
| Mechanical | Keycaps | Low-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) |
| Environmental | 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) |
| | 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 |
| Approvals | CE Marking, TUV, EAC, FCC, cULus/CSAus, ICES, RCM, VCCI, KCC, BSMI | |
| Ergonomic compliance | ISO 9241-4, TUVGS | |

## Technical Specifications – Input/Output Devices

| HP 125 (AntiMicrobial) Wired Keyboard (China only) | | |
|---|---|---|
| **Physical Characteristics** | Keys | 104/105/107/109layout (depending upon country) |
| | Dimensions (L x W x H) | 436 x 138 x24.7 mm |
| | Weight | 471g |
| **Electrical** | Operating voltage | 5V +- 5% |
| | Power consumption | 50mA |
| | System interface | USB Type A plug connector |
| | ESD | Contact Discharge: 8 KV Air Discharge: 12.5 KV |
| | EMI - RFI | Conforms to FCC rules for a Class B computing device |
| **Mechanical** | Keycaps | Low-profile design |
| | Switch actuation | 55±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 | 1.8 m |
| **Environmental** | Acoustics | 43-dBA maximum sound pressure level |
| | Operating temperature | 50° to 122° F (10° to 50° C) |
| | Non-operating temperature | -4° to 149° F (-20° to 65° C) |
| | Operating humidity | 10% to 95% (non-condensing at ambient) |
| | Non-operating humidity | 0% to 95% (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 |
| | 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 |
| **Approvals** | UL, cUL, FCC, CE, TUV GS, VCCI, BSMI, RCM, KCC, USB-IF, WHQL, EN/IEC 60601-1 | |
| **Ergonomic compliance** | ANSI HFS 100, ISO 9241-4, and TUVGS | |

## Technical Specifications – Input/Output Devices

### HP 655 wireless Keyboard

| | | |
|---|---|---|
| **Physical Characteristics** | Keys | 104, 105, 107,109 layouts |
| | Dimensions (L x W x H) | 16.86 x 4.55 x 0.71 in (428.22 x 115.47 x 18.06 mm) |
| | Weight | 0.96 lb (435g) |
| **Electrical** | Operating voltage | 3 VDC, +/-5% |
| | Power consumption | 20 mA Max (All LED on) |
| | System interface | 2.4GHz Wireless |
| | ESD | Contact Discharge: 8 KV Air Discharge: 15 KV |
| | EMI - RFI | Conforms to FCC rules for a Class B computing device |
| **Mechanical** | Keycaps | Plunger, 2.0 mm key travel |
| | Key actuation | 60±10g nominal peak force with tactile feedback |
| | Key life | 10 million keystrokes (Life tester) |
| | Key structure type | Rubber dome & Membrane |
| | Key-leveling mechanisms | For all double-wide and greater-length keys |
| **Environmental** | 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 |
| | 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 |
| **Approvals** | CB, CE, FCC, cULus, ICES, IC, I TRC, TRA, CASA, UA, EAC, CNC, ANATEL, NOM-NYCE SCT, IFETEL, MPTC, RCM, BIS, PosTel, VCCI, TELEC, KC, MCMC, IDA, BSMI, NCC, DWLF&M, TP-BY, MOC | |
| **Ergonomic compliance** | TUVGS | |

## Technical Specifications – Input/Output Devices

### HP Wired Desktop 320K Keyboard

| | | |
|---|---|---|
| **Physical Characteristics** | Keys | 104, 105, 107,109 layouts |
| | Dimensions(L x W x H) | 18.86*4.55*0.66 in (426.2 x 110.9 x 16.7 mm) |
| | Weight | 1.00 lb(452g) |
| **Electrical** | Operating voltage | 5 VDC, +/-5% |
| | Power consumption | 50 mA Max (All LED on) |
| | System interface | USB Port |
| | ESD | Contact Discharge: 8 KV Air Discharge: 15 KV (Class B) |
| | EMI - RFI | European Standard EN 55022: 2006+A1: 2007, Class B.<br>FCC/CFR 47 : Part 15 Class B |
| **Mechanical** | Keycaps | 2.0mm +/-0.2mm at 120gf Key travel |
| **Environmental** | Operating temperature | 10° C to 90° C |
| | Non-operating temperature | -30° C to 95° C |
| | Operating humidity | N/A |
| | Non-operating humidity | 10% to 90% (non-condensing at ambient) |
| | Operating shock | N/A |
| | Non-operating shock | i. Half-Sine Shock – End-Use Handling, Non-Operational<br>Sample size: 5pcs.<br>Condition: Sample power off.<br>Axis: X, Y, Z axis (all 6 faces) – sample normal mode of operation.<br>　Number of shocks: 1 shock/face.<br>　Pulse duration: < 3 ms<br>　Velocity change: 50lps (inch-per-second)- 65lps desired.<br><br>ii. Trapezoidal Shock- Transportation Environment, Non-Operational<br>Sample size: 5pcs.<br>Condition: Sample power off.<br>Orientation: All six faces: Front, Rear, Left, Right, Bottom, and Top.<br>Configuration: As intended for shipment<br>Number of shocks: 1 shock/face.<br>Minimum faired acceleration: 30G's. Test also at 40 and 50G's to find margin.<br>Velocity change: 266lps (inch-per-second) for product mass (m) 20<m<40lb. |

Operating vibration:

| Frequency (Hz) | Slope (dB/oct) | PSD ($g^2$/Hz) |
|---|---|---|
| 5-350 | 0 | 0.0001 |
| 350-500 | -6 | - |
| 500 | - | 0.00005 |
| (~0.21$G_{nms}$) | | |
| Total Test time: 10 minutes | | |

Non-operating vibration:

| Frequency (Hz) | Slope (dB/oct) | PSD ($g^2$/Hz) |
|---|---|---|
| 5.100 | 0 | 0.015 |
| 100-137 | -6 | - |
| 137-350 | 0 | 0.008 |
| 350-500 | -6 | - |
| 500 | - | 0.0039 |

| | | |
|---|---|---|
| | Drop (out of box) | 76cm on carpet, six-drop sequence |
| | Drop (in box) | 10 times drop including 6 faces, one corner and 3 edges on rigid surface.<br>Drop Height: 91cm |
| **Approvals** | | CB, CE, FCC, ICES, EAC, NOM-NYCE SCT, RCM, BIS, VCCI, KC, BSMI |
| **Ergonomic compliance** | | TUVGS |

## Technical Specifications – Input/Output Devices

| **HP Wired Desktop 320M Mouse** | | |
|---|---|---|
| **Physical Characteristics** | Keys | Left/right key |
| | Dimensions(L x W x H) | 4.09 x 2.50 x 1.40 in (103.8 x 63.4 x 35.5 mm) |
| | Weight | 0.16 lb (72g) |
| **Electrical** | Operating voltage | 5 VDC, +/-0.25V |
| | Power consumption | 100 mA Max |
| | System interface | USB Port |
| | ESD | Contact Discharge: 8 KV Air Discharge: 15 KV (Class B) |
| | EMI - RFI | European Standard EN 55022: 2006+A1: 2007, Class B. FCC/CFR 47 : Part 15 Class B |
| **Mechanical** | Keycaps | 0.3mm key travel |
| | Key actuation | 75±20g |
| | Key life | 1 million cycles |
| | Key structure type | Tact Switch |
| | Key-leveling mechanisms | N/A |
| **Environmental** | Operating temperature | 10° to 90° C |
| | Non-operating temperature | -30° C to 95° C |
| | Operating humidity | N/A |
| | Non-operating humidity | 10% to 90% (non-condensing at ambient) |
| | Operating shock | N/A |
| | Non-operating shock | i. Half-Sine Shock – End-Use Handling, Non-Operational<br>Sample size: 5pcs.<br>Condition: Sample power off.<br>Axis: X, Y, Z axis (all 6 faces) – sample normal mode of operation.<br>   Number of shocks: 1 shock/face.<br>   Pulse duration: < 3 ms<br>   Velocity change: 50lps (inch-per-second)- 65lps desired.<br><br>ii. Trapezoidal Shock- Transportation Environment, Non-Operational<br>Sample size: 5pcs.<br>Condition: Sample power off.<br>Orientation: All six faces: Front, Rear, Left, Right, Bottom, and Top.<br>Configuration: As intended for shipment<br>Number of shocks: 1 shock/face.<br>Minimum faired acceleration: 30G's. Test also at 40 and 50G's to find margin.<br>Velocity change: 266lps (inch-per-second) for product mass (m) 20<m<40lb. |

Operating vibration:

| Frequency (Hz) | Slope (dB/oct) | PSD ($g^2$/Hz) |
|---|---|---|
| 5-350 | 0 | 0.0001 |
| 350-500 | -6 | - |
| 500 | - | 0.00005 |
| (~0.21$G_{rms}$) | | |
| Total Test time: 10 minutes | | |

Non-operating vibration:

| Frequency (Hz) | Slope (dB/oct) | PSD ($g^2$/Hz) |
|---|---|---|
| 5.100 | 0 | 0.015 |
| 100-137 | -6 | - |
| 137-350 | 0 | 0.008 |
| 350-500 | -6 | - |
| 500 | - | 0.0039 |

| | Drop (out of box) | 76cm on carpet, six-drop sequence |
|---|---|---|

## Technical Specifications – Input/Output Devices

| | Drop (in box) | N/A |
|---|---|---|
| **Approvals** | CB, CE, FCC, cULus, ICES, EAC, NOM-NYCE SCT,  RCM, VCCI, KC, BSMI | |
| **Ergonomic compliance** | TUVGS | |

### HP 655 wireless Mouse

| | | |
|---|---|---|
| **Dimensions** (H x L x W) | 4.74 x 2.75 x 1.63 in (120.29 x 69.97 x41.39 mm) | |
| **Weight** | 0.194lb (88g) | |
| **Environmental** | 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 |
| **Electrical** | Operating voltage | 3 VDC, +/-5% |
| | Power consumption (typical) | 10 mA Max |
| | Resolution | 1,200 DPI (Default) |
| | Sensor | Pixart  PAW3222DB-TJDS |
| | Tracking speed | 10G(max), 1G=9.8m/s2 |
| | Tracking acceleration | 2.4GHz Wireless |
| **Mechanical** | Color | Jack Black |
| **Regulatory approvals** | Compliant | CB, CE, FCC, cULus, ICES, IC, TRC, TRA, ICASA, UA, EAC, CNC, ANATEL, NOM-NYCE SCT, IFETEL, MPTC, RCM, PosTel, VCCI, TELEC, KC, MCMC, IDA, BSMI, NCC, DWLF&M, TP-BY, MOC |
| **Ergonomic compliance** | Compliant | TUVGS |

### HP PS/2 Mouse

| | | |
|---|---|---|
| **Dimensions** (H x L x W) | 4.53 x 2.48 x1.46 in (115.2x 63 x37 mm) | |
| **Weight** | 0.22lb (101.6g) | |
| **Environmental** | Operating temperature | 41° to 122° F (5° to 50° C) |
| | Non-operating temperature | (-4° to 140° F )(-20° to 60° C) |
| | Operating humidity | 10% to 85% (non-condensing at ambient) |
| | Non-operating humidity | 5% to 95% (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 |
| **Electrical** | Tracking speed | 30 inch/sec (max) |
| | Tracking acceleration | 8G(max), 1G=9.8m/s2 |
| | System interface | PS/2 |
| **Mechanical** | Switch actuation | 60±15g nominal peak force with tactile feedback |
| | Switch life | 3 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) |
| | Color | Jack Black |
| **Regulatory approvals** | Compliant | UL, FCC, CE Mark, TUV GS, VCCI, BSMI, RCM, KCC |

## Technical Specifications – Input/Output Devices

| HP USB 125 (Antimicrobial)/128 Laser Mouse (China only) | | |
|---|---|---|
| **Dimensions** (H x L x W) | 112 x 63 x 36.2 mm (L x W x H) | |
| **Weight** | 85 g | |
| **Environmental** | 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 |
| **Electrical** | Operating voltage | 5 VDC, +/-5% |
| | Power consumption (typical) | 100mA |
| | Resolution | 1,200 DPI |
| | Sensor | Optical/ Laser USB mouse sensor |
| | Tracking speed | 30 inch/sec (max) |
| | Tracking acceleration | 8G(max), 1G=9.8m/s2 |
| **Mechanical** | Connector | USB |
| | Cable length | 6 ft (1.8 m) |
| | Color | Jack Black |
| **Regulatory approvals** | Compliant | UL, FCC, CE Mark, TUV GS, VCCI, BSMI, RCM, KCC, EAC |

Technical Specifications – Audio/Multimedia

## AUDIO/MULTIMEDIA

### HP Pro Mini 400 G9 Desktop PC

| | |
|---|---|
| **Type** | Integrated |
| **HD Stereo Codec** | Realtek ALC3252 |
| **Audio I/O Ports** | Front: Headset connector supports a CTIA and style headset and is retaskable as a Line-in, Line-out, Microphone-in or Headphone-out port |
| **Internal Speaker Amplifier** | 2W class D mono amplifier for the internal speaker only. External speakers must be powered |
| **Multi-streaming Capable** | Playback multi-streaming can be enabled in the audio control panel to allow independent audio streams to be sent to/from the front jacks or integrated speaker. |
| **Sampling** | Supports resolutions from 16 to 24-bit; 44.1 kHz to 192 kHz for DAC and ADC |
| **Wavetable Syntheses** | Yes - Uses OS soft wavetable |
| **Analog Audio** | Yes |
| **# of Channels on Line-Out** | Stereo (Left & Right channels) |
| **Internal Speaker** | Yes |

### HP Pro SFF 400 G9 Desktop PC

| | |
|---|---|
| **Type** | Integrated |
| **HD Stereo Codec** | Realtek ALC3252 |
| **Audio I/O Ports** | Front: Headset connector supports a CTIA and style headset and is retaskable as a Line-in, Line-out, Microphone-in or Headphone-out port<br>Rear: Audio line-in/line-out jack connector*, 3.5mm and support stereo and retasking |
| **Internal Speaker Amplifier** | 2W class D mono amplifier for the internal speaker only. External speakers must be powered |
| **Multi-streaming Capable** | 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. |
| **Sampling** | Supports resolutions from 16 to 24-bit; 44.1 kHz to 192 kHz for DAC and ADC |
| **Wavetable Syntheses** | Yes - Uses OS soft wavetable |
| **Analog Audio** | Yes |
| **# of Channels on Line-Out** | Stereo (Left & Right channels) |
| **Internal Speaker** | Yes |

**\*NOTE:** System default is line-out. Line-in / Line-out can be adjusted through the audio setting

### HP Pro Tower 400 G9 PCI Desktop PC

## Technical Specifications – Audio/Multimedia

| | |
|---|---|
| **Type** | Integrated |
| **HD Stereo Codec** | Realtek ALC3252 |
| **Audio I/O Ports** | Front: Headset connector supports a CTIA and style headset and is retaskable as a Line-in, Line-out, Microphone-in or Headphone-out port<br>Rear: Audio line-in/line-out jack connector*, 3.5mm and support stereo and retasking |
| **Internal Speaker Amplifier** | 2W class D mono amplifier for the internal speaker only. External speakers must be powered |
| **Multi-streaming Capable** | 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. |
| **Sampling** | Supports resolutions from 16 to 24-bit; 44.1 kHz to 192 kHz for DAC and ADC |
| **Wavetable Syntheses** | Yes - Uses OS soft wavetable |
| **Analog Audio** | Yes |
| **# of Channels on Line-Out** | Stereo (Left & Right channels) |
| **Internal Speaker** | Yes |

**\*NOTE:** System default is line-out. Line-in / Line-out can be adjusted through the audio setting

### HP Pro Tower 480 G9 PCI Desktop PC

| | |
|---|---|
| **Type** | Integrated |
| **HD Stereo Codec** | Realtek ALC3252 |
| **Audio I/O Ports** | Front: 3.5mm headset connector supports an OMTP or CTIA style headset and is re-taskable as a Line-in, Line-out, Microphone-in or Headphone-out port<br>Rear: Audio line-in/line-out jack connector*, 3.5mm and support stereo and retasking |
| **Internal Speaker Amplifier** | 2W per channel class D stereo amplifier for the internal speakers only |
| **Multi-streaming Capable** | Playback multi-streaming allows independent audio streams to be sent to/from the side jack and integrated speakers. |
| **Sampling** | Supports resolutions from 16 to 24-bit; 44.1 kHz to 192 kHz for DAC and ADC |
| **Wavetable Syntheses** | Yes – Uses OS Soft Wavetable |
| **Analog Audio** | Yes |
| **# of Channels on Line-Out** | Stereo (Left & Right channels) |
| **Internal Speaker** | Yes |

**\*NOTE:** System default is line-out. Line-in / Line-out can be adjusted through the audio setting

### HP ProOne 440 G9 24 All-in-One PC

| | |
|---|---|
| **Type** | Integrated |
| **HD Stereo Codec** | Realtek ALC3252 |
| **Audio I/O Ports** | Side 3.5mm headset connector supports an OMTP or CTIA style headset and is re-taskable as a Line-in, Line-out, Microphone-in or Headphone-out port |
| **Internal Speaker Amplifier** | 2W per channel class D stereo amplifier for the internal speakers only |
| **Multi-streaming Capable** | Playback multi-streaming allows independent audio streams to be sent to/from the side jack and integrated speakers. |
| **Sampling** | Supports resolutions from 16 to 24-bit; 44.1 kHz to 192 kHz for DAC and ADC |
| **Wavetable Syntheses** | Yes – Uses OS Soft Wavetable |
| **Analog Audio** | Yes |
| **# of Channels on Line-Out** | Stereo (Left & Right channels) |
| **Internal Speaker** | Yes - Stereo |

**INTEGRATED WEBCAM AND MICROPHONE**

Optional integrated 5 MP RGB webcam & microphone; maximum resolution of 2592 x 1944
Optional integrated 5 MP RGB webcam with IR sensor & microphone; maximum resolution of 2592 x 1944

Technical Specifications – Power

## POWER

| | Mini | SFF | TWR | AiO |
|---|---|---|---|---|
| **External Power Supplies[1]** | 90W EPS, active PFC, 88% average efficiency at 115V & 89% at 230Vac | N/A | N/A | 120W EPS, active PFC, 88% average efficiency at 115V & 89% at 230Vac<br>150W EPS, active PFC, 88% efficiency in 115Vac / 89% efficiency in 230Vac<br>180W EPS, active PFC, 88% average efficiency at 115V & 89% at 230Vac<br>230W EPS, active PFC, 89% average efficiency at 115V / 230Vac |
| **80 PLUS Gold** | N/A | 180W active PFC / 80 PLUS Gold<br>87/90/87% efficient at 20/50/100% load (115V)<br>90/92/89% efficient at 20/50/100% load (230V) | 180W active PFC / 80 PLUS Gold<br>87/90/87% efficient at 20/50/100% load (115V)<br>90/92/89% efficient at 20/50/100% load (230V) | N/A |
| **80 PLUS Platinum** | N/A | 240W active PFC / 80 PLUS Platinum<br>90/92/89% efficient at 20/50/100% load (115V)<br>91/93/90% efficient at 20/50/100% load (230V) | 260W active PFC / 80 PLUS Platinum<br>400Wactive PFC / 80 PLUS Platinum<br>90/92/89% efficient at 20/50/100% load (115V)<br>91/93/90% efficient at 20/50/100% load (230V) | N/A |
| **Operating Voltage Range** | 90Vac~264Vac | 90Vac~264Vac | 90Vac~264Vac | 90Vac~264Vac |
| **Rated Voltage Range** | 100Vac~240Vac | 100Vac~240Vac | 100Vac~240Vac | 100Vac~240Vac |
| **Rated Line Frequency** | 50HZ~60HZ | 50HZ~60HZ | 50HZ~60HZ | 50HZ~60HZ |
| **Operating Line Frequency** | 47HZ~63HZ | 47HZ~63HZ | 47HZ~63HZ | 47HZ~63HZ |
| **Rated Input Current with Energy Efficient\* Power Supply** | 65W?1.6A<br>90W?1.7A | 180W Gold ? 2.3A<br>240W Platinum ? 2.9A | 180W?2.3A<br>260W?3.1A<br>400W?5.2A | 120W?1.7A<br>150W?2.5A<br>180W?2.5A<br>230W?3.5A |
| **DC Output** | +19.5V | +12V | +12V | +19.5V |
| **Current Leakage (NFPA 99: 2012)** | Less than 500 microamps of leakage current at 264 Vac with the ground wire | Less than 500 microamps of leakage current at 264 Vac with the ground wire disconnected, as required for Non-patient | Less than 500 microamps of leakage current at 264 Vac with the ground wire disconnected, as required for Non-patient | Less than 500 microamps of leakage current at 264 Vac with the ground wire disconnected, as required for Non-patient |

## Technical Specifications – Power

| | | | | |
|---|---|---|---|---|
| | 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 264 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. | 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 264 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. | 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 264 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. | 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 264 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. |
| **Power Supply Fan** | N/A | 50mm variable speed | 70mm variable speed | N/A |
| **Power cord length*** | 6.0 ft. (1.83 m) | 6.0 ft. (1.83 m) | 6.0 ft. (1.83 m) | 6.0 ft. (1.83 m) |
| **Dimensions** | 65W: 90 x 51 x 28.5mm / 102 x 55 x 30mm 90W: 126 x 50 x 30mm | 200 x 85 x 53 mm | 165 x 95 x 73 mm | 120W: 138mm x 68.5mm x 25.4mm 150W: 148 x 75.5 x 25.4 mm 180W: 165.5mm x 79mm x 25.4mm 230W: 180mm x 88mm x 25.4mm |

1. External power supplies, power cords, cables and peripherals are not low halogen. Service parts obtained after purchase may not be low halogen.
**\*NOTE:** 2m for India

The power supply shall comply with harmonic input current requirements as detailed in EN61000-3-2 and JEIDA MITI standards. The harmonic input current requirements must be met under the following operating conditions:
Load Requirements: 50% and 100%
Input Voltage: 230Vac/50Hz.
For active power factor correction the power factor at 50% &100% loads shall be greater than 0.9 over the entire nominal input voltag range (100-127VAC and 200-240VAC).

| Condition | Standard Efficiency | 82/85/82% | 85/88/85% | 87/90/87% | 90/92/89% | Input Voltage |
|---|---|---|---|---|---|---|
| 10% of Rated Load | - | 75% | 81% | 84% | 86% | 115Vac/60HZ |
| 20% of Rated Load | - | 82% | 85% | 87% | 90% | 115Vac/60HZ |
| 50% of Rated Load | - | 85% | 88% | 90% | 92% | 115Vac/60HZ |
| | PF>0.9 | PF>0.9 | PF>0.9 | PF>0.9 | PF>0.95 | |
| 100% of Rated Load | 70% | 82% | 85% | 87% | 89% | 115Vac/60HZ |
| | PF>0.9 | PF>0.9 | PF>0.9 | PF>0.9 | PF>0.9 | 230Vac/50HZ |

Technical Specifications – Weights and Dimensions

## WEIGHTS & DIMENSIONS[1]

| | DM | SFF |
|---|---|---|
| **Chassis** (WxDxH) | 6.97 x 6.89 x 1.35 in<br>177 x 175 x 34.2 mm | 10.6 x 3.7 x 12.1 in<br>269 x 95 x 308 mm |
| **System Volume** | 64 cu in<br>1.05 L | 481.85 cu in<br>7.9 L |
| **System Weight[1]** | 2.74 lb<br>1.25 kg | 9.59 lb<br>4.35 kg |
| **Max Supported Weight (desktop orientation)** | N/A | 77.16 lb<br>35 kg |
| **Packaging Dimension (W x D x H)** | 19.57 x 5.04 x 8.78 in<br>(497 x 128 x 223 mm)<br><br>**MPP**: 19.61 x 9.25 x 5.20 in<br>(498 x 235 x 132 mm) | 15.52 x 19.65 x 8.07 in<br>(394 x 499 x 205 mm)<br><br>**MPP**: 15.52 x 19.65 x 8.07 in<br>(394 x 499 x 205 mm) |
| **Shipping Weight** | 6.52 lb (2.97 kg)<br><br>**MPP**: 7.50 lb (3.40 kg) | 15.31 lb (6.95 kg)<br><br>**MPP**: 15.97 lb (7.25 kg) |
| **Palletization Profile (Fabricated EPE)** | 18-units per layer<br>5 or 6 layers max depending on details of air freight<br>90 or 108 units per pallet depending on details of air freight<br>45.354 x 39.13 x 57.80 in, 1152 x 994 x 1468 mm (include pallet) | 6-units per layer<br>11 layer max<br>66 per pallet<br>47.24 x 39.37 x 93.90 in, 1200 x 1000 x 2380 mm (including pallet) |
| **Palletization Profile (Molded Pulp)** | 10-units per layer<br>10 to 19 layers max depending on details of freight<br>100 or 190 units per pallet depending on details of freight<br>46.26 x 39.21 x 103.74 in, 1175 x 996 x 2635 mm (including pallet) | 6-units per layer<br>11 layer max<br>66 per pallet<br>47.24 x 39.37 x 93.90 in, 1200 x 1000 x 2380 mm (including pallet) |

1. Packaging material used will vary by country
2. Configured with 1 HDD & 1 ODD; DM configured with 1 HDD only

| | TWR |
|---|---|
| **Chassis (W x D x H)** | 6.1 x 12.13 x 13.27 in<br>155x 308 x 337 mm |
| **System Volume** | 981.9 cu in<br>16.1 L |
| **System Weight[1]** | 11.7 lb<br>5.31 kg |
| **Max Supported Weight (desktop orientation)** | 14.5 lb<br>6.58 kg |
| **Packaging Dimension (W x D x H)** | 15.75 x 19.65 x 11.30 in<br>(400 x 499 x 287 mm)<br><br>**MPP**: 15.75 x 19.65 x 11.30 in<br>(400 x 499 x 287 mm) |
| **Shipping Weight** | 17.69 lb (8.03 kg)<br><br>**MPP**: 18.5 lb (8.4 kg) |

## Technical Specifications – Weights and Dimensions

| | |
|---|---|
| **Palletization Profile (Fabricated EPE)** | 6-units per layer<br>8 layer max<br>48 per pallet<br>47.24 x 39.37 x 95.12 in, 1200 x 1000 x 2416 mm<br>(including pallet) |
| **Palletization Profile (Molded Pulp)** | 6-units per layer<br>8 layer max<br>48 per pallet<br>47.24 x 39.37 x 95.12 in, 1200 x 1000 x 2416 mm<br>(including pallet) |

1. Packaging material used will vary by country
2. Configured with 1 HDD & 1 ODD; DM configured with 1 HDD only

## ALL-IN-ONE DIMENSIONS[1]

| | | Without Stand (VESA Cover Plate) | | Cantilever Stand (Fixed Height Tilt Stand) | | Adjustable Height Stand | |
|---|---|---|---|---|---|---|---|
| | | cm/kg | inch/lb | cm/kg | inch/lb | cm/kg | inch/lb |
| **Product** | **Width** | 53.93 cm | 21.23 in | 53.93 cm | 21.23 in | 53.93 cm | 21.23 in |
| | **Length/Depth** | 8.96 cm | 3.53 in | 18.70 cm | 7.36 in | 22.5 cm | 8.85 in |
| | **Height** | 35.36 cm | 13.92 in | 40.28 cm | 15.85 in | 37.94 ~ 50.94 cm | 14.93 ~ 20.05 in |
| | **Weight** | 6.93 kg | 15.28 lb | 7.315 kg | 16.12 lb | 7.775kg | 17.57 lb |
| **Package** | **Width** | 66.0 cm | 25.98 in | 66.0 cm | 25.98 in | 66.0 cm | 25.98 in |
| | **Length/Depth** | 24.0 cm | 9.45 in | 24.0 cm | 9.45 in | 24.0 cm | 9.45 in |
| | **Height** | 46.2 cm | 18.19 in | 46.2 cm | 18.19 in | 46.2 cm | 18.19 in |
| | **Weight** | 10.85 kg | 23.92 lb | 12.04 kg | 26.54 lb | 12.69 kg | 27.98 lb |
| **Palletization for Sea/Rail** | **Width** | 120.0 cm | 47.24 in | 120.0 cm | 47.24 in | 120.0 cm | 47.24 in |
| | **Length/Depth** | 100.0 cm | 39.37 in | 100.0 cm | 39.37 in | 100.0 cm | 39.37 in |
| | **Height** | 198.8 cm | 78.27 in | 198.8 cm | 78.27 in | 198.8 cm | 78.27 in |
| | **Weight** | 260.4 kg | 574.08 lb | 288.96 kg | 663.96 kg | 304.56 kg | 671.52 lb |
| | **Qty / Layer** | 6 | | 6 | | 6 | |
| | **Layers** | 4 | | 4 | | 4 | |

| | | | | |
|---|---|---|---|---|
| **Qty / Pallet via Sea/Rail** | 24 | | 24 | | 24 |
| **Qty / Pallet via Air** | 18 | | 18 | | 18 |

1. Packaging material used will vary by country.
2. Configured with 1 HDD & 1 ODD.
3. Package weight is based on EPE package.
4. Actual system weight will depend on the system configuration.

## Miscellaneous Features

**MISCELLANEOUS FEATURES**

### Management Features

- Advanced Configuration and Power Management Interface (ACPI). Allows the system to wake from a low power mode. Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system.
- Intel® Wired for Management support; industry wide initiative to make Intel® architecture based PCs, servers and mobile computers more inherently manageable out-of-the-box and over the network
- Dual State Power Button; acts as both an on/off button and a suspend-to-sleep button

### Serviceability Features

- Dual colored power LED on front of computer to indicate either normal or fault condition
- Diagnostic LED Explanation Table:
  - Power LED will blink red 2 to 5 times, then blink white 2 or more times, then repeat (with beep tones for each blink initially):
    - 2 red + 2 white   User must provide file for BIOS recovery (USB storage typically)
    - 2 red + 3 white   User must enter a key sequence to proceed with recovery by policy
    - 2 red + 4 white   BIOS recovery is in progress
    - 3 red + 2 white   Memory could not be initialized
    - 3 red + 3 white   Graphics adaptor could not be found
    - 3 red + 4 white   Power supply failure / not connected
    - 3 red + 5 white   Processor not installed
    - 3 red + 6 white   Current processor does not support an enabled feature
    - 4 red + 2 white   Processor has exceeded its temperature threshold / system thermal shutdown
    - 4 red + 3 white   System internal temperature has exceeded its threshold
    - 5 red + 2 white   System controller firmware is not valid
    - 5 red + 3 white   System controller detected BIOS is not executing
    - 5 red + 4 white   BIOS could not complete initialization / mainboard failure
    - 5 red + 5 white   System controller rebooted the system after a health or recovery timer triggered
- HP PC Hardware Diagnostics UEFI:
  - This utility enables hardware level testing outside the operating system on many components. The diagnostics can be invoked by pressing F2 at POST, and is available as a download from HP Support
- System/Emergency ROM
- Flash ROM
- CMOS Battery Holder for easy replacement
- Flash Recovery with Video Configuration Record Software
- 1 Aux Power LED on System PCA
- Processor ZIF Socket for easy Upgrade
- Over-Temp Warning on Screen (Requires IM Agents)
- DIMM Connectors for easy Upgrade
- Clear CMOS Button
- NIC LEDs (integrated) (Green & Amber)
- Dual Color Power and HD LED - To Indicate Normal Operations and Fault Conditions
- Color coordinated cables and connectors
- Tool-less Hood Removal
- Front power switch
- System memory can be upgraded without removing the system board or any internal components
- Tool-less Hard Drive, memory & optical drive Removal (For MT, SFF, and DM only)
- Green Pull Tabs, and Quick Release Latches for easy Identification

## Miscellaneous Features

| Additional Features | Description |
|---|---|
| Product Orientation | Microtower (MT) can be oriented in a tower (vertical) orientation.<br>Small Form Factor (SFF) can be oriented as either a desktop (horizontal) or a tower (vertical) with optional vertical stand.<br>Desktop Mini (DM) can be oriented as either a desktop (horizontal) or a tower (vertical) with optional vertical stand. |
| Boot Sectors Protection | MBR and GPT sectors of the hard drive are critical to booting the operating system.  By saving the MBR or GPT data (depending on the how the OS was installed), the BIOS will be able to monitor for changes and allow the user to override them with the backup copy at boot-up. |
| Drive Protection System | DPS Access through F10 Setup during Boot |
| | A diagnostic hard drive self- test. It scans critical physical components and every sector of the hard drive for physical faults and then reports any faults to the user |
| | Running independently of the operating system, it can be accessed through a Windows-based diagnostics utility or through the computer's setup procedure. It produces an evaluation on whether the hard drive is the source of the problem and needs to be replaced |
| | The system expands on the Self-Monitoring, Analysis, and Reporting Technology (SMART), a continuously running systems diagnostic that alerts the user to certain types of failures |
| SMART Technology (Self-Monitoring, Analysis and Reporting Technology) | Allows hard drives to monitor their own health and to raise flags if imminent failures were predicted |
| SMART I - Drive Failure Prediction | Predicts failures before they occur. Tracks fault prediction and failure indication parameters such as re-allocated sector count, spin retry count, calibration retry count |
| SMART II - Off-Line Data Collection | By avoiding actual hard drive failures, SMART hard drives act as "insurance" against unplanned user downtime and potential data loss from hard drive failure |
| SMART III - Off-Line Read Scanning with Defect Reallocation | IOEDC: I/O Error Detection Circuitry |
| SMART IV - End-to-End CRC for hard drives | Detects errors in Read/Write buffers on HDD cache RAM |

After Market Options

## AFTER MARKET OPTIONS

| Graphics Solutions | Mini | SFF | TWR | AiO | Part Number |
|---|:---:|:---:|:---:|:---:|:---:|
| NVIDIA T400 2GB GDDR6 3mDP | | X | X | | 340K8AA |
| HP DisplayPort™ To HDMI True 4k Adapter | X | X | X | X | 2JA63AA |
| HP DVI Cable Kit | | X | X | | DC198A |
| HP HDMI Standard Cable Kit | X | X | X | X | T6F94AA |
| HP DisplayPort™ Cable Kit | X | X | X | X | VN567AA |
| HP DisplayPort™ To VGA Adapter | X | X | X | X | AS615AA |
| HP DisplayPort™ To DVI-D Adapter | X | X | X | X | FH973AA |

| Desktop Mini Accessories | Mini | SFF | TWR | AiO | Part Number |
|---|:---:|:---:|:---:|:---:|:---:|
| HP Desktop Mini Port Cover v3 | X | | | | 13L69AA |
| HP Desktop Mini 2.5" SATA Drive Bay kit v2 | X | | | | 13L70AA |
| HP Desktop Mini LockBox V2 | X | | | | 3EJ57AA |
| HP Desktop Mini DVD-Writer ODD Expansion Module | X | | | | K9Q83AA |
| HP Desktop Mini Security/Dual VESA Sleeve v3 | X | | | | 13L67AA |
| HP Desktop Mini Security/Dual VESA Sleeve v3 With Power Supply Holder | X | | | | 13L68AA |
| HP B250 PC Mounting Bracket | X | | | | 8RA46AA |
| HP B300 PC Mounting Bracket | X | | | | 2DW53AA |
| HP B300 PC Mounting Bracket with Power Supply Holder | X | | | | 7DB37AA |
| HP Desktop Mini Vertical Chassis Stand | X | | | | G1K23AA |
| B550 PC Mounting Bracket | X | | | | 16U00AA |
| HP DM Power Supply Holder Kit v2 | X | | | | 7DB38AA |
| HP Quick Release Bracket 2 | X | | | | 6KD15AA |
| HP Single Monitor Arm | X | | | | BT861AA |
| HP Integrated Work Center Stand 5 | X | | | | G1V61AA |

| Data Storage Drives | Mini | SFF | TWR | AiO | Part Number |
|---|:---:|:---:|:---:|:---:|:---:|
| HP PCIe NVME TLC 256GB SSD M.2 Drive | X | X | X | X | 1CA51AA |
| HP PCIe NVME TLC 512GB SSD M.2 Drive | X | X | X | X | X8U75AA |
| HP PCIe Gen 4 NVME TLC M.2 512GB SSD | X | X | X | X | 406L8AA |
| HP PCIe Gen 4 NVME TLC M.2 1TB SSD | X | X | X | X | 406L7AA |
| HP 500GB 7200PRM SATA 6.0Gb/s 3.5"? Hard Drive | | X | X | | QK554AA |
| HP 1TB 7200rpm SATA 6Gb/s 3.5"? Hard Drive | | X | X | | QK555AA |

# QuickSpecs

## After Market Options

| Input Devices | Mini | SFF | TWR | AiO | Part Number |
|---|---|---|---|---|---|
| HP Wired Desktop 320K Keyboard | X | X | X | X | 9SR37AA |
| HP USB Business Slim CCID SmartCard Keyboard | X | X | X | X | Z9H48AA |
| HP Wired Desktop 320MK Mouse and Keyboard | X | X | X | X | 9SR36AA |
| HP Wired Desktop 320M Mouse | X | X | X | X | 9VA80AA |
| HP 655 Wireless Keyboard and Mouse Combo | X | X | X | X | 4R009AA |
| HP 455 Programmable Wireless Keyboard | X | X | X | X | 4R177AA |
| HP 125 Wired Keyboard | X | X | X | X | 266C9AA |
| HP 125 Wired Mouse | X | X | X | X | 265A9AA |
| HP 128 Laser Wired Mouse | X | X | X | X | 265D9AA |
| HP 225 Wired Mouse and Keyboard Combo | X | X | X | X | 286J4AA |
| HP 225 Antimicrobial Wired Mouse and Keyboard Combo (China Only) | X | X | X | X | 286K3AA |

| System Memory | Mini | SFF | TWR | AiO | Part Number |
|---|---|---|---|---|---|
| HP 4GB DDR4-3200 UDIMM | | X | X | | 13L78AA |
| HP 8GB DDR4-3200 UDIMM | | X | X | | 13L76AA |
| HP 16GB DDR4-3200 UDIMM | | X | X | | 13L74AA |
| HP 32GB DDR4-3200 UDIMM | | X | X | | 13L72AA |
| HP 4GB DDR4-3200 SODIMM | X | | | X | 13L79AA |
| HP 8GB DDR4-3200 SODIMM | X | | | X | 13L77AA |
| HP 16GB DDR4-3200 SODIMM | X | | | X | 13L75AA |
| HP 32GB DDR4-3200 SODIMM | X | | | X | 13L73AA |

| Multimedia Devices | Mini | SFF | TWR | AiO | Part Number |
|---|---|---|---|---|---|
| HP S101 Speaker Bar | X | X | X | | 5UU40AA |
| HP Stereo 3.5mm Headset G2 | X | X | X | X | 428K7AA |
| HP Stereo USB Headset G2 | X | X | X | X | 428K6AA |
| HyperX Cloud MIX – Gaming Headset (Black-Gunmetal) | X | X | X | X | 4P5K9AA |
| HyperX Cloud Flight – Wireless Gaming Headset (Black-Red) | X | X | X | X | 4P5L4AA |
| HyperX Cloud Stinger Core – Gaming Headset (Black) | X | X | X | X | 4P4F4AA |
| HyperX Cloud Core + 7.1 Gaming Headset (Black) | X | X | X | X | 4P4F2AA |
| HyperX SoloCast USB WHT Microphone (Black) | X | X | X | X | 4P5P8AA |

| Communication Devices | Mini | SFF | TWR | AiO | Part Number |
|---|---|---|---|---|---|
| Intel® Ethernet I225-T1 GbE NIC | | X | X | | 406L9AA |

# QuickSpecs

## After Market Options

| Security Devices | Mini | SFF | TWR | AiO | Part Number |
|---|---|---|---|---|---|
| HP Business PC Security Lock v3 Kit | | X | X | X | 3XJ17AA |
| HP Keyed Cable Lock 10mm | X | X | X | X | T1A62AA |
| HP Master Keyed Cable Lock 10mm | X | X | X | X | T1A63AA |

| Stands and Mounting Accessories | Mini | SFF | TWR | AiO | Part Number |
|---|---|---|---|---|---|
| HP B250 PC Mounting Bracket | X | | | | 8RA46AA |
| HP B300 PC Mounting Bracket | X | | | | 2DW53AA |
| HP B550 PC Mounting Bracket | X | | | | 16U00AA |
| HP Quick Release Bracket 2 | X | | | X | 6KD15AA |
| HP Single Monitor Arm | | | | X | BT861AA |
| HP ProOne G9 VESA Plate with Power Supply Holder | | | | X | 56P78AA |
| HP ProOne G9 Height Adjustable Stand | | | | X | 13L65AA |

| I/O Devices | Mini | SFF | TWR | AiO | Part Number |
|---|---|---|---|---|---|
| HP DisplayPort Port Flex IO v2 | X | X | X | | 13L54AA |
| HP HDMI Port Flex IO v2 | X | X | X | | 13L55AA |
| HP Type-C USB 3.1 Gen2 Port Flex IO v2 | | X | X | | 13L59AA |
| HP Type-C USB 3.1 Gen2 Port with 100W PD Flex IO v2 | X | | | | 13L60AA |
| HP VGA Port Flex IO v2 | X | X | X | | 13L53AA |
| HP Serial Port Flex IO v2 | X | X | X | | 13L56AA |
| HP Serial Port Flex IO 2nd | X | | | | 13L57AA |
| HP Internal Serial Port (400) | | | X | | 3TK81AA |
| HP PCIe x1 Parallel Port Card | | X | X | | N1M40AA |
| HP 800/600/400 G3 Serial/ PS/2 Adapter | | X | X | | 1VD82AA |
| HP USB to Serial Port Adapter | X | X | X | X̶ | J7B60AA |
| HP USB-C to Display Port Adapter | X | X | X | X̶ | N9K78AA |
| HP Serial Port Flex IO v3 | X | X | X | | 5B895AA |
| HP Thunderbolt 3.0 Flex IO v3 | X | | | | 440A5AA |
| HP USB-C To DisplayPort Adapter | X | X | X | X̶ | N9K68AA |
| HP Single Mini Display Port Adapter to Display Port Adapter | X | | | | 2MY05AA |

**NOTE:** For more detail on HP I/O Devices please refer to the HP FLEX IO Option Cards QuickSpecs. URL is:
http://h20195.www2.hp.com/v2/GetDocument.aspx?docname=c06042607

title

## Change Log

| Date | Version History | Action | Description of Change |
|---|---|---|---|
| March 22, 2022 | From v1 to v2 | Correction | 440 G9 Environmental table edited |
| March 23, 2022 | From v2 to v3 | Addition | Environmental information added to AiO table |
| March 24, 2022 | From v3 to v4 | Correction | AiO Environmental information table |
| April 14, 2022 | From v4 to v5 | Addition | Type-C® SuperSpeed USB 20Gbps signaling rate port for DM |
| April 21, 2022 | From v5 to v6 | Removal | HSA Fusion for Commercial and HSA Telemetry for Commercial removed |
| May 6, 2022 | From v6 to v7 | Addition | Environmental information added SFF and Pro Tower |
| May 10, 2022 | From v7 to v8 | Addition | Declared Noise Emissions values added to DM environmental Table |
| June 2, 2022 | From v8 to v9 | Removal | 12700T and 6900T processors removed for SFF / T400 graphic card corrected |
| June 9, 2022 | From v9 to v10 | Update | Environmental tables certifications updated |
| June 27, 2022 | From v10 to v11 | Addition | Power consumption bullet added to At a glance section |
| June 28, 2022 | From v11 to v12 | Update | Intel® Core™ i7-12700 Processor updated to 4.9 GHz max. turbo frequency |
| August 2, 2022 | From v12 to v13 | Update | At a Glance section updated |
| August 12, 2022 | From v13 to v14 | Update | Video ports section for AiO updated |
| August 22, 2022 | From v14 to v15 | Removal | DVD writers for SFF and Tower removed from AMO section |
| September 20, 2022 | From v15 to v16 | Correction | 1 Audio Line-out (rear) correction for SFF and TWR |
| October 12, 202 | From v16 to v17 | Correction | TPM 2.0 specs corrected in Security section / Disclaimer 17 removed from Software section. |
| October 18, 2022 | From v17 to v18 | Update | At a Glance RAID section to corrected / Declared Noise Emissions specs for TWR and SFF updated |
| October 26, 2022 | From v18 to v19 | Update | Call out #1 for SFF updated / Weight corrected for SFF / Note added to DM, SFF and TWR specs in Audio/Multimedia section |
| November 28, 2022 | From v19 to v20 | Update | Antenna type for AX211 tables updated |
| December 9, 2022 | From v20 to v21 | Update | Operating system section updated |
| December 14, 2022 | From v21 to v22 | Correction | Chassis dimensions for SFF corrected in Weights and dimensions section |
| December 21, 2022 | From v22 to v23 | Correction | Ethernet cards table corrected |
| January 17, 2023 | From v23 to v24 | Update | Bluetooth 5.2 to 5.3 in Networking and communication sectionsfor Intel AX211 and Realtek RTL8852BE cards |
| February 6, 2023 | From v24 to v25 | Update | Intel® HD Graphics (integrated) updated to support "a maximum of 4 displays"? in graphics section. |