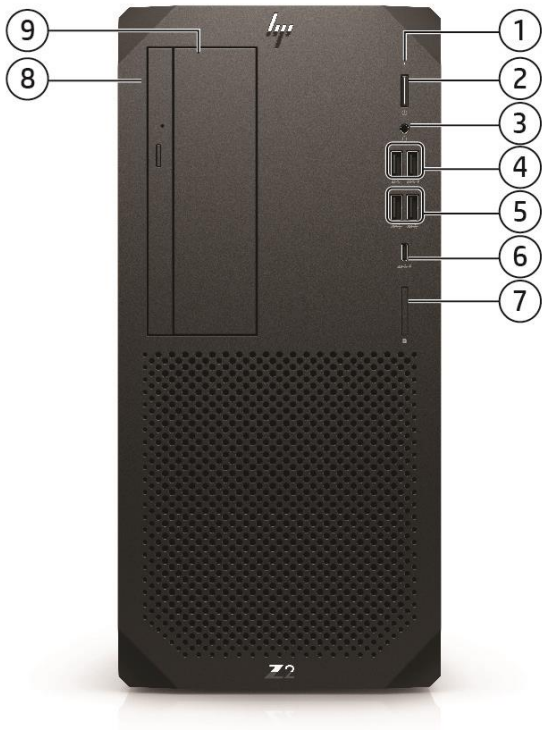
Overview

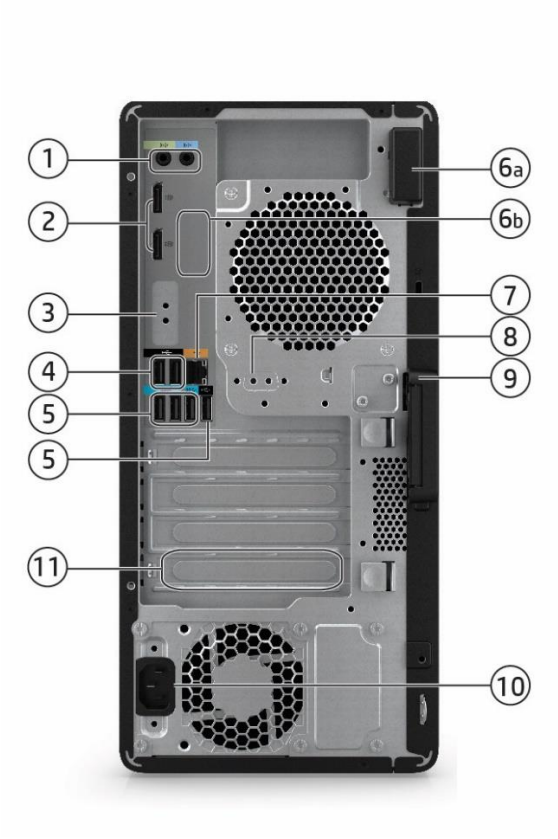
## HP Z2 G9 Tower Workstation Desktop PC




**front**

1. HDD Activity LED
2. Power button
3. Universal audio jack (with CTIA & OMTP headset support)
4. (2) USB-A 10Gbps ports (1 charge port supports up to 5V/2.1A)
5. (2) USB-A 10Gbps rate ports
6. (1) USB-C® 20Gbps port (optional, charge supports up to 5V/3A)
7. SD card reader 4.0 (optional)
8. Slim ODD bay
9. External 5.25" bay

## Overview




**rear**

1. (1) Audio Line-in jack
   (1) Audio Line-out jack
2. (2) DisplayPort 1.4 ports
3. Flex I/O module: choose one from the following:
   (1) DisplayPort 1.4, (1) HDMI 2.0b, (1) VGA, (1) Dual USB-A 5Gbps port, (1) USB-C® 10Gbps port (Power Delivery 15W, Alt Mode DisplayPort), (1) 2nd 1 GbE LAN, (1) Thunderbolt 3 with USB-C® / USB4 40Gbps * (cabled to PCIe AIC**) (1) 1Gbps Fiber LC NIC
4. (2) Hi-Speed USB-A 480Mbps port
5. (2) USB-A 10Gbps ports
   (1) USB-A 5Gbps port
   (1) Hi-Speed USB-A 480Mbps port
6. (1) WLAN Antenna (optional)
   a. Internal
   b. External
7. (1) 1Gb LAN
8. 2nd serial port (optional)
9. Hood lock (optional)
10. Power connector

*Maximum speed requires DisplayPort™ and PCIe aggregation.
**Thunderbolt support only in PCI-E slot4.
**NOTE:** Onboard Display support DP1.4/HBR2. Flex I/O module Display support DP1.4/HBR3. Resolution all support up to 5120x3200 24bpp @60Hz.

**Form Factor** Tower

**Operating Systems** Preinstalled:

- Windows 11 Pro - HP recommends Windows 11 Pro[2]
- Windows 11 Home - HP recommends Windows 11 Pro[2]
- Windows 10 Pro (available through downgrade rights from Windows 11 Pro) [1,2,3]
- Linux®-ready[5]

- Ubuntu®[4,5]
  - Intel 12th generation processors will support and preinstall Ubuntu 20.02 and 20.04.
  - Intel 13th generation processors support and preinstall Ubuntu 22.04 LTS

Web-supported only:

- Windows 10 Enterprise 64[2]

Supported Version:

- HP tested Windows 10, versions 20H2, 21H1, 21H2 and 22H2 on this platform. For testing information on newer versions of Windows 10, please see: https://support.hp.com/document/c05195282.
- Red Hat® Enterprise Linux® Workstation 8[6]
- SUSE Linux® Enterprise Desktop 15[6]
- Ubuntu®[4,5]
  - Intel 12th generation processors will support and preinstall Ubuntu 20.02 and 20.04.
  - Intel 13th generation processors support and preinstall Ubuntu 22.04 LTS

[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 internet and Microsoft account required. ISP fees may apply and additional requirements may apply over time for updates. See http://www.windows.com.
[3]This system is preinstalled with Windows 10 Pro software and also comes with a license for Windows 11 Pro software and provision for recovery software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.
[4] Not all features are available in all editions or versions of Ubuntu. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS to take full advantage of Ubuntu functionality. Ubuntu may be automatically updated. ISP fees may apply and additional requirements may apply over time for updates.
[5]A certified preloaded version of Ubuntu® 20.04 LTS is available from HP for this platform. Not all features are available in all editions or versions of Ubuntu. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS to take full advantage of Ubuntu functionality. Ubuntu may be automatically updated. ISP fees may apply, and additional requirements may apply over time for upgrades.
[6]For detailed Linux® OS/hardware support information, see:
http://www.hp.com/support/linux_hardware_matrix

**NOTE:** Your product does not support Windows 8 or Windows 7. In accordance with Microsoft's support policy, HP does not support the Windows® 8 or Windows 7 operating system on products configured with Intel® and AMD® 7th generation and forward processors or provide any Windows® 8 or Windows 7 drivers on http://www.support.hp.com. A full list of HP products and the Windows 10 versions tested is available on the HP support website. https://support.hp.com/us-en/document/c05195282

**Processors Overview[1,3,4,5]**

**Intel 14th Generation Processors:**

Intel® Core™ i5-14400 (2.5GHz P-Core base frequency, 1.8GHz E-Core base frequency, up to 3.5GHz E-Core Max Turbo frequency, up to 4.7 GHz P-core Max Turbo frequency, 20MB L3 cache, 6 P-cores and 4 E-cores, 16 threads)

## Overview

Intel® Core™ i5-14500 (2.6GHz P-Core base frequency, 1.9GHz E-Core base frequency, up to 3.7GHz E-Core Max Turbo frequency, up to 5GHz P-core Max Turbo frequency, 24MB L3 cache, 6 P-cores and 8 E-cores, 20 threads)

Intel® Core™ i5-14600 (2.7GHz P-Core base frequency, 2GHz E-Core base frequency, up to 3.9GHz E-Core Max Turbo frequency, up to 5.2GHz P-core Max Turbo frequency, 24MB L3 cache, 6 P-cores and 8 E-cores, 20 threads)

Intel® Core™ i5-14600K (3.5GHz P-Core base frequency, 2.6GHz E-Core base frequency, up to 4.2GHz E-Core Max Turbo frequency, up to 5.3GHz P-core Max Turbo frequency, 24MB L3 cache, 6 P-cores and 8 E-cores, 20 threads)

Intel® Core™ i7-14700 (2.1GHz P-Core base frequency, 1.5GHz E-Core base frequency, up to 4.2Ghz E-Core base frequency, up to 5.3Ghz E-Core base frequency,33MB L3 cache, 8 P-cores and 12 E-cores, 28 threads)

Intel® Core™ i7-14700K (3.4GHz P-Core base frequency, 2.5GHz E-Core base frequency, up to 4.3GHz E-Core Max Turbo frequency, up to 5.5 GHz P-core Max Turbo frequency, 33MB L3 cache, 8 P-cores and 12 E-cores, 28 threads)

Intel® Core™ i9-14900 (2GHz P-Core base frequency, 1.5GHz E-Core base frequency, up to 4.3GHz E-Core Max Turbo frequency, up to 5.4 GHz P-core Max Turbo frequency, 36MB L3 cache, 8 P-cores and 16 E-cores, 32 threads)

Intel® Core™ i9-14900K (3.2GHz P-Core base frequency, 2.4GHz E-Core base frequency, up to 4.4GHz E-Core Max Turbo frequency, up to 5.6 GHz P-core Max Turbo frequency, 36MB L3 cache, 8 P-cores and 16 E-cores, 32 threads)

**Intel 13th Generation Processors:**

Intel® Core™ i5-13400 (2.5GHz P-Core base frequency, 1.8GHz E-Core base frequency, up to 3.3GHz E-Core Max Turbo frequency, up to 4.6 GHz P-core Max Turbo frequency, 20MB L3 cache, 6 P-cores and 4 E-cores, 16 threads)

Intel® Core™ i5-13500 (2.5GHz P-Core base frequency, 1.8GHz E-Core base frequency, up to 3.5GHz E-Core Max Turbo frequency, up to 4.8 GHz P-core Max Turbo frequency, 24MB L3 cache, 6 P-cores and 8 E-cores, 20 threads)

Intel® Core™ i5-13600 (2.7GHz P-Core base frequency, 2GHz E-Core base frequency, up to 3.7GHz E-Core Max Turbo frequency, up to 5 GHz P-core Max Turbo frequency, 24MB L3 cache, 6 P-cores and 8 E-cores, 20 threads)

Intel® Core™ i5-13600K (3.5GHz P-Core base frequency, 2.6GHz E-Core base frequency, up to 3.9GHz E-Core Max Turbo frequency, up to 5.1 GHz P-core Max Turbo frequency, 24MB L3 cache, 6 P-cores and 8 E-cores, 20 threads)

Intel® Core™ i7-13700 (2.1GHz P-Core base frequency, 1.5GHz E-Core base frequency, up to 4.1Ghz E-Core base frequency, up to 5.1Ghz E-Core base frequency,30MB L3 cache, 8 P-cores and 8 E-cores, 24 threads)

Intel® Core™ i7-13700K (3.4GHz P-Core base frequency, 2.5GHz E-Core base frequency, up to 4.2GHz E-Core Max Turbo frequency, up to 5.3 GHz P-core Max Turbo frequency, 30MB L3 cache, 8 P-cores and 8 E-cores, 24 threads)

Intel® Core™ i9-13900 (2GHz P-Core base frequency, 1.5GHz E-Core base frequency, up to 4.2GHz E-Core Max Turbo frequency, up to 5.2 GHz P-core Max Turbo frequency, 36MB L3 cache, 8 P-cores and 16 E-cores, 32 threads)

Intel® Core™ i9-13900K (3GHz P-Core base frequency, 2.2GHz E-Core base frequency, up to 4.3GHz E-Core Max Turbo frequency, up to 5.4 GHz P-core Max Turbo frequency, 36MB L3 cache, 8 P-cores and 16 E-cores, 32 threads)

**Intel 12th Generation Processors:**

Intel® Core™ i9-12900 (1.8GHz E-core base frequency, 5.0 GHz P-core base frequency, up to 3.8 GHz E-core Max Turbo frequency, up to 5.0 GHz P-core Max Turbo frequency, 30MB L3 cache, 8 P-cores and 8 E-cores, 24 threads)

Intel® Core™ i7-12700 (1.6 GHz E-core base frequency, 2.1 GHz P-core base frequency, up to 3.6 GHz E-core Max Turbo frequency, up to 4.8 GHz P-core Max Turbo frequency, 25MB L3 cache, 8 P-cores and 4 E-cores, 20 threads)

Intel® Core™ i5-12500 (3.0 GHz P-core base frequency, up to 4.6 GHz P-core Max Turbo frequency, 18MB L3 cache, 6 P-cores and 0-E-cores, 12 threads)

Intel® Core™ i3-12100 (3.3 GHz P-core base frequency, up to 4.3 GHz P-core Max Turbo frequency, 12MB, 4 P-cores. 8 threads)

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

[3] Intel Turbo Boost performance varies depending on hardware, software and overall system configuration. See http://www.intel.com/technology/turboboost for more information.

## Overview

[4] Intel vPro® requires Windows 10 Pro 64 bit or higher, a vPro supported processor, vPro enabled chipset, vPro enabled wired LAN and/or Wi-Fi 6E WLAN and TPM 2.0. Some functionality requires additional 3rd party software in order to run. Features of vPro® Essentials and Enterprise vary. See http://intel.com/vpro

[5] Memory will run at 4400 speed (MT/s) in 2DPC within 1DIMM population; memory will run at 4000 speed (MT/s) in 2DPC within 2DIMM of 1 Rank population and memory will run at 3600 speed (MT/s) in 2DPC within 2DIMM of 2 Rank population

| | |
|---|---|
| **Color** | Black |
| **Convertibility** | No |
| **Expansion Slots** (see system board section for more details) | Slot 1: PCIe Gen5 x16<br>Slot 2: PCIe Gen3 x1 - with x4 open end Connector<br><br>Slot 3: PCIe Gen3 x4 - with x16 Connector<br><br>Slot 4: PCIe Gen3 x4 with open end connector |
| **Expansion Bays** (see storage section for more details) | (2) Internal 3.5" bays<br>(1) External 5.25" bay<br>(1) Internal 2.5" bay (for SSD only)<br>(1) Dedicated 9.5mm slim optical disk drive bay |
| **Front I/O** | (2) USB-A 10Gbps ports (1 charge port supports up to 5V/2.1A), (2) USB-A 10Gbps ports, (1) USB-C 20Gbps eport (charge supports up to 5V/3A, optional), (1) SD card reader (optional), (1) universal audio jack |
| **Internal I/O [5]** | (1) Hi-Speed USB 480Mbps header for SD card reader<br>(1) serial port available with header<br>(1) serial and PS/2 available with header |
| **Rear I/O** | (2) DisplayPort 1.4 ports, (1) Audio Line out, (1) Audio Line in, (1) 1GbE LAN, (3) Hi-Speed USB 480Mbps ports, (2) USB-A 10Gbps ports, (1) USB-A 5Gbps port, (1) serial (optional), (1) Flex I/O port (VGA, HDMI 2.0b, DisplayPort 1.4, USB-C® 10Gbps port (Power Delivery 15W, Alt Mode Display Port), (1) Dual USB-A 5Gbps port, (1) 2nd 1GbE LAN, (1) Thunderbolt 3 with USB4 USB-C® 40Gbps (cabled to PCIe AIC)*, (1) 1Gbps Fiber LC NIC |
| **Optional I/O** | Flex IO* – choose one of the following options: (1) DisplayPort™ 1.4 port, (1) HDMI 2.0b, (1) VGA,(1) 2nd 1GbE LAN, (1) 1Gbps Fiber LC NIC, (1) Dual USB-A 5Gbpsport ,(1) USB -C® 10Gbps port (15W USB Power Delivery, Alt Mode DisplayPort™), (1) Thunderbolt™ 3 with USB4 USB-C® 40Gbps port (cabled to PCIe® AIC**);<br><br>Front – (1) USB-C® 20Gbps port (charging), (1) SD card reader;<br><br>Front – choose one of the following options: (1) USB-C ® 20Gbps (charging), (1) SD 4.0 card reader<br>Rear –(1) serial;<br><br>*About Thunderbolt compatibility, please refer to the FAQ of Thunderbolt community. https://www.thunderbolttechnology.net/tech/faq<br><br>**Flex IO port and PCIe slot 4 will be occupied when Thunderbolt is installed. |
| **Interfaces Supported** | SD card reader (optional) |
| **On-board RAID Support** | SATA and NVME RAID 0 Striped Array<br>SATA RAID and NVME RAID 1 Mirror Array |

## Overview

| | |
|---|---|
| **Chassis Dimensions (H x W x D)** | H: 14" [356mm]<br>W: 6.7" [169mm]<br>D: 15.2" [385mm] |
| **Packaged Dimensions** | H: 20.39" (518mm)<br>W: 11.61" (295mm)<br>D: 19.29" (490mm) |
| **Rack Dimensions** | 4U |
| **Weight** | Exact weights depend upon configuration (System weight only).<br>Starting at 6.2kg (13.7lbs.) |
| **Temperature** | Operating: 5° to 35° C (40° to 95° F)<br>Above 1524 m (5,000 feet) altitude, the maximum operating temperature is reduced by 1° C (1.8° F) for every 305 m (1,000 feet) increase in elevation<br>Non-operating: -40° to 60° C (-40° to 140° F)<br>Maximum rate of change: 10°C/hr |
| **Humidity** | Operating: 10% to 85% RH, non-condensing, 35° C maximum wet bulb<br>Non-operating: 10% to 90% RH, non-condensing, 35° C maximum wet bulb |
| **Maximum Altitude (non-pressurized)[6]** | Operating (with Rotational Hard Drives): 3,048 m (10,000 feet)<br>Operating (with only Solid-State Drives): 5,000 m (16,404 feet)<br>Non-operating: 12,192 m (40,000 feet)<br>Maximum operating temperature is reduced as altitude increases. See Temperature for details. |
| **Power Supply** | 700W wide-ranging, active Power Factor Correction, 92% Efficiency with two 6+2 graphics power connectors. 500W wide-ranging, active Power Factor Correction, 90% Efficiency. 450W wide-ranging, active Power Factor Correction, 90% Efficiency. 350W wide-ranging, active Power Factor Correction, 92% Efficiency.<br><br>**NOTE:** The Power Supply Efficiency Report for the 700W 92% Efficiency, 500W 90% Efficiency, 450W 90% Efficiency and 350W 92% Efficiency Power Supply may be found at the following links:<br><br>700W PSU:<br>https://www.plugloadsolutions.com/80PlusPowerSuppliesDetail.aspx?id=0&type=2<br><br>500W PSU:<br>LiteOn 500W PSU Efficiency Report<br>Delta 500W PSU Efficiency Report<br><br>450W PSU:<br>https://www.plugloadsolutions.com/80PlusPowerSuppliesDetail.aspx?id=0&type=2<br><br>350W PSU:<br>AcBel 350W PSU (SFF) Efficiency Report<br>AcBel 350W PSU (Custom) Efficiency Report<br>Delta 350W PSU Efficiency Report |
| **Backup Devices** | For a complete listing of compatible DAT tape drives, LTO tape drives and RDX Removable Disk Backup System offerings, please visit http://www.hp.com/go/connect |
| **Chipset** | Intel® W680 chipset |
| **Memory** | 4 DIMM slots, supporting up to 128GB ECC/non-ECC, DDR5 4800 MT/s speed depending on the system configuration |

## Supported Components

| SATA Hard Drives | Factory Configured | Option Kit | Option Kit Part Number |
|---|---|---|---|
| 500GB SATA 7200 rpm 6Gb/s 3.5" HDD | Y | Y | LQ036AA |
| 1TB SATA 7200 rpm 6Gb/s 3.5" HDD | Y | Y | LQ037AA |
| 2TB SATA 7200 rpm 6Gb/s 3.5" HDD | Y | Y | QB576AA |
| 1TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class) | Y | Y | W0R10AA |
| 2TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class) | Y | Y | 2Z274AA |
| 4TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class) | Y | Y | K4T76AA |
| 8TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class) | Y | Y | 2Z273AA |
| 12TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class) | Y | Y | 5S461AA |
| 500GB SATA 7.2K SED HDD | Y | Y | D8N29AA |

**NOTE:** For internal bay install, HDD option kits require separate purchase of 6Z9U6AA HP Z2 Tower HDD Cable Kit. For external bay install, HDD options kits require separate purchase of 6Z9U6AA HP Z2 Tower HDD Cable Kit & NQ099AA HP Optical Bay HDD Mounting Bracket.

| PCIe Solid State Drives | | | |
|---|---|---|---|
| HP ZTurbo 512GB PCIe-Gen 4x4 TLC Z2 SSDKit | Y | Y | 201G0AA/AT |
| HP ZTurbo 512GB PCIe-Gen 4x4 SED Z2 SSDKit | Y | Y | 201F9AA |
| HP ZTurbo 1TB PCIe-Gen 4x4 TLC Z2 SSDKit | Y | Y | 201F5AA/AT |
| HP ZTurbo 2TB PCIe-Gen 4x4 TLC Z2 SSDKit | Y | Y | 201F8AA |
| Z Turbo 1TB 2280 PCIe-Gen4x4 Self Encrypted OPAL2 TLC M.2 Z2 SSD | Y | Y | 223A3AA/AT |
| Z Turbo 2TB 2280 PCIe-Gen4x4 Self Encrypted OPAL2 TLC M.2 Z2 SSD | Y | Y | 223A4AA/AT |
| 256GB 2280 PCIe-4x4 NVMe Value M.2 Z2 Kit SSD | Y | Y | 4M9Z1AA |
| 512GB 2280 PCIe-4x4 NVMe Value M.2 Z2 Kit SSD | Y | Y | 4M9Z2AA |
| 1TB 2280 PCIe-4x4 NVMe Value M.2 Z2 Kit SSD | Y | Y | 4M9Z3AA |
| Z Turbo 4TB 2280 PCIe-4x4 TLC M.2 Z2 Kit SSD | Y | Y | 5S492AA |
| Z Turbo 2TB PCIe-4x4 TLC SSD Module | Y | Y | 38T75AA |
| Z Turbo 1TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 SSD Module | Y | Y | 38T76AA |
| Z Turbo 1TB PCIe-4x4 TLC SSD Module | Y | Y | 38T77AA |
| Z Turbo 2TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 SSD Module | Y | Y | 38T79AA |
| Z Turbo 512GB PCIe-4x4 TLC SSD Module | Y | Y | 38T80AA |
| Z Turbo 512GB 2280 PCIe-4x4 SED OPAL2 TLC M.2 SSD Module | Y | Y | 38T81AA |
| Z Turbo 4TB 2280 PCIe-4x4 TLC M.2 SSD Module | Y | Y | 5S496AA |
| Z Turbo 4TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 SSD Module | Y | Y | 5S497AA |
| Z Turbo 4TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 Z2 Kit SSD | Y | Y | 5S498AA |

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

| Graphics | Factory Configured | Option Kit | Option Kit Part Number | Supported # of cards | Support Notes |
|---|---|---|---|---|---|

## Supported Components

| | | | | | | |
|---|---|---|---|---|---|---|
| **Graphics Cable Adapters** | HP DisplayPort To HDMI True 4k Adapter | Y | Y | 2JA63AA | | |
| | HP Single miniDP-to-DP Adapter Cable | Y | Y | 2MY05AA | | |
| | HP DisplayPort To DVI-D Adapter | Y | Y | FH973AA | | |
| | HP DisplayPort To DVI Adapter (Bulk 90) | Y | Y | FH973A6 | | |
| | HP DisplayPort To VGA Adapter | Y | Y | AS615AA/ AT | | |
| | HP DisplayPort to VGA Adapter Bulk Qty.90) | Y | Y | AS615A6 | | |
| | HP DisplayPort To VGA Adapter | Y | Y | F7W97AA | | |
| | HP USB-C to DisplayPort Adapter | Y | Y | 4SH08AA | | |
| | HP USB-C to HDMI Adapter | Y | Y | 4SH07AA | | |
| | HP USB-C to VGA Adapter | Y | Y | 4SH06AA | | |
| **Entry 3D** | NVIDIA® T400 4 GB Graphics[2] | Y | Y | 5Z7E0AA/ AT | 2 | 1 |
| | NVIDIA® T600 4 GB Graphics[1] | N | Y | 340K9AA | 2 | 1 |
| | AMD Radeon Pro WX 3200 4GB | Y | Y | 6YT6*AA/ AT | 1 | 1 |
| | AMD Radeon RX 6400 4 GB DH DP+HDMI Graphics | N | Y | 6Q3U4AA/ AT | 1 | 1 |
| **Mid-range 3D** | NVIDIA® T1000 4 GB Graphics | Y | Y | | 2 | 1 |
| | NVIDIA® T1000 8 GB Graphics | Y | Y | 5Z7D8AA/ AT | 2 | 1 |
| | NVIDIA Long-Life T1000E 8 GB 4mDP Graphics | Y | Y | 6V9V4AA/ AT | 2 | 1 |
| | NVIDIA RTX™ A2000 6 GB 4mDP Graphics* | Y | Y | 340L0AA | 2 | |
| | NVIDIA RTX™ A2000 12GB Graphics* | Y | Y | 5Z7D9AA/ AT | 2 | |
| | NVIDIA RTX™ A4000 16GB* | Y | | 20X24AA/ AT | 2 | |
| | NVIDIA Long-Life RTX A4000E 16 GB 4DP Graphics* | Y | Y | 6H7J7AA | 1 | |
| | NVIDIA RTX™ 4000 Ada 20 GB 4DP Graphics* | Y | Y | 8D6B7AA | 2 | |
| | NVIDIA Long-Life RTX A2000E 12 GB 4mDP Graphics | Y | Y | 6V9V5AA/ AT | 2 | |
| | AMD Radeon™ Pro W6600 Graphics (8GB GDDR6 dedicated) * | Y | Y | 340K5AA | 1 | |
| **High-End 3D** | AMD Radeon™ Pro W6800 Graphics (32 GB GDDR6 dedicated) * | Y | Y | 340K7AA | 1 | |
| | AMD Radeon Pro W7900 48 GB 3DP+1mDP Graphics | Y | Y | 8F699AA | 1 | |
| | AMD Radeon Pro W7600 8 GB Graphics* | Y | | 8D6B9AA | 1 | |
| | AMD Radeon Pro W7500 8 GB Graphics | Y | Y | 8D6C2AA | 1 | |
| | NVIDIA RTX 4500 Ada 24 GB 4DP Graphics | Y | Y | 8D6C1AA | 1 | |
| | NVIDIA® RTX™ A5000 24 GB Graphics* | Y | Y | 20X23AA/ AT | 1 | |

## Supported Components

| | | | | |
|---|---|---|---|---|
| NVIDIA RTX 5000 Ada 32 GB 4DP Graphics | Y | Y | 8D6B6AA | 1 |
| AMD Radeon™ RX 6700 XT 12GB* | Y | Y | 4C203AA | 1 |

**NOTE:** Z2 G9 Tower with 700W PSU can support up to a 250W professional graphics card from HP, either factory-configured or added via after-market option, and can support up to 320W total graphics power when graphics is factory-configured.
**Note 1:** When dual graphics is configured the 450W and 500W base units will require the AMO HP Z2 TWR Dual Front Fan Kit part number 4N007AA; One storage device configuration for higher than 75W graphics cards (T1000 and up)
* Requires 700W chassis.

**Memory**

| | Factory Configured | Option Kit | Option Kit Part Number | Support Notes |
|---|---|---|---|---|
| HP 8GB (1x8GB) DDR5-4800 nECC UDIMM | Y | Y | 4M9X9AA | |
| HP 16GB (1x16GB) DDR5-4800 nECC UDIMM | Y | Y | 4M9Y0AA | |
| HP 16GB (1x16GB) DDR5-4800 ECC UDIMM | Y | Y | 4M9Y1AA | 1 |
| HP 32GB (1x32GB) DDR5-4800 nECC UDIMM | Y | Y | 4M9Y2AA | |
| HP 32GB (1x32GB) DDR5-4800 ECC UDIMM | Y | Y | 4M9Y3AA | 1 |

**NOTE 1:** ECC memory is supported
**GENERAL NOTE:** Two channels of DDR5 memory are supported. To realize full performance at least one DIMM must be inserted into each channel.
Though the memory modules can run up to 4800MHz, the current platform will support maximum memory speed of 4400MHz.

The system speed will be determined by a number of key factors:

| Module Configuration | Description of configuration | Max Memory Speed (Actual Memory speed is dependent on CPU) |
|---|---|---|
| Single DIMM per channel | Configurations that contain only one or two DIMM modules with DIMMs only in the black slots | 4400MHz |
| Two single ranked DIMMs in a channel | Configurations with 3 or 4 single ranked DIMMs (8GB and 16GB) installed in a system | 4000MHz |
| Two dual ranked DIMMs in a channel | Configurations with 3 or 4 dual ranked DIMMs (32GB) installed in a system | 3600MHz |

**When more than one memory slot is populated, symmetric configurations are required for 2 DIMMs per channel. Mix of different part numbers or mix of single and dual ranks within a channel is not allowed.**

**Optical and Removable Storage**

| | Factory Configured | Option Kit | Option Kit Part Number |
|---|---|---|---|
| HP DX175 Removable HDD Frame/Carrier | N | Y | 1ZX71AA |
| HP DX175 Removable HDD Spare Carrier | N | Y | 1ZX72AA |
| HP Z2 TWR SuperMulti DVD-Writer 9.5mm Slim ODD | Y | Y | 4L5K0AA |
| HP Z2 TWR DVD-ROM 9.5mm Slim ODD | Y | Y | 4L5K1AA |
| HP CRU QX328 5.25 in Front Removable M.2 Frame/Carrier | Y | Y | 4N011AA |

## Supported Components

| | | | |
|---|---|---|---|
| HP CRU Secure High Performance Storage Module with 2TB M.2 SSD | Y | Y | 56Q87AA |
| HP CRU Secure High Performance Storage Module with 1TB M.2 SSD | Y | Y | 56Q88AA |
| HP CRU Secure High Performance Storage Module with 512GB M.2 SSD | Y | Y | 56Q89AA |
| HP CRU SHIPS M.2 Spare Carrier | Y | Y | 633X9AA |

**NOTES:** Duplication of copyrighted material is strictly prohibited. Actual speeds may vary. Double Layer media compatibility will widely vary with some home DVD players and DVD-ROM drives. Note that DVD-RAM cannot read or write to 2.6GB Single Sided/5.2 Double Sided-Version 1.0 Media.

4N011AA HP CRU QX328 5.25in Front Removeable Frame/Carrier requires a separate purchase of HP CRU SHIPS Storage Module(s).

HP CRU Secure High Performance Storage (SHIPS) Module Kit contains select M.2 SSD for install into a factory configured or after market option front removeable storage carrier (HP CRU QX328 Frame/Carrier).

| **Networking and Communications** | **Factory Configured** | **Option Kit** | **Option Kit Part Number** |
|---|---|---|---|
| Integrated Intel® I219LM PCIe GbE Controller (Intel® vPro® with Intel® AMT 16.0) | Y | N | |
| HP 1GbE LAN Flex Port 2020 | Y | Y | 141J6AA/AT |
| HP Flex 1GbE Fiber LC Single Port | Y | Y | 20J15AA |
| NVIDIA Mellanox ConnectX-6 DX Dual Port 10/25GbE SFP28 NIC[1] | Y | Y | 436M8AA |
| HP 10GbE SFP+ SR/SW LC Fiber Optic Transceiver | Y | Y | 860T8AA |
| HP 25GbE SFP28 LC Fiber Optic Transceiver | Y | Y | 860T9AA |
| Intel Ethernet I350-T4 4-Port 1Gb NIC* | N | Y | W8X25AA |
| Intel X550 10GBASE-T Dual Port NIC | Y | Y | 1QL46AA |
| Intel Ethernet Network Adapter I225-T1 | Y | Y | 406L9AA |
| Intel Wi-Fi 6E AX211 BT 5.3 wireless card M.2 non-vPro[1,**,***] | Y | N | |
| Allied Telesis AT-2911T/2-901 Dual Port 1GbE NIC | Y | Y | 6E3Y9AA/AT |
| Intel BE200 Wi-Fi 7 +Bluetooth 5.4 non-vPro WW WLAN**** | Y | | |

*Intel I350-T4 4-port GbE NIC is an After Market Option only.
[1] Intel AX211 with Internal antenna support WIFI 6/WIFI 6E
**Wi-Fi 6E requires a Wi-Fi 6E router, sold separately, to function in the 6GHz band. Availability of public wireless access points limited. Wi-Fi 6E is backwards compatible with prior 802.11 specs. And available in countries where Wi-Fi 6E is supported.
***Intel AX211 must be configured at time of purchase. Not available as an After Market Option.
**** Not available with 12th Gen Intel ADL processors; Wireless access point and Internet service required and sold separately. Availability of public wireless access points limited. Wi-Fi 7 (802.11BE) functionality requires Windows 11 24H2, select Intel® processor, and a Wi-Fi 7 router, sold separately. Wi-Fi 7 is backwards compatible with prior 802.11 specs. Available in countries where Wi-Fi 7 is supported.

**NOTES**:
The integrated network connection is required to support Intel® vPro® Technology.

If AMT is provisioned, then network teaming with the integrated LAN port is not possible.

"Gigabit" Ethernet indicates compliance with IEEE standard 802.3ab for Gigabit Ethernet, and does not connote actual operating speed of 1 Gb/sec. For high-speed transmission, connection to a Gigabit Ethernet server and network infrastructure is required.

## Supported Components

| Input Devices | Factory Configured | Option Kit | Option Kit Part Number |
|---|---|---|---|
| HP USB 320K Keyboard | Y | Y | 9SR37AA |
| HP 320M Wired Mouse | Y | Y | 9VA80AA |
| HP Wired Desktop 320MK Mouse and Keyboard | N | Y | 9SR36AA |
| HP 125 Wired Keyboard | Y | Y | 266C9AA |
| HP 975 USB+BT Dual Mode Wireless | N | Y | 3Z726AA |
| HP 655 Wireless USB BLK KBD/MSE Kit | N | Y | N/A |
| HP 125 Wired Mouse | Y | Y | 265A9AA |
| HP 128 Laser Wired Mouse | Y | Y | 265D9AA |
| HP 935 Creator Wireless Mouse | N | Y | 1D0K8AA |
| HP 455 Programmable Wireless Keyboard | Y | Y | 4R177AA |
| HP 455 Programmable Wireless Keyboard (Bulk Qty.12) | Y | Y | 4R177A6 |
| HP 655 Wireless Keyboard and Mouse Combo | Y | Y | 4R009AA |
| HP 655 Wireless Keyboard and Mouse Combo (Blk Qty.10) | Y | Y | 4R009A6 |

**NOTE:** Keyboard and Mouse are optional or add on features.

| Flex Module (Rear IO) | Factory Configured | Option Kit | Option Kit Part Number |
|---|---|---|---|
| HP 1GbE LAN Flex Port 2020 | Y | Y | 141J6AA/AT |
| HP DP Flex Port 2020 | Y | Y | 141J7AA/AT |
| HP Dual USB-A 3.2 Gen1 Flex Port 2020 | Y | Y | 141J8AA/AT |
| HP HDMI Flex Port | Y | Y | 69D47AA/AT |
| HP USB-C 3.2 Gen2 Alt Flex Port 2020 | Y | Y | 141K6AA/AT |
| HP VGA Flex Port 2020 | Y | Y | 141K7AA/AT |
| HP Flex 1GbE Fiber LC Single Port | Y | Y | 20J15AA |

| Other Hardware | Factory Configured | Option Kit | Option Kit Part Number |
|---|---|---|---|
| HP Single TBT3 wType C and USB4 PCIe x4 Card | Y | N | N/A |
| HP Z2 Internal Serial Port and PS/2 Port | Y | Y | 141K9AA/AT |
| HP Z2 Power Cord Kit | Y | Y | 1N1D5AA |
| C13-C14 2.0m 15A 100-127V Countries Straight Desktop Power Cord | Y | Y | 8R881AA |
| C13-C14 2.0m 10A 200-240V Countries Straight Desktop Power Cord | Y | Y | 8R882AA |
| HP Z2 2nd serial port adapter | Y | Y | 141K8AA/AT |
| HP Z2 Tower Dust Filter | Y | Y | 141L2AA/AT |
| HP Z2 Tower Dust Filter and bezel | Y | Y | 141L3AA/AT |
| HP PCIe x1 Parallel Port Card | Y | Y | N1M40AA |
| HP Z2 G9 Single Type-C SuperSpeed USB 20Gbps Front Port | Y | Y | 4M9X8AA/AT |
| HP Z2 TWR Dual Front Fan Kit | Y | Y | 4N007AA |
| HP Optical Bay HDD Mounting Bracket | Y | Y | NQ099AA |
| HP Z2 Tower HDD Cable Kit | N | Y | 6Z9U6AA |
| HP Anyware Integrated Remote System Controller | Y | Y | 7K6D9AA |

## Supported Components

| | | | |
|---|---|---|---|
| HP Anyware Remote System Controller Main Board Adapter | Y | Y | 7K6D8AA |
| HP Anyware Remote System Controller | Y | Y | 7K6D7AA |
| HP Anyware Remote System Controller for Universal KVM | N | Y | 7K7N2AA |

| **Racking and Physical Security** | **Factory Configured** | **Option Kit** | **Option Kit Part Number** |
|---|---|---|---|
| HP Z2 Mini and Z2/Z4/Z6 TWR Depth Adjustable Fixed Rail Rack Kit | Y | Y | 2A8Y5AA |
| HP Keyed Cable Lock | Y | Y | T1A62AA |
| HP Master Keyed Cable Lock 10mm | Y | Y | T1A63AA |
| HP Business PC Security Lock V3 Kit | Y | Y | 3XJ17AA |

| **Software** | **Factory Configured** | **Option Kit** | **Support Notes** |
|---|---|---|---|
| HP Performance Advisor | Y | N | 1 |
| HP PC Hardware Diagnostics UEFI (Windows OS only) | Y | N | 2 |
| HP PC Hardware Diagnostics Windows | | N | 3 |
| HP Wolf Security | Y | N | |
| HP Notifications | Y | N | |
| HP Desktop Support Utility | Y | N | |
| HP Documentation | Y | N | |
| HP Image Assistant | N | N | |
| HP Support Assistant | N | N | |
| myHP | Y | N | |
| HP Easy Clean | Y | N | |
| Kingsoft WPS Office | Y | N | 4 |
| My Office | Y | N | 5 |
| Adobe Substance 3D Collection Plan | N | Y | 6 |
| WSL2/Ubuntu Data Science Stack | Y | N | 7 |

**Notes:**

1. Supports, and preinstalled with Windows 10 only. Also available as a free download from http://www.hp.com/go/performanceadvisor
2. Windows OS only
3. Not available in Russia
4. Only available in China
5. Only available in Russia
6. Not available in China
7. Optional Software

**Operating Systems**

Windows 11 Pro – HP recommends Windows 11 Pro[2]

Windows 11 Home – HP recommends Windows 11 Pro[2]

Windows 10 Pro (available through downgrade rights from Windows 11 Pro) [1,2,3]

Linux®-ready[5]

Ubuntu®[4,5]

## Supported Components

- Intel 12th generation processors will support and preinstall Ubuntu 20.02 and 20.04.
- Intel 13th generation processors support and preinstall Ubuntu 22.04 LTS

[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 internet and Microsoft account required. ISP fees may apply and additional requirements may apply over time for updates. See http://www.windows.com.
[3]This system is preinstalled with Windows 10 Pro software and also comes with a license for Windows 11 Pro software and provision for recovery software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.
[4] Not all features are available in all editions or versions of Ubuntu. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS to take full advantage of Ubuntu functionality. Ubuntu may be automatically updated. ISP fees may apply and additional requirements may apply over time for updates.
[5]For detailed Linux® OS/hardware support information, see:
http://www.hp.com/support/linux_hardware_matrix

**NOTE:** Your product does not support Windows 8 or Windows 7. In accordance with Microsoft's support policy, HP does not support the Windows® 8 or Windows 7 operating system on products configured with Intel® and AMD® 7th generation and forward processors or provide any Windows® 8 or Windows 7 drivers on http://www.support.hp.com. A full list of HP products and the Windows 10 versions tested is available on the HP support website. https://support.hp.com/us-en/document/c05195282

## Supported Components

**HP BIOS**

Additional HP BIOS Features:

- Power-On password – Helps prevent an unauthorized user from powering on the system.
- Administrator password – Also known as the BIOS Setup password, this helps prevent unauthorized changes to the system configuration. If the administrator password is not known, the BIOS cannot be updated and changes cannot be made to BIOS settings using BIOS Setup or under the OS.
- S4/S5 Maximum Power Savings setting supports EU Lot6 requirement and allows the computer to power down below 0.5W in S4/S5 (when turned off). When S4/S5 Maximum Power Savings feature is enabled below features are turned off:
  - -Power to expansion connectors / slots
  - -Most Wake events other than power buttons and WOL(Wake on LAN supported by embedded Lan controller under S4/S5 Maximum Power Saving Enabled )
  - -USB charging ports

HP Sure Start Gen7 Start

- BIOS Integrity checking – Sure Start protection ensures that only trusted BIOS code is executed and not rootkits, viruses and malware. Verification is done upon boot up, shutdown and while the system is on.
- Sure Start is set by default to automatically repair the BIOS if corrupted or compromised but is policy driven for better manageability. Start is set by default to automatically repair the BIOS if corrupted or compromised but is policy driven for better manageability.
- Protecting beyond BIOS – Integrity checking and repair is extended to other data that should be protected such as network configuration parameters, platform specific information (i.e. system IDs), secure boot credentials, and other code the system needs to boot.
- Audit enabled – System Audit via Sure Start Event Logs capture data such as incident, repair date and time for troubleshooting and investigating

**NOTE:** HP Sure Start Gen7 is available on HP Workstation products equipped with Intel® 12th generation processors.

**HP Performance Control Modes**

**HP Z Desktop Workstations offers Performance Control Modes in the F10 BIOS menu. Z2 G9 offers Quiet Mode, Performance Mode and High-Performance Mode. HP recommends using High Performance Mode unless you have concerns about acoustics in an open office environment. Customers can get up to 34% performance improvements using High Performance Mode over Performance Mode*. It is possible to configure High Performance Mode as default from the factory.**

**How to Set HP Performance Control Modes in HP F10 BIOS Menu**

In the F10 BIOS Menu, the setting titled “Performance Control” is adjustable to High Performance Mode, Performance Mode or Quiet Mode. These modes are choice points for performance and acoustic trade-offs based on user needs or recommended balanced conditions in performance and noise optimization.

At startup, push the F10 key while system is booting to get to the BIOS Menu.
Go to → Advanced -> System Options ->scroll down and choose “Performance Control”

Set the Performance Mode you desire and then go back to Main->Save Changes and Exit -> Yes
The machine will restart in the mode you’ve chosen.

**How to set HP Performance Mode in HP Performance Advisor software,** select BIOS Settings -> Advanced -> System Options -> Performance Controls

The machine will restart in the mode you’ve chosen.

You can change these modes anytime you prefer to prioritize acoustics (Quiet Mode), want a balance between performance and acoustics (Performance Mode) or prefer to prioritize performance (High Performance Mode).

For more information on performance control modes, please see the white paper called, HP Performance Control Modes for Z Desktop Workstations.

*Compared to Performance Mode. Performance increase based on Z2 Tower G9 with 64GB of memory, 1TB NVMe, Windows 11 22H2 OS, RTX A4000, i9-13900 CPU using SPECworkstation 3.1

## SOFTWARE COMPONENTS AND APPLICATIONS WITH WINDOWS

**Software**
HP Support Assistant [14]
HP Image Assistant
HP Desktop Support Utility
HP Documentation
HP Notifications
HP PC Hardware Diagnostics UEFI
HP PC Hardware Diagnostics Windows
HP Performance Advisor[1]
myHP
HP Easy Clean[20]
WSL/Ubuntu Data Science Stack
HP Privacy Settings
Touchpoint Customizer for Commercial

**Manageability Features**
HP Driver Packs[2]
HP UWP Pack
HP System Software Manager (SSM)
HP Manageability Integration Kit Gen4[3]
HP Smart Support[5]
HP Client Catalog (download)
HP Image Assistant (download)
HP Cloud Recovery
HP Client Management Script Library (download)
HP BIOSphere Gen6 [13]

**Client Security Software**
HP Client Security Suite Gen7[4] including: (including Credential Manager, HP Password Manager[6], HP Spare Key)
HP Power On Authentication
Microsoft Defender[7]

**Security Management**
HP Secure Erase [16]
HP Wolf Pro Security Edition (optional) [18]
HP Wolf Security for Business[22] Includes:
HP Sure Click[11]
HP Sure Sense[12]
HP Sure Run Gen5[9]
HP Sure Recover Gen4 [10]

## Supported Components

HP Sure Start Gen7[8]
HP Tamper Lock
HP Sure Admin [17]
HP Client Security Manager Gen 7[4]

[1] HP Performance Advisor Software - –P Performance Advisor is ready to help you get the most out of your HP Workstation from day one—and every day after. Learn more or download at: http://hp.com/PerformanceAdvisor

[2] HP Driver Packs not preinstalled, however available for download at http://www.hp.com/go/clientmanagement.

[3] HP Manageability Integration Kit can be downloaded from http://www8.hp.com/us/en/ads/clientmanagement/overview.html

[4] HP Client Security Manager Gen7 requires Windows and is available on the select HP PCs.

[5] 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, thru HP Factory Configuration Services; or it can be downloaded. For more information about how to enable HP Smart Support or for download, please visit http://www.hp.com/smart-support.

[6] HP Password Manager requires Internet Explorer or Chrome or FireFox. Some websites and applications may not be supported. User may need to enable or allow the add-on / extension in the internet browser.

[7] Microsoft Defender Opt in and internet connection required for updates.

[8] HP Sure Start Gen 7 is available on select HP PCs and workstations. See product specifications for availability.

[9] HP Sure Run Gen5 is available on select Windows 11 based HP Pro, Elite and Workstation PCs with select Intel® or AMD processors

[10] HP Sure Recover Gen4 is available on select HP PCs and requires Windows 10 and an open network connection. You must back up important files, data, photos, videos, etc. before using HP Sure Recover to avoid loss of data. Network based recovery using Wi-Fi is only available on PCs with Intel Wi-Fi Module

[11] HP Sure Click requires Windows 10 Pro or higher or Enterprise. See https://bit.ly/2PrLT6A_SureClick for complete details.
[12] HP Sure Sense requires Windows 11 Pro or Enterprise and supports Microsoft Internet Explorer, Google Chrome™, and Chromium™. Supported attachments include Microsoft Office (Word, Excel, PowerPoint) and PDF files in read only mode, when Microsoft Office or Adobe Acrobat are installed.
[13] HP BIOSphere Gen6 features may vary depending on the platform and configurations.
[14] HP Support Assistant requires Windows and Internet access.
[16] Secure Erase - –or the methods outlined in the National Institute of Standards and Technology Special Publication 800-88 “C“ear” ”anitation method. HP Secure Erase does not support platforms with Intel® Optane.
[17] HP Sure Admin requires Windows 11, 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.
[18] HP Wolf Pro Security Edition is available preloaded on select SKUs and, depending on the HP product purchased, includes a paid 1-year or 3-year license. The HP Wolf Pro Security Edition software is licensed under the license terms of the HP Wolf Security Software - –nd-User license Agreement (EULA) that can be found at: https://support.hp.com/us-en/document/ish_3875769-3873014-16 as that EULA is modified by the following: “7. Term. Unless otherwise terminated earlier pursuant to the terms contained in this EULA, the license for the HP Wolf Pro Security Edition (HP Sure Sense Pro and HP Sure Click Pro) is effective upon activation and will continue for either a twelve (12) month or thirty-six (36) month license term (“Initial Term”). At the end of the Initial Term you may either (a) purchase a renewal license for the HP Wolf Pro Security Edition from HP.com, HP Sales or an HP Channel Partner, or (b) continue using the standard versions of HP Sure Click and HP Sure Sense at no additional cost with no future software updates or HP Support.
[20] HP Easy Clean requires Windows 10 RS3 and higher and will disable the keyboard, touchscreen, and clickpad only. Ports are not disabled. See user guide for cleaning instructions.
[22] 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

System Technical Specifications

## System Board

| | |
|---|---|
| **System Board Form Factor** | Customized PCB 36.056 x 25.130 mm (14.197 x 9.894 inch) |
| **Processor Socket** | Single LGA-1700 |
| **CPU Bus Speed** | DMI Gen4 |
| **Chipset** | Intel® PCH W680 |
| **Super I/O Controller** | Nuvoton SIO21 |
| **Memory Expansion Slots** | 4 DDR5 memory slots |
| **Memory Type Supported** | DDR5, UDIMM (Unbuffered), ECC& non-ECC |
| **Memory Modes** | Non-Interleaved for single channel. Interleaved when both channels are populated. |
| **Memory Speed Supported** | 3600MT/s to 4400MT/s DDR5, dependent on memory configuration[1] |

[1]Though the memory modules can run up to 4800MHz, the current platform will only be able to support the maximum memory speed of 4400MHz.

The system speed will be determined by a number of key factors:

| Module Configuration | Description of configuration | Max Memory Speed (Actual Memory speed is dependent on CPU) |
|---|---|---|
| Single DIMM per channel | Configurations that contain only one or two DIMM modules with DIMMs only in the black slots | 4400MHz |
| Two single ranked DIMMs in a channel | Configurations with 3 or 4 single ranked DIMMs (8GB and 16GB) installed in a system | 4000MHz |
| Two dual ranked DIMMs in a channel | Configurations with 3 or 4 dual ranked DIMMs (32GB) installed in a system | 3600MHz |

| | |
|---|---|
| **Memory Protection** | ECC available on data |
| **Maximum Memory** | 128GB |
| **Memory Configuration** (Supported) | 8GB, 16GB and 32GB non-ECC, 16GB and 32GB ECC unbuffered DIMMs are supported. ECC and non-ECC memory DIMMs cannot be mixed in the same system |
| **PCI Express Connectors** | (1) PCI Express Gen5 slot x16 mechanical/ x16 electrical (full height, full length)<br>(1) PCI Express Gen3 slot x4 mechanical/ x1 electrical (full height, full length, open-ended)<br>(1) PCI Express Gen3 slot x16 mechanical/ x4 electrical (full height, full length)<br>(1) PCI Express Gen3 slot x4 mechanical/ x4 electrical (full height, full length, open-ended)<br>(1) M.2 2280 Storage (PCIe Gen4 x4)<br>(1) M.2 2280 Storage (PCIe Gen4 x4)<br>(1) M.2 2280 Storage (PCIe Gen4 x4)<br>(1) M.2 2230 WLAN (PCIe Gen3 x1+ Intel CNVi) |

**NOTE:** The PCIe Gen5 x16 slot has validated and passed PCI-SIG electrical compliance test ONLY. HP does not guarantee and support any PCIe Gen5 cards available -in the open market. May or may not see performance reduced when device MRRS (Maximum Read Request Size) is 512Bytes and above. To reach highest Gen5 PCIe performance, Use the top bin DRAM module (e.g. 4400) to minimize the impact.

| | | |
|---|---|---|
| **Supported Interfaces** | **SATA** | Integrated (4) Serial ATA interfaces (6Gb/s SATA). RAID 0 and 1 supported. Factory integrated RAID for Microsoft Windows only. |
| | **Integrated Graphics** | Intel® UHD Graphics 730 (on Core i5-12400/i3-12300/i3-12100) processors); Intel® UHD Graphics 770 (on 13th and 14th gen Core i5/i7/i9 processors); |

System Technical Specifications

| | | |
|---|---|---|
| | | Based on Unified Memory Architecture (UMA) - – region of system memory is reserved and dedicated to the graphics display.<br>Support for Microsoft DirectX 12, OpenGL 4.6 and OpenCL 3.0 on Intel® UHD Graphics 730/770;<br>Based on Unified Memory Architecture (UMA) - – region of system memory is reserved and dedicated to the graphics display.<br><br>2 DP 1.4 graphics ports integrated in motherboard; Supports up to three simultaneous displays across DisplayPort*/HDMI*/DVI outputs.<br>Max. resolution supported on onboard DP 1.4/HBR2 ports: 4096x2304 @ 60Hz, 24bpp<br>Max. resolution supported on FlexIO DP 1.4/HBR3 port: 5120x3200 @60Hz, 24bpp |
| | **Network Controller** | Integrated Ethernet PHY Connection I219LM. Management capabilities: WOL, PXE 2.1 and AMT 16 |
| | **Serial** | 1 internal header (requires optional Serial Port and PS/2 Combo Kit with PCIe bracket) |
| | **2nd Serial** | 1 internal header(requires optional Serial Port Adapter Kit) |
| **USB Connector(s)** | **Front** | 2 Type-A SuperSpeed USB 10Gbps signaling rate port (charge supports up to 5V/2.1A);<br>2 Type-A SuperSpeed USB 10Gbps signaling rate port; 1 Type-C® SuperSpeed USB 20Gbps signaling rate port (optional, charge supports up to 5V/3A) |
| | **Rear** | 3 High-speed USB 480Mbps signaling rate port; 1 Type-A SuperSpeed USB 5Gbps signaling rate port; 2 Type-A SuperSpeed USB 10Gbps signaling rate port;<br>Flex I/O option:<br>1 SuperSpeed USB Type-C® 10Gbps signaling rate (Power Delivery 15W, Alt Mode DisplayPort); 1 Dual SuperSpeed USB Type-A 5Gbps signaling rate |
| | **Internal** | 1 High-speed USB 480Mbps signaling rate header for SD Card Reader |
| **HD Integrated Audio** | Realtek ALC3205 | |
| **Flash ROM** | Yes | |
| **CPU Fan Header** | Yes | |
| **Memory Fan Header** | None | |
| **Chassis Fan Header** | 1 Rear System Chassis Fan Header, 1 Graphic chassis Fan Header. | |
| **Front PCI Fan Header** | None | |
| **Front Control Panel/Speaker Header** | Yes | |
| **CMOS Battery Holder - – ithium** | Yes | |
| **Integrated Trusted Platform Module** | Integrated TPM 2.0 (Infineon SLB9672)<br>Convertible to FIPS 140-2 Certified mode through firmware v15.21 | |
| **Power Supply Headers** | Yes | |
| **Power Switch, Power LED & Hard Drive LED Header** | Yes | |
| **Clear Password Jumper** | None | |

## System Technical Specifications

**Keyboard/Mouse** USB or PS/2 (option)

**Power Supply** 700W EPA92, 500W EPA90, 450W EPA90 and 350W EPA92

[1]Maximum memory capacities assume 64-bit operating systems, such as Genuine Windows® 10 Professional 64 bit, Red Hat Linux 64-bit. 32-bit Windows Operating Systems support up to 4 GB.

[2]M.2 storage supports compatible devices up to 80mm

## PROCESSORS

| Name | Ghz P-Core Base Frequency | Ghz E-Core Base Frequency | Up to X P-Core Max Turbo Freq | Up to x GHz E-Core Max Turbo Frequency | L3 Cache (MB) | P-Cores | E-Cores | Total Cores | Processor Threads | Memory Speed (MT/s) (DDR5)[4] | ECC Memory Supported[5] | Integrated Graphics | Featuring Intel® vPro® Technology[3] | TDP (W) | Max Turbo Frequency (GHz) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Intel 14th Generation Processors** | | | | | | | | | | | | | | | |
| Intel® Core™ i9-14900K | 3.2 | 2.40 | 5.6 | 4.4 | 36 | 8 | 16 | 24 | 32 | 5600 | Y | Intel® UHD Graphics 770 | Y | 125 | 6 |
| Intel® Core™ i9-14900 | 2 | 1.50 | 5.4 | 4.3 | 36 | 8 | 16 | 24 | 32 | 5600 | Y | Intel® UHD Graphics 770 | Y | 65 | 5.8 |
| Intel® Core™ i7-14700K | 3.4 | 2.50 | 5.5 | 4.3 | 33 | 8 | 12 | 20 | 28 | 5600 | Y | Intel® UHD Graphics 770 | Y | 125 | 5.6 |
| Intel® Core™ i7-14700 | 2.1 | 1.50 | 5.3 | 4.2 | 33 | 8 | 12 | 20 | 28 | 5600 | Y | Intel® UHD Graphics 770 | Y | 65 | 5.4 |
| Intel® Core™ i5-14600K | 3.5 | 2.60 | 5.3 | 4.2 | 24 | 6 | 8 | 14 | 20 | 5600 | Y | Intel® UHD Graphics 770 | Y | 65 | 5.3 |
| Intel® Core™ i5-14600 | 2.7 | 2.00 | 5.2 | 3.9 | 24 | 6 | 8 | 14 | 20 | 5600 | Y | Intel® UHD Graphics 770 | Y | 65 | 5.2 |
| Intel® Core™ i5-14500 | 2.6 | 1.80 | 5 | 3.7 | 24 | 6 | 8 | 14 | 20 | 4800 | Y | Intel® UHD Graphics 770 | Y | 65 | 5.0 |
| Intel® Core™ i5-14400 | 2.5 | 1.80 | 4.7 | 3.5 | 20 | 6 | 4 | 20 | 16 | 4800 | N | Intel® UHD Graphics 730 | N/A | 65 | 4.7 |
| **Intel 13th Generation Processors** | | | | | | | | | | | | | | | |
| Intel® Core™ i9-13900K | 3 | 2.20 | 5.4 | 4.3 | 36 | 8 | 16 | 24 | 32 | 5600 | Y | Intel® UHD Graphics 770 | Y | 125 | 5.8 |
| Intel® Core™ i9-13900 | 2 | 1.50 | 5.2 | 4.2 | 36 | 8 | 16 | 24 | 32 | 5600 | Y | Intel® UHD Graphics 770 | Y | 65 | 5.6 |
| Intel® Core™ i7-13700K | 3.4 | 2.50 | 5.3 | 4.2 | 30 | 8 | 8 | 16 | 24 | 5600 | Y | Intel® UHD Graphics 770 | Y | 125 | 5.8 |
| Intel® Core™ i7-13700 | 2.1 | 1.50 | 5.1 | 4.10 | 30 | 8 | 8 | 16 | 24 | 5600 | Y | Intel® UHD Graphics 770 | Y | 65 | 5.2 |
| Intel® Core™ i5-13600K | 3.5 | 2.60 | 5.1 | 3.9 | 24 | 6 | 8 | 14 | 20 | 5600 | Y | Intel® UHD Graphics 770 | Y | 65 | 5.1 |
| Intel® Core™ i5-13600 | 2.7 | 2.00 | 5.0 | 3.7 | 24 | 6 | 8 | 14 | 20 | 4800 | Y | Intel® UHD Graphics 770 | Y | 65 | 5.0 |
| Intel® Core™ i5-13500 | 2.5 | 1.80 | 4.8 | 3.5 | 24 | 6 | 8 | 14 | 20 | 4800 | Y | Intel® UHD Graphics 770 | Y | 65 | 4.8 |
| Intel® Core™ i5-13400 | 2.5 | 1.80 | 4.6 | 3.3 | 20 | 6 | 4 | 10 | 16 | 4800 | N | Intel® UHD Graphics 730 | N/A | 65 | 4.6 |
| **Intel 12th Generation Processors** | | | | | | | | | | | | | | | |
| Intel® Core™ i9-12900 | 5 | 1.8 | 5.0 | 3.8 | 30 | 8 | 8 | 16 | 24 | 4800 | Y | Intel® UHD Graphics 770 | Y | 65 | 5.1 |

## System Technical Specifications

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Intel® Core™ i7-12700 | 2.1 | 1.6 | 4.8 | 3.6 | 25 | 8 | 4 | 12 | 20 | 4800 | Y | Intel® UHD Graphics 770 | Y | 65 | 4.9 |
| Intel® Core™ i5-12600 | 3.3 | N/A | 4.8 | N/A | 18 | 6 | 0 | 6 | 12 | 4800 | Y | Intel® UHD Graphics 770 | Y | 65 | 4.8 |
| Intel® Core™ i3-12100 | 3.3 | N/A | 4.3 | N/A | 12 | 4 | 0 | 4 | 8 | 4800 | N | Intel® UHD Graphics 730 | N/A | 60 | 4.3 |

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

[3] Intel Turbo Boost performance varies depending on hardware, software and overall system configuration. See http://www.intel.com/technology/turboboost for more information.

[4] Intel vPro® requires Windows 10 Pro 64 bit or higher, a vPro supported processor, vPro enabled chipset, vPro enabled wired LAN and/or Wi-Fi 6E WLAN and TPM 2.0. Some functionality requires additional 3rd Party software in order to run. Features of vPro® Essentials and Enterprise vary. See http://intel.com/vpro

[5] Memory will run at 4400 speed (MT/s) in 2DPC within 1DIMM population; memory will run at 4000 speed (MT/s) in 2DPC within 2DIMM of 1 Rank population and memory will run at 3600 speed (MT/s) in 2DPC within 2DIMM of 2 Rank population

System Technical Specifications

| System Configurations | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Example Configuration #1** | **Processor Info** | Core i5-12500,6C 3.0G 65W | | | | | | |
| | **Memory Info** | 2 x 8G DDR5 4800 UDIMM NECC | | | | | | |
| | **Graphics Info** | NVIDIA T400 4GB | | | | | | |
| | **Disks/Optical/Floppy** | 512GB SSD Z Turbo | | | | | | |
| | **PSU** | 350W | | | | | | |
| | **Other** | NA | | | | | | |
| **Energy Consumption (Watts)** | | 115 VAC | | 230 VAC | | 100 VAC | | |
| | | LAN Enabled | LAN Disabled | LAN Enabled | LAN Disabled | LAN Enabled | LAN Disabled | |
| | Windows long Idle (S0) | 17.866 | | 17.912 | | 17.804 | | |
| | Windows short Idle (S0) | 18.926 | | 19.024 | | 18.883 | | |
| | Windows Busy Typ (S0) | 160.167 | | 155.973 | | 161.10 | | |
| | Windows Busy Max (S0) | 192.557 | | 187.067 | | 193.063 | | |
| | Sleep (S3) | 1.367 | 1.259 | 1.401 | 1.367 | 1.259 | 1.401 | |
| | Off (S5) | 0.555 | 0.552 | 0.561 | 0.555 | 0.552 | 0.561 | |
| | Zero Power Mode (EuP) | 0.171 | | 0.173 | | 0.168 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Heat Dissipation (Btu/hr)** | | 115 VAC | | 230 VAC | | 100 VAC | |
| | | LAN Enabled | LAN Disabled | LAN Enabled | LAN Disabled | LAN Enabled | LAN Disabled |
| | Windows Idle (S0) | 60.959 | | 61.116 | | 60.747 | |
| | Windows short Idle (S0) | 64.576 | | 64.91 | | 64.429 | |
| | Windows Busy Typ (S0) | 546.489 | | 532.181 | | 549.707 | |
| | Windows Busy Max (S0) | 657.003 | | 638.271 | | 658.732 | |
| | Sleep (S3) | 4.664 | 4.296 | 4.78 | 4.664 | 4.296 | 4.78 |
| | Off (S5) | 1.894 | 1.883 | 1.914 | 1.894 | 1.883 | 1.914 |
| | Zero Power Mode (EuP) | 0.583 | | 0.59 | | 0.573 | |
| ***Example Configuration #2*** | **Processor Info** | Core i7-12700,12C 2.1G 65W | | | | | |
| | **Memory Info** | 2 x 16G DDR5 4800 UDIMM NECC | | | | | |
| | **Graphics Info** | NVIDIA T1000 8GB | | | | | |
| | **Disks/Optical/Floppy** | 512GB SSD Z Turbo | | | | | |
| | **PSU** | 450W | | | | | |
| | **Other** | NA | | | | | |
| **Energy Consumption (Watts)** | | 115 VAC | | 230 VAC | | 100 VAC | |
| | | LAN Enabled | LAN Disabled | LAN Enabled | LAN Disabled | LAN Enabled | LAN Disabled |
| | Windows long Idle (S0) | 20.169 | | 20.335 | | 20.087 | |
| | Windows short Idle (S0) | 21.222 | | 21.547 | | 21.195 | |
| | Windows Busy Typ (S0) | 119.48 | | 117.953 | | 120.406 | |
| | Windows Busy Max (S0) | 157.13 | | 155.03 | | 157.833 | |
| | Sleep (S3) | 1.575 | 1.461 | 1.582 | 1.575 | 1.461 | 1.582 |
| | Off (S5) | 0.944 | 0.941 | 0.952 | 0.944 | 0.941 | 0.952 |
| | Zero Power Mode (EuP) | 0.204 | | 0.207 | | 0.202 | |

## System Technical Specifications

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|---|---|---|---|---|---|---|---|
| **Heat Dissipation (Btu/hr)** | | 115 VAC | | 230 VAC | | 100 VAC | |
| | | LAN Enabled | LAN Disabled | LAN Enabled | LAN Disabled | LAN Enabled | LAN Disabled |
| | Windows Idle (S0) | 68.817 | | 69.383 | | 68.537 | |
| | Windows short Idle (S0) | 72.409 | | 73.518 | | 72.317 | |
| | Windows Busy Typ (S0) | 407.666 | | 402.457 | | 410.824 | |
| | Windows Busy Max (S0) | 536.128 | | 528.962 | | 538.527 | |
| | Sleep (S3) | 5.374 | 4.985 | 5.398 | 5.374 | 4.985 | 5.398 |
| | Off (S5) | 3.221 | 3.211 | 3.248 | 3.221 | 3.211 | 3.248 |
| | Zero Power Mode (EuP) | 0.696 | | 0.706 | | 0.689 | |
| ***Example Configuration #3*** | **Processor Info** | Core i9-12900,16C 2.4G 65W | | | | | |
| | **Memory Info** | 2 x 16G DDR5 4800 UDIMM ECC | | | | | |
| | **Graphics Info** | NVIDIA RTX A2000 | | | | | |
| | **Disks/Optical/Floppy** | 512GB SSD Z Turbo | | | | | |
| | **PSU** | 450W | | | | | |
| | **Other** | NA | | | | | |
| **Energy Consumption (Watts)** | | 115 VAC | | 230 VAC | | 100 VAC | |
| | | LAN Enabled | LAN Disabled | LAN Enabled | LAN Disabled | LAN Enabled | LAN Disabled |
| | Windows long Idle (S0) | 22.555 | | 23.324 | | 22.484 | |
| | Windows short Idle (S0) | 23.414 | | 24.656 | | 23.397 | |
| | Windows Busy Typ (S0) | 159.883 | | 156.853 | | 161.463 | |
| | Windows Busy Max (S0) | 189.99 | | 185.89 | | 190.127 | |
| | Sleep (S3) | 1.585 | 1.492 | 1.694 | 1.585 | 1.492 | 1.694 |
| | Off (S5) | 0.952 | 0.95 | 1.083 | 0.952 | 0.95 | 1.083 |
| | Zero Power Mode (EuP) | 0.21 | | 0.217 | | 0.198 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Heat Dissipation (Btu/hr)** | | 115 VAC | | 230 VAC | | 100 VAC | |
| | | LAN Enabled | LAN Disabled | LAN Enabled | LAN Disabled | LAN Enabled | LAN Disabled |
| | Windows Idle (S0) | 76.958 | | 79.581 | | 76.715 | |
| | Windows short Idle (S0) | 79.889 | | 84.126 | | 79.831 | |
| | Windows Busy Typ (S0) | 545.522 | | 535.184 | | 550.913 | |
| | Windows Busy Max (S0) | 648.246 | | 634.257 | | 648.712 | |
| | Sleep (S3) | 5.408 | 5.091 | 5.78 | 5.408 | 5.091 | 5.78 |
| | Off (S5) | 3.248 | 3.241 | 3.695 | 3.248 | 3.241 | 3.695 |
| | Zero Power Mode (EuP) | 0.717 | | 0.74 | | 0.676 | |

**NOTE:** The Power Supply Efficiency report may be found at the following links:
https://www.plugloadsolutions.com/80PlusPowerSuppliesDetail.aspx?id=0&type=2

## System Technical Specifications

| | |
|---|---|
| **Operating Voltage Range** | 90-269 VAC |
| **Rated Voltage Range** | 100-240 VAC |
| **Rated Line Frequency** | 50-60 Hz |
| **Operating Line Frequency Range** | 47-63 Hz |
| **Rated Input Current** | 8.2A @ 100-240V |
| **Heat Dissipation** | Typical: 1598.101 btu/hr (402.984 kcal/hr)<br>Maximum: 1619.608 btu/hr (408.407 kcal/hr) |
| **ENERGY STAR® certified** (Config Dependent) | Yes |
| **CECP Compliant @ 220V** | Yes |
| **FEMP Standby Power Compliant** | Yes, with Wake-on-LAN disabled: <1W in S4/S5 - –ower Off |
| **Built-in Self Test** (BIST) **LED** | Yes |
| **Surge Tolerant Full Ranging Power Supply** (withstands power surges up to 2000V) | Yes |
| **Hood Lock Header** | Yes |
| **ErP Lot 6- Tier 1 Compliance @ 230V** (<1W in S5 - –ower Off) | Yes |
| **ErP Lot 6- Tier 2 Compliance @ 230V** (<0.5W in S5 - –ower Off) | Yes |

| **Declared Noise Emissions** (Entry-level, Mid-level, and High-end configurations; tested on floor) | | | |
|---|---|---|---|
| **System Configuration (Mid-level)** | **Processor Info** | Intel® CPU Core i9-12900 16C LGA 2.40G 30 MB 65W ECC (Intel - –lder Lake-S) | |
| | **Memory Info** | 4* 32GB 4800 SK hy24ynixemory | |
| | **Graphics Info** | NVIDIA® RTX A5000 | |
| | **Disks/Optical** | 3*2TB Samsung M.2 SSD; 2*WD 2TB 7200RPM SATA HDD | |
| | **Power Supply** | Chicony 700W EPA92 | |
| **Declared Noise Emissions** | | **Sound Power** (LWAd, bels) | **Deskside Sound Pressure** (LpAm, decibels) |
| | **Idle** | 3.59 | 18.5 |
| | **Hard drive Operating (Drive Random Seek)** | 3.82 | 20.1 |
| | **Hard drive Operating (Active mode)** | 3.97 | 23.6 |
| **System Configuration (High-end)** | **Processor Info** | Intel® Core i9-12900K 16C 3.20G LGA 30 MB 125W ECC (Intel - –lder Lake-S) | |
| | **Memory Info** | 4* 32GB 4800 SK hy24ynixemory | |
| | **Graphics Info** | NVIDIA® RTX A5000 | |
| | **Disks/Optical** | 3*2TB Samsung M.2 SSD; 2*WD 2TB 7200RPM SATA HDD | |
| | **Power Supply** | Chicony 700W EPA92 | |

## System Technical Specifications

| Declared Noise Emissions | | **Sound Power** (LWAd, bels) | **Deskside Sound Pressure** (LpAm, decibels) |
|---|---|---|---|
| | **Idle** | 3.58 | 18.2 |
| | **Hard drive Operating (Drive Random Seek)** | 3.78 | 20 |
| | **Hard drive Operating (Active mode)** | 4.05 | 20.9 |
| | | | |

| | | |
|---|---|---|
| **Environmental Requirements** | **Temperature** | Operating: 5° to 35° C (40° to 95° F)<br>Non-operating: -40° to 60° C (-40° to 140° F)<br>Maximum rate of change: 10°C/hr |
| | **Humidity** | Operating: 10% to 85% RH, non-condensing, 35° C maximum wet bulb<br>Non-operating: 10% to 90% RH, non-condensing, 35° C maximum wet bulb |
| | **Maximum Altitude** | Operating (with Rotational Hard Drives): 3,048 m (10,000 feet)<br>Operating (with only Solid-State Drives): 5,000 m (16,404 feet)<br>Non-operating: 12,192 m (40,000 feet)<br>Maximum operating temperature is reduced as altitude increases. See Cooling for details. |
| | **Dynamic** | Shock<br>Operating: ½-sine: 40g, 2-3ms (~62 cm/sec)<br>Non-operating: ½-sine: 160 cm/s, 2-3ms (~105g)<br>square: 422 cm/s, 20g<br><br>Vibration<br>Operating random: 0.5g (rms), 5-300 Hz, up to 0.0025g²/Hz<br>Non-operating random: 2.0g (rms), 5-500 Hz, up to 0.0150 g²/Hz |
| | **Cooling** | Above 1524 m (5,000 feet) altitude, the maximum operating temperature is reduced by 1° C (1.8° F) for every 305 m (1,000 feet) increase in elevation, up to 3048 m (10,000 feet) |
| | **NOTE:** | System enduring or operating beyond the environmental requirement range is not recommended and may compromise system reliability permanently. |

System Technical Specifications

## Physical Security and Serviceability

| | |
|---|---|
| **Access Panel** | Tool-less<br>Includes support information |
| **Optical Drive** | Tool-less, except for Screw-In carrier |
| **Hard Drives** | Tool-less, except for 2.5” ”bay |
| **Expansion Cards** | Tool-less |
| **Processor Socket** | Tool-less, except for the processor heatsink |
| **Blue User Touch Points** | Yes, on tool-less internal chassis mechanisms |
| **Color-coordinated Cables and Connectors** | Yes |
| **Memory** | Tool-less |
| **System Board** | Screw-In |
| **Padlock Support** | Yes (optional): Locks side cover and secures chassis from theft<br>0.22-in diameter padlock loop at rear of system |
| **Cable Lock Support** | Yes, Kensington Cable Lock (optional): Locks side cover and secures chassis from theft<br>3 mm x 7 mm slot at rear of system |
| **Universal Chassis Clamp Lock Support** | Yes (optional): Locks side cover and locks cables to chassis. Secures chassis from theft and allows multiple units to be chained together when used with optional cable<br>Threaded feature at rear of system |
| **Solenoid Lock and Hood Sensor** | Yes (optional)<br>The Solenoid Hood Lock eliminates the need for a physical key by making the chassis lockable through software and a password. You can also lock and unlock the chassis remotely over the network. The Sensor Kit detects when the access panel has been removed. |
| **Rear Port Control Cover** | No |
| **CPUs and Heatsinks** | A T-15 Torx or flat blade screwdriver is needed to remove the CPU heatsink before the CPU can be removed. CPU removal is tool-less |
| **Internal Speaker** | Yes |
| **Power Supply Fans** | 70mm x 70mm x 25mm 4-wire PWM (non-serviceable) |
| **Access Panel Key Lock** | No |
| **Integrated Chassis Handles** | Rear Recessed Handle |
| **Power Supply** | Requires T15 Torx or flat blade screwdriver |
| **PCI Card Retention** | Yes, rear (all), middle (optional), front (full-length cards with extender) |

## Service, Support, and Warranty

On-site Warranty and Service[1]: Three-years, limited warranty and service offering delivers on-site, next business-day[2] service for parts and labor and includes free telephone support[3] 8am - –pm. Global coverage[2] ensures that any product purchased in one country and transferred to another, non-restricted country will remain fully covered under the original warranty and service offering. 24/7 operation will not void the HP warranty. Storage devices are not covered under warranty for 24/7 operation except for Enterprise class HDDs.

**NOTE 1:** Terms and conditions may vary by country. Certain restrictions and exclusions apply.
**NOTE 2:** On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.
**NOTE 3:** Technical telephone support applies only to HP-configured, HP and HP-qualified, third-party hardware and software. Toll-free calling and 24x7 support service may not be available in some countries.
HP Care Pack Services extend service contracts beyond the standard warranties. Service starts from date of hardware purchase. To choose the right level of service for your HP product, use the HP Care Pack Services Lookup Tool at:

System Technical Specifications

http://www.hp.com/go/lookuptool. Service levels and response times for HP Care Packs may vary depending on your geographic location.

**Certification and Compliance**

Environmental Sustainability questions concerning:

- Ecolabels (EPEAT, TCO, etc.)
- ENERGY STAR, California Energy Commission (CEC)
- Compliance with Environmental legislation (EU ErP, China CECP, EU RoHS and other countries)
- Supply Chain Social Environmental Responsibility (SER) (conflict minerals; human rights, etc.)
- Product specific environmental features (material content, packaging content, recycled content, etc.)
- China Energy Label (CEL)
-

Please contact sustainability@hp.com

For country specific Regulatory Compliance approval documents or Regulatory and Safety questions concerning:

- Declarations of Conformity (for self-service, go to https://www.hp.com/uk-en/certifications/technical/regulations-certificates.html?jumpid=ex_r135_uk/en/any/corp/hpuk-mu_chev/certificates)
- GS Certificates
- Product Safety Certificates (UL, CB, BIS, etc.)
- EMC Certificates, Declarations of Conformity, or Certificates of Conformity (CE, FCC, ICES, etc.)
- CCC Certificates
- Ergonomics
-

Please contact techregshelp@hp.com

## BIOS

| | |
|---|---|
| **BIOS 64-bit Services** | BIOS supports 64-bit Operating systems only. |
| **PCI 3.0 Support** | Full BIOS support for PCI Express through industry standard interfaces. |
| **ATAPI** | ATAPI Removable Media Device BIOS Specification Version 1.0. |
| **BBS** | BIOS Boot Specification v1.01.(Not support) |
| **WMI Support** | WMI is Microsoft's'implementation of Web-Based Enterprise Management (WBEM) for Windows. WMI is fully compliant with the Distributed Management Task Force (DMTF) Common Information Model (CIM) and WBEM specifications. |
| **BIOS Boot Spec 1.01+** | Provides more control over how and from what devices the workstation will boot.(Not Support) |
| **BIOS Power On** | Users can define a specific date and time for the system to power on. |
| **ROM Based Computer Setup Utility (F10)** | Review and customize system configuration settings controlled by the BIOS. |
| **System/Emergency ROM Flash Recovery with Video** | Recovers system BIOS in corrupted Flash ROM. |
| **Replicated Setup** | Saves BIOS settings to USB flash device in human readable file (HpSetup.txt). BiosConfigurationUtility.exe utility can then replicate these settings on machines being deployed without entering Computer Configuration Utility (F10 Setup). |
| **SMBIOS** | System Management BIOS 3.4, for system management information. |
| **Boot Control** | Disables the ability to boot from removable media on supported devices. |
| **Memory Change Alert** | Alerts management console if memory is removed or changed. |
| **Thermal Alert** | Monitors the temperature state within the chassis. Three modes:<br>• NORMAL - –ormal temperature ranges.<br>• ALERTED - –xcessive temperatures are detected. Raises a flag so action can be taken to avoid |

## System Technical Specifications

| | |
|---|---|
| | shutdown or provide for a smoother system shutdown.<br>• SHUTDOWN - –xcessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs. |
| **Remote ROM Flash** | Provides secure, fail-safe ROM image management from a central network console. |
| **ACPI (Advanced Configuration and Power Management Interface)** | Allows the system to enter and resume from low power modes (sleep states).<br>Enables an operating system to control system power consumption based on the dynamic workload.<br>Makes it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system.<br>Supports ACPI 6.0 for full compatibility with 64-bit operating systems. |
| **Ownership Tag** | A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen. |
| **Remote Wakeup/Remote Shutdown** | System administrators can power on, restart, and power off a client computer from a remote location. |
| **Instantly Available PC (Suspend to RAM - –CPI sleep state S3)** | Allows for very low power consumption with quick resume time. |
| **Remote System Installation via F12 (PXE 2.1) (Remote Boot from Server)** | Allows a new or existing system to boot over the network and download software, including the operating system. |
| **ROM revision levels** | Reports the system BIOS revision level in Computer Configuration Utility (F10 Setup). Version is available through an industry standard interface (SMBIOS and WMI) so that management SW applications can use and report this information. |
| **System board revision level** | Allows management SW to read revision level of the system board.<br>Revision level is digitally encoded into the HW and cannot be modified. |
| **Start-up Diagnostics (Power-on Self-Test)** | Assesses system health at boot time with selectable levels of testing. |
| **Auto Setup when new hardware installed** | System automatically detects addition of new hardware. |
| **Keyboard-less Operation** | The system can be booted without a keyboard. |
| **Localized ROM Setup** | Common BIOS image supports System Configuration Utility (F10 Setup) menus in 15 languages with local keyboard mappings. |
| **Asset Tag** | The user or MIS to set a unique tag string in non-volatile memory. |
| **Per-slot Control** | Allows I/O slot parameters (option ROM enable/disable, bus latency) to be configured individually. |
| **Adaptive Cooling** | Control parameters are set according to detected hardware configuration for optimal acoustics. |
| **Pre-boot Diagnostics** | (Pre-video) critical errors are reported via beeps and blinks on the power LED. |
| **UEFI Specification Revision** | 2.7 |
| **ACPI** | Advanced Configuration and Power Management Interface, Version 6.0 |
| **ATA (IDE)** | AT Attachment 6 with Packet Interface (ATA/ATAPI-6), Revision 3b |
| **CD Boot** | “E“ Torito” ”ootable CD-ROM Format Specification Version 1.0 |
| **EDD** | Enhanced Disk Drive Specification Version 1.1<br>BIOS Enhanced Disk Drive Specification Version 3.0(Not support) |
| **EHCI** | Enhanced Host Controller Interface for Universal Serial Bus, Revision 1.0 |
| **PCI** | PCI Local Bus Specification, Revision 2.3<br>PCI Power Management Specification, Revision 1.1<br>PCI Firmware Specification, Revision 3.0, Draft .7 |
| **PCI Express** | PCI Express Base Specification, Revision 2.0<br>PCI Express Base Specification, Revision 3.0<br>PCI Express Base Specification, Revision 4.0<br>PCI Express Base Specification, Revision 5.0 Ready |
| **PMM** | POST Memory Manager Specification, Version 1.01 |

## System Technical Specifications

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|---|---|
| **SATA** | Serial ATA Specification, Revision 1.0a<br>Serial ATA 3 Gb/s: Serial ATA Specification, Revision 2.5<br>Serial ATA 6 Gb/s: Serial ATA Specification, Revision 3.0 |
| **SPD** | JEDEC JESD300-5 |
| **TPM** | Trusted Computing Group TPM Specification Version 2.0 (Infineon SLB 9670).<br>Common Criteria EAL4+ certified.<br>FIPS 140-2 Certification<br>TCG TPM Certified products list:<br>http://www.trustedcomputinggroup.org/certification/tpm-certified-products/ |
| **UHCI** | Universal Host Controller Interface Design Guide, Revision 1.1 |
| **USB** | Universal Serial Bus Revision 1.1 Specification<br>Universal Serial Bus Revision 2.0 Specification<br>Universal Serial Bus Revision 3.1 Specification<br>Universal Serial Bus Revision 3.2 Specification |
| **SMBIOS** | System Management BIOS Reference Specification, Version 3.4<br><br>External BIOS simulator found at: http://csrsml.itcs.hp.com/ |

## Social and Environmental Responsibility

**Eco-Label Certifications & Declarations**

This product is low halogen except for HP Z Turbo Quad Pro PCIe TLC SSD, CRU QX 428 & QX448 removable storage frames, ConnectX-6 DX Amphenol 10 & 25 Gb Transceivers, power cords, cables, and peripherals. Service parts obtained after purchase may not be Low Halogen.

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

- IT ECO declaration
- US ENERGY STAR®
- US Federal Energy Management Program (FEMP)
- EPEAT® Gold with Climate+ registered. See www.epeat.net for registration status and tier levels by country
- TCO Certified
- China Energy Conservation Program (CECP)
- China State Environmental Protection Administration (SEPA)
- Taiwan Green Mark
- Korea Eco-label
- Japan PC Green label*

**Sustainable Impact Specifications**

- Product Carbon Footprint (hp.com)
- Ocean-bound plastic in System FAN, CPU FAN and Speaker
- 50% post-consumer recycled plastic
- Low halogen
- Outside Box and corrugated cushions are 100% sustainably sourced and recyclable
- Molded Paper Pulp Cushion inside box is 100% sustainably sourced and recyclable

**System Configuration**

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

| **Energy Consumption (in accordance with US ENERGY STAR® test method)** | **115VAC, 60Hz** | **230VAC, 50Hz** | **100VAC, 50Hz** |
|---|---|---|---|

## System Technical Specifications

| | | | |
|---|---|---|---|
| Normal Operation (Sort idle) | 34.16 W | 34.01 W | 34.39 W |
| Normal Operation (Long idle) | 32.77 W | 32.74 W | 33.15 W |
| Sleep | 2.57 W | 2.54 W | 2.57 W |
| Off | 0.67 W | 0.68 W | 0.67 W |

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

| **Heat Dissipation*** | **115VAC, 60Hz** | **230VAC, 50Hz** | **100VAC, 50Hz** |
|---|---|---|---|
| Normal Operation (Short idle) | 116.8 BTU/hr | 116.3 BTU/hr | 117.6 BTU/hr |
| Normal Operation (Long idle) | 112.1 BTU/hr | 112 BTU/hr | 113.4 BTU/hr |
| Sleep | 8.8 BTU/hr | 8.7 BTU/hr | 8.8 BTU/hr |
| Off | 2.3 BTU/hr | 2.3 BTU/hr | 2.3 BTU/hr |

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

**Longevity and Upgrading**

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

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

**Additional Information**

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC.
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold level, see www.epeat.net
- Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.
- This product is 94.8% recycle-able when properly disposed of at end of life.

**Packaging Materials**

| | | |
|---|---|---|
| **External:** | PAPER/Corrugated | 1214 g |
| | PAPER/Molded Pulp | 890 g |
| **Internal:** | PLASTIC/Polyethylene low density - – DPE | 40 g |

The plastic packaging material contains at least 0.0% recycled content.

The corrugated paper packaging materials contains at least 62.5% recycled content.

**RoHS Compliance**

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

## System Technical Specifications

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

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

To obtain a copy of the HP RoHS Compliance Statement, see HP RoHS position statement.

**Material Usage**

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

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants – may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Bis(2-Ethylhexyl) phthalate (DEHP)
- Benzyl butyl phthalate (BBP)
- Dibutyl phthalate (DBP)
- Diisobutyl phthalate (DIBP)
- 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 offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/go/reuse-recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

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

**HP, Inc. Corporate Environmental Information**

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

Global Citizenship Report
http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html
Eco-label certifications
http://www8.hp.com/us/en/hp-information/environment/ecolabels.html
ISO 14001 certificates:
http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842
and
http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf

**footnotes**

- Percentage of ocean-bound plastic contained in each component varies by product
- Recycled plastic content percentage is based on the definition set in the IEEE 1680.1-2018 standard.
- External power supplies, WWAN modules, power cords, cables and peripherals excluded.
- 100% outer box packaging and corrugated cushions made from sustainably sourced certified and recycled fibers.
- Fiber cushions made from 100% recycled wood fiber and organic materials.

## Technical Specifications - Hard Drives

| | | | | |
|---|---|---|---|---|
| **SATA Hard Drives for HP Workstations** | **500GB SATA 7200 rpm 6Gb/s 3.5" "DD** | **Capacity** | 500GB | |
| " | | **Protocol** | SATA | |
| | | **Controller** | AHCI | |
| | | **Height** | 1 in; 2.54 cm | |
| | | **Width** | **Media Diameter** | 3.5 in; 8.9 cm |
| | | | **Physical Size** | 4 in; 10.17 cm |
| | | **Interface** | Serial ATA (6.0Gb/s), NCQ enabled | |
| | | **Synchronous Transfer Rate** (Maximum) | Up to 600MB/s * | |
| | | **Buffer** | 32MB | |
| | | **Seek Time** (typical reads, includes controller overhead, including settling) | **Single Track** | 2 ms * |
| | | | **Average** | 11 ms * |
| | | | **Full Stroke** | 21 ms * |
| | | **Rotational Speed** | 7,200 rpm | |
| | | **Logical Blocks** | 976,773,168 | |
| | | **Operating Temperature** | 41° to 131° F (5° to 55° C) | |

*Actual performance may vary.

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

| | | | | |
|---|---|---|---|---|
| | **1TB SATA 7200 rpm 6Gb/s 3.5" "DD** | **Capacity** | 1TB | |
| | | **Protocol** | SATA | |
| " | | **Controller** | AHCI | |
| | | **Height** | 1 in; 2.54 cm | |
| | | **Width** | **Media Diameter** | 3.5 in; 8.9 cm |
| | | | **Physical Size** | 4 in; 10.17 cm |
| | | **Interface** | Serial ATA (6.0Gb/s), NCQ enabled | |
| | | **Synchronous Transfer Rate** (Maximum) | Up to 600 MB/s * | |
| | | **Buffer** | 64MB | |
| | | **Seek Time** (typical reads, includes controller overhead, including settling) | **Single Track** | 2 ms * |
| | | | **Average** | 11 ms * |
| | | | **Full Stroke** | 21 ms * |
| | | **Rotational Speed** | 7,200 rpm | |
| | | **Logical Blocks** | 1,953,525,168 | |
| | | **Operating Temperature** | 41° to 131° F (5° to 55° C) | |

*Actual performance may vary.

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

| | | | | |
|---|---|---|---|---|
| | **2TB SATA 7200 rpm 6Gb/s 3.5" "DD** | **Capacity** | 2TB | |
| | | **Protocol** | SATA | |
| " | | **Controller** | AHCI | |
| | | **Annualized Failure Rate (based on Rated POH)** | <0.62% | |
| | | **Height** | 1 in; 2.54 cm | |
| | | **Width** | **Media Diameter** | 3.5 in; 8.9 cm |

| | | | |
|---|---|---|---|
| | | **Physical Size** | 4 in; 10.17 cm |
| | **Interface** | Serial ATA (6.0 Gb/s), NCQ Enabled | |
| | **Synchronous Transfer Rate** (Maximum) | Up to 600MB/s * | |
| | **Buffer** | 64MB | |
| | **Seek Time** (typical reads, includes controller overhead, including settling) | **Single Track** | 2.0 ms * |
| | | **Average** | 11 ms * |
| | | **Full Stroke** | 21 ms * |
| | **Rotational Speed** | 7,200 rpm | |
| | **Logical Blocks** | 3,907,029,168 | |
| | **Operating Temperature** | 41° to 131° F (5° to 55° C) | |

*Actual performance may vary.

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

| | | | |
|---|---|---|---|
| **1TB SATA 7200 rpm 6Gb/s 3.5" "DD (Enterprise Class)** | **Capacity** | 1TB | |
| | **Height** | 1 in; 2.54 cm | |
| | **Protocol** | SATA | |
| | **Controller** | AHCI | |
| | **Reliability** | 2.0M hours | |
| | **Rated Power On Hours** | 8760/yr | |
| | **Annualized Failure Rate (based on Rated POH)** | <0.62% | |
| | **Width** | **Media Diameter** | 3.5 in; 8.9 cm |
| | | **Physical Size** | 4 in; 10.17 cm |
| | **Interface** | Serial ATA (6.0 Gb/s), NCQ Enabled | |
| | **Synchronous Transfer Rate** (Maximum) | Up to 600MB/s * | |
| " | **Buffer** | 128MB | |
| | **Seek Time** (typical reads, includes controller overhead, including settling) | **Single Track** | 0.32ms* |
| | | **Average** | 7.45ms* |
| | | **Full Stroke** | 14.2ms* |
| | **Rotational Speed** | 7,200 rpm | |
| | **Operating Temperature** | 41° to 140° F (5° to 60° C) | |
| | **Performance** | **Sequential Read** | up to 226MB/s* |
| | | **Sequential Write** | up to 226MB/s* |
| | **Enterprise Class Features** | High Reliability | |

*Actual performance may vary.

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

| | | |
|---|---|---|
| **2TB SATA 7200 rpm 6Gb/s 3.5" "DD (Enterprise Class)** | **Capacity** | 2TB |
| | **Protocol** | SATA |
| | **Controller** | AHCI |
| " | **Reliability (MTBF)** | 2.0M hours |
| | **Rated Power On Hours** | 8760/yr |

Technical Specifications - Hard Drives

| | | |
|---|---|---|
| **Annualized Failure Rate** (based on Rated POH) | <0.62% | |
| **Rated for 24/7/365 Operation** | | |
| **Physical Size** (Height) | 1 in; 2.54 cm | |
| **Physical Size** (Width) | 4 in; 10.17 cm | |
| **Media Diameter** | 3.5 in; 8.9 cm | |
| **Interface** | Serial ATA (6Gb/s), NCQ enabled | |
| **Synchronous Transfer Rate** (Maximum) | Up to 600MB/s* | |
| **Buffer** | 128MB | |
| **Seek Time** (typical reads, includes controller overhead, including settling) | **Single Track** | 0.7ms* |
| | **Average** | 8.5ms* |
| | **Full Stroke** | 15.7ms* |
| **Rotational Speed** | 7,200 rpm | |
| **Operating Temperature** | 41° to 131° F (5° to 55° C) | |
| **Performance** | **Sequential Read** | up to 226MB/s* |
| | **Sequential Write** | up to 226MB/s* |
| **Enterprise Class Features** | High Reliability | |

*Actual performance may vary.

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

”

| | | | |
|---|---|---|---|
| **4TB SATA 7200 rpm 6Gb/s 3.5” ”DD (Enterprise Class)** | **Capacity** | 4TB | |
| | **Protocol** | SATA | |
| | **Controller** | AHCI | |
| | **Reliability** | 2.0M hours | |
| | **Rated Power On Hours** | 8760/yr | |
| | **Annualized Failure Rate** (based on Rated POH) | <0.62% | |
| | **Rated for 24/7/365 Operation** | | |
| | **Physical Size** (Height) | 1 in; 2.54 cm | |
| | **Physical Size** (Width) | 4 in; 10.17 cm | |
| | **Media Diameter** | 3.5 in; 8.9 cm | |
| | **Physical Size** | 4 in; 10.17 cm | |
| | **Interface** | Serial ATA (6Gb/s), NCQ enabled | |
| | **Synchronous Transfer Rate** (Maximum) | Up to 600MB/s* | |
| | **Buffer** | 256MB | |
| | **Seek Time** (typical reads, includes controller overhead, including settling) | **Single Track** | 0.7ms* |
| | | **Average** | 8.5ms* |
| | | **Full Stroke** | 15.7ms* |
| | **Rotational Speed** | 7,200 rpm | |
| | **Operating Temperature** | 41° to 131° F (5° to 55° C) | |

## Technical Specifications - Hard Drives

| | | | |
|---|---|---|---|
| | **Performance** | **Sequential Read** | up to 226MB/s* |
| | | **Sequential Write** | up to 226MB/s* |
| | **Enterprise Class Features** | High Reliability | |

*Actual performance may vary.

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

| | | | |
|---|---|---|---|
| **8TB SATA 7200 rpm 6Gb/s 3.5" "DD (Enterprise Class)** | **Capacity** | 8TB | |
| | **Protocol** | SATA | |
| | **Controller** | AHCI | |
| | **Reliability** | 2.0M hours | |
| | **Width** | **Media Diameter** | 3.5 in; 8.9 cm |
| | | **Physical Size** | 4 in; 10.17 cm |
| | **Interface** | Serial ATA (6.0Gb/s), NCQ enabled | |
| | **Synchronous Transfer Rate** (Maximum) | Up to 600MB/s [1] | |
| | **Buffer** | 256MB | |
| | **Seek Time** (typical reads, includes controller overhead, including settling) | **Single Track** | 0.7ms* |
| | | **Average** | 8.5ms* |
| | | **Full Stroke** | 15.7ms* |
| | **Rotational Speed** | 7,200 rpm | |
| | **Operating Temperature** | 41° to 140° F (5° to 60° C) | |
| | **Performance** | **Sequential Read** | up to 226MB/s[1] |
| | | **Sequential Write** | up to 226MB/s[1] |
| | **Enterprise Class Features** | High Reliability | |

"

*Actual performance may vary.

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

| | | | |
|---|---|---|---|
| **500GB SATA 7.2K SED 2.5" "DD** | **Capacity** | 500GB | |
| | **Protocol** | SATA | |
| | **Height** | 0.275 in; 0.7 cm | |
| | **Width** | Media Diameter | 2.5 in; 6.36 cm |
| | | Physical Size | 2.75 in; 6.99 cm |
| | **Interface** | Serial ATA (6.0Gb/s), NCQ enabled | |
| | **Synchronous Transfer Rate** (Maximum) | Up to 600MB/s* | |
| | **Buffer** | 64MB | |
| | **Seek Time** (typical reads, includes controller overhead, including settling) | **Single Track** | 1ms* |
| | | **Average** | 4.2ms* |
| | | **Full Stroke** | 25ms (Typical)* |
| | **Rotational Speed** | 7,200 rpm | |
| | **Operating Temperature** | 32° to 131° F (0° to 60° C) | |
| | **Self-Encrypting Drive Support** | Yes | |

"

## Technical Specifications - Hard Drives

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

| | | | |
|---|---|---|---|
| **HP Z Turbo Drv PCIE-4X4 512GB TLC PCIe SSD (Z2G9)** | **Capacity** | 512GB | |
| | **Protocol** | PCIe | |
| | **Form Factor** | M.2 in native Slot on motherboard | |
| | **Controller** | NVMe | |
| | **NAND Type** | 3D TLC | |
| | **Endurance** | 150TBW (TB Written) | |
| | **Reliability** (MTBF) | 1.5M hours | |
| | **Interface** | PCI Express 4.0 x4 electrical | |
| | **Operating Temperature** | 32° to 178° F (0° to 81° C) | |
| | **Performance** | **Sequential Read** | 6400MB/s* |
| | | **Sequential Write** | 3400MB/s* |
| | | **Random Read** | 600K IOPS* |
| | | **Random Write** | 600K IOPS* |

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

| | | | |
|---|---|---|---|
| **HP Z Turbo Drv PCIE-4X4 1TB TLC PCIe SSD (Z2G9)** | **Capacity** | 1TB | |
| | **Protocol** | PCIe | |
| | **Form Factor** | M.2 in native Slot on motherboard | |
| | **Controller** | NVMe | |
| | **NAND Type** | 3D TLC | |
| | **Endurance** | 300TBW (TB Written) | |
| | **Reliability** | 1.5M Hours | |
| | **Interface** | PCI Express 4.0 x4 electrical | |
| | **Operating Temperature** | 32° to 178° F (0° to 81° C) | |
| | **Performance** | **Sequential Read** | 6500MB/s* |
| | | **Sequential Write** | 5000MB/s* |
| | | **Random Read** | 800K IOPS* |
| | | **Random Write** | 800K IOPS* |

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

| | | |
|---|---|---|
| **HP Z Turbo Drv PCIE-4X4 2TB TLC PCIe SSD (Z2G9)** | **Capacity** | 2TB |
| | **Protocol** | PCIe |
| | **Form Factor** | M.2 in native Slot on motherboard |
| | **Controller** | NVMe |
| | **NAND Type** | 3D TLC |
| | **Endurance** | 500TBW (TB Written) |
| | **Reliability** | 1.5M Hours |
| | **Interface** | PCI Express 4.0 x4 electrical |

| | | | |
|---|---|---|---|
| | **Operating Temperature** | 32° to 178° F (0° to 81° C) | |
| | **Performance** | **Sequential Read** | 6500MB/s* |
| | | **Sequential Write** | 5000MB/s* |
| | | **Random Read** | 800K IOPS* |
| | | **Random Write** | 800K IOPS* |

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

| | | | |
|---|---|---|---|
| **HP Z Turbo Drv PCIE-4X4 4TB TLC PCIe SSD** | **Capacity** | 4TB | |
| | **Protocol** | PCIe | |
| | **Form Factor** | M.2 in native Slot on motherboard | |
| | **Controller** | NVMe | |
| | **NAND Type** | 3D TLC | |
| | **Endurance** | 600TBW (TB Written) | |
| | **Reliability** (MTBF) | 1.5M Hours | |
| | **Interface** | PCI Express 4.0 x4 electrical | |
| | **Operating Temperature** | 32° to 178° F (0° to 81° C) | |
| | **Performance** | **Sequential Read** | 6500MB/s* |
| | | **Sequential Write** | 5000MB/s* |
| | | **Random Read** | 700K IOPS* |
| | | **Random Write** | 700K IOPS* |

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

| | | | |
|---|---|---|---|
| **HP Z Turbo Drv PCIE Gen4x4 4TB TLC PCIe SED OPAL2** | **Capacity** | 4TB | |
| | **Protocol** | PCIe | |
| | **Form Factor** | M.2 in native Slot on motherboard | |
| | **Controller** | NVMe | |
| | **NAND Type** | 3D TLC | |
| | **Endurance** | 600TBW (TB Written) | |
| | **Interface** | PCI Express 4.0 x4 electrical | |
| | **Operating Temperature** | 32° to 178° F (0° to 81° C) | |
| | **Performance** | **Sequential Read** | 6500MB/s* |
| | | **Sequential Write** | 5000MB/s* |
| | | **Random Read** | 700K IOPS* |
| | | **Random Write** | 700K IOPS* |
| | **Self-Encrypting Drive Support** | OPAL2 | |

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

| | | |
|---|---|---|
| **HP Z Turbo Drv 512GB** | **Capacity** | 512GB |
| | **Protocol** | PCIe |

## Technical Specifications - Hard Drives

| | | | |
|---|---|---|---|
| **TLC PCIe SED OPAL2 (Z2G9)** | **Form Factor** | M.2 in native Slot on motherboard | |
| | **Controller** | NVMe | |
| | **NAND Type** | 3D TLC | |
| | **Endurance** | 150TBW (TB Written) | |
| | **Reliability** | 1.5M Hours | |
| | **Interface** | PCI Express 4.0 x4 electrical | |
| | **Operating Temperature** | 32° to 178° F (0° to 81° C) | |
| | **Performance** | **Sequential Read** | 6400MB/s* |
| | | **Sequential Write** | 3400MB/s* |
| | | **Random Read** | 600K IOPS* |
| | | **Random Write** | 600K IOPS* |
| | **Self-Encrypting Drive Support** | OPAL2 | |

*Actual performance may vary.

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

| | | | |
|---|---|---|---|
| **HP Z Turbo Drv 1TB TLC PCIe SED OPAL2 (Z2G9)** | **Capacity** | 1TB | |
| | **Protocol** | PCIe | |
| | **Form Factor** | M.2 in native Slot on motherboard | |
| | **Controller** | NVMe | |
| | **NAND Type** | 3D TLC | |
| | **Endurance** | 300TBW (TB Written) | |
| | **Reliability** | 1.5M Hours | |
| | **Interface** | PCI Express 4.0 x4 electrical | |
| | **Operating Temperature** | 32° to 178° F (0° to 81° C) | |
| | **Performance** | **Sequential Read** | 6500MB/s* |
| | | **Sequential Write** | 5000MB/s* |
| | | **Random Read** | 800K IOPS* |
| | | **Random Write** | 800K IOPS* |
| | **Self-Encrypting Drive Support** | OPAL2 | |

*Actual performance may vary.

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

| | | | |
|---|---|---|---|
| **HP Z Turbo Drv 2TB TLC PCIe SED OPAL2 (Z2G9)** | **Capacity** | 2TB | |
| | **Protocol** | PCIe | |
| | **Form Factor** | M.2 in native Slot on motherboard | |
| | **Controller** | NVMe | |
| | **NAND Type** | 3D TLC | |
| | **Endurance** | 500TBW (TB Written) | |
| | **Reliability** | 1.5M Hours | |
| | **Interface** | PCI Express 4.0 x4 electrical | |
| | **Operating Temperature** | 32° to 178° F (0° to 81° C) | |
| | **Performance** | **Sequential Read** | 6500MB/s* |

| | | | |
|---|---|---|---|
| | | **Sequential Write** | 5000MB/s* |
| | | **Random Read** | 800K IOPS* |
| | | **Random Write** | 800K IOPS* |
| | **Self-Encrypting Drive Support** | OPAL2 | |

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

| | | | |
|---|---|---|---|
| **256GB 2280 PCIe-4x4 Value M.2 SSD** | **Capacity** | 256GB | |
| | **Protocol** | PCIe | |
| | **Form Factor** | M.2 in native Slot on motherboard | |
| | **Controller** | NVMe | |
| | **NAND Type** | 3D TLC | |
| | **Endurance** | 150TBW (TB Written) | |
| | **Reliability** | 1.5M Hours | |
| | **Interface** | PCI Express 4.0 x4 electrical | |
| | **Operating Temperature** | 32° to 158° F (0° to 70° C) | |
| | **Performance** | **Sequential Read** | 3100MB/s* |
| | | **Sequential Write** | 1400MB/s* |
| | | **Random Read** | 200K IOPS* |
| | | **Random Write** | 400K IOPS* |

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

| | | | |
|---|---|---|---|
| **512GB 2280 PCIe-4x4 Value M.2 SSD** | **Capacity** | 512GB | |
| | **Protocol** | PCIe | |
| | **Form Factor** | M.2 in native Slot on motherboard | |
| | **Controller** | NVMe | |
| | **NAND Type** | 3D TLC | |
| | **Endurance** | 300TBW (TB Written) | |
| | **Reliability** | 1.5M Hours | |
| | **Interface** | PCI Express 4.0 x4 electrical | |
| | **Operating Temperature** | 32° to 158° F (0° to 70° C) | |
| | **Performance** | **Sequential Read** | 3400MB/s* |
| | | **Sequential Write** | 2500MB/s* |
| | | **Random Read** | 380K IOPS* |
| | | **Random Write** | 430K IOPS* |

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

| | | |
|---|---|---|
| **1TB 2280 PCIe-4x4 Value M.2 SSD** | **Capacity** | 1TB |
| | **Protocol** | PCIe |
| | **Form Factor** | M.2 in native Slot on motherboard |
| | **Controller** | NVMe |

## Technical Specifications - Hard Drives

| | | |
|---|---|---|
| **NAND Type** | 3D TLC | |
| **Endurance** | 400TBW (TB Written) | |
| **Reliability** | 1.5M Hours | |
| **Interface** | PCI Express 4.0 x4 electrical | |
| **Operating Temperature** | 32° to 158° F (0° to 70° C) | |
| **Performance** | **Sequential Read** | 3400MB/s* |
| | **Sequential Write** | 2500MB/s* |
| | **Random Read** | 500K IOPS* |
| | **Random Write** | 440K IOPS* |

*Actual performance may vary.

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

## Technical Specifications - Graphics

| | | |
|---|---|---|
| **AMD Radeon™ Pro W6600 8GB Graphics** | **Form Factor** | Single slot, full-height, 9.5” length |
| | **Graphics Controller** | Navi23 architecture<br>Power: 122 Watts<br>Cooling Solution: Active Fan Heatsink |
| | **Bus Type** | PCI Express 4.0 x8 |
| | **Memory** | 8GB GDDR6 Memory<br>Memory Bandwidth: 224 GB/s<br>Memory Interface: 128 bit |
| | **Connectors** | 4x DisplayPort™ 1.4 with DSC<br>- HDR Ready<br>- Supports Multi-Stream Transport (MST) |
| | **Max simultaneous displays** | @ 60Hz with HDR Enabled<br>4x @ 3840x2160px (4K)<br>4x @ 5120x2880px (5K)<br>1x @ 7680x4320px (8K) |
| | **Shading Architecture** | DirectX 12 Shader Model 6.5 |
| | **Supported Graphics APIs** | DirectX®12 Ultimate<br>OpenGL® 4.6<br>OpenCL™ 2.1<br>Vulkan™ 1.2 |
| | **Available Graphics Drivers** | Windows 10 64-bit<br>Windows 11 64-bit<br>Linux® 64-bit (selected Enterprise distributions)<br><br>HP qualified drivers may be preloaded or available from the HP support Web site:<br>http://welcome.hp.com/country/us/en/support.html |
| **AMD Radeon™ Pro W6800 32GB Graphics** | **Form Factor** | Double slot, full-height, 10.5” length |
| | **Graphics Controller** | Navi21 architecture<br>Power: 261 Watts<br>Cooling Solution: Active Fan Heatsink |
| | **Bus Type** | PCI Express 4.0 x16 |
| | **Memory** | 8GB GDDR6 Memory<br>Memory Bandwidth: 512 GB/s<br>Memory Interface: 256 bit |
| | **Connectors** | 6x Mini-DisplayPort™ 1.4 with DSC<br>- HDR Ready<br>- Supports Multi-Stream Transport (MST) |
| | **Max simultaneous displays** | @ 60Hz with HDR Enabled<br>6x @ 3840x2160px (4K)<br>6x @ 5120x2880px (5K)<br>2x @ 7680x4320px (8K) |
| | **Shading Architecture** | DirectX 12 Shader Model 6.5 |
| | **Supported Graphics APIs** | DirectX®12 Ultimate<br>OpenGL® 4.6<br>OpenCL™ 2.1<br>Vulkan™ 1.2 |

## Technical Specifications - Graphics

| | | |
|---|---|---|
| **NVIDIA® T400 4GB Graphics** | **Form Factor** | Single Slot, Low Profile (2.7" H x 6.1" L) |
| | **Graphics Controller** | Turing architecture<br>Max Power: 30 Watts<br>Cooling Solution: Active fan heatsink |
| | **Bus Type** | PCI Express 3.0 x16 |
| | **Memory** | 4GB GDDR6 Memory<br>Memory Bandwidth: 80 GB/s<br>Memory Interface: 64 bit |
| | **Connectors** | 3x mDP (Mini DisplayPort™ ) 1.4 Connectors |
| | **Max simultaneous displays** | - 3x 3840 x 2160 @ 120Hz<br>- 3x 5120 x 2880 @ 60Hz<br>- supports Multi-Stream Transport (MST) |
| | **Shading Architecture** | DirectX 12 Shader Model 5.1 |
| | **Supported Graphics APIs** | OpenGL 4.6<br>DirectX 12<br>Vulkan 1.2<br>API support includes:<br>CUDA, OpenCL 1.2 |
| | **Available Graphics Drivers** | Windows 10 64-bit<br>Windows 11 64-bit<br>Linux® 64-bit (selected Enterprise distributions)<br><br>HP qualified drivers may be preloaded or available from the HP support Web site:<br>http://welcome.hp.com/country/us/en/support.html |
| **NVIDIA® T600 4GB Graphics*** | **Form Factor** | Single Slot, Low Profile (2.7" H x 6.1" L) |
| | **Graphics Controller** | Turing architecture<br>Max Power: 40 Watts<br>Cooling Solution: Active fan heatsink |
| | **Bus Type** | PCI Express 3.0 x16 |
| | **Memory** | 4GB GDDR6 Memory<br>Memory Bandwidth: 160 GB/s<br>Memory Interface: 128 bit |
| | **Connectors** | 4x mDP (Mini DisplayPort™) 1.4 Connectors |
| | **Max simultaneous displays** | - 4x 3840 x 2160 @ 120Hz<br>- 4x 5120 x 2880 @ 60Hz<br>- 2x 7680 x 4320 @ 60Hz<br>- supports Multi-Stream Transport (MST) |
| | **Shading Architecture** | DirectX 12 Shader Model 5.1 |
| | **Supported Graphics APIs** | OpenGL 4.6<br>DirectX 12<br>Vulkan 1.2<br>API support includes:<br>CUDA, OpenCL 1.2 |
| | **Available Graphics Drivers** | Windows 10 64-bit<br>Windows 11 64-bit<br>Linux® 64-bit (selected Enterprise distributions) |

| | | |
|---|---|---|
| | | HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html |
| | | *May go End of Life in late 2022 |
| **AMD® Radeon™ RX 6400 4GB Graphics** | **Form Factor** | Single slot, Low Profile (2.8" H x 6.3" L )<br>Weight: 155g |
| | **Graphics Controller** | Radeon™ RX 6400<br>Max Power: 53W<br>Cooling Solution: Active axial fan<br>Architecture: RDNA™ 2 |
| | **Bus Type** | PCI Express x4 Gen4 |
| | **Memory** | Size: 4GB GDDR6<br>Interface: 64-bit<br>Bandwidth: up to 128 GB/s |
| | **Connectors** | DP (DisplayPort™ ) 1.4 + HDMI 2.1 |
| | **Max simultaneous displays** | - up to 4x 5120 x 2880 x 24 bpp @ 60Hz |
| | **Shading Architecture** | Microsoft DirectX 12 Shader Model 5.1 |
| | **Supported Graphics APIs** | OpenGL® 4.6<br>DirectX® 12 Ultimate<br>Vulkan™ 1.1<br>API support includes: OpenCL™ 2.2 |
| | **Available Graphics Drivers** | Microsoft Windows 10 64-bit, Windows 11 64-bit<br>HP qualified drivers may be preloaded or the latest prosumer graphics drivers are available from the AMD.com |
| | **Notes** | This is a Prosumer or Consumer graphics card, and not a Professional graphics card. As such, it does not have formal professional application validation, but is intended per AMD to function properly for game development, real-time engine, and many prosumer application workloads. Customers using Prosumer or Consumer graphic cards with axial fan cooling solutions are likely to experience higher acoustics in comparison with Professional graphic cards that use blower fan cooling. |
| **NVIDIA® T1000 4GB Graphics** | **Form Factor** | Single Slot, Low Profile (2.7" H x 6.1" L) |
| | **Graphics Controller** | Turing architecture<br>Max Power: 50 Watts<br>Cooling Solution: Active fan heatsink |
| | **Bus Type** | PCI Express 3.0 x16 |
| | **Memory** | 4GB GDDR6 Memory<br>Memory Bandwidth: 160 GB/s<br>Memory Interface: 128 bit |
| | **Connectors** | 4x mDP (Mini DisplayPort™) 1.4 Connectors |

## Technical Specifications - Graphics

| | | |
|---|---|---|
| | **Max simultaneous displays** | - 4x 3840 x 2160 @ 120Hz<br>- 4x 5120 x 2880 @ 60Hz<br>- 2x 7680 x 4320 @ 60Hz<br>- supports Multi-Stream Transport (MST) |
| | **Shading Architecture** | DirectX 12 Shader Model 5.1 |
| | **Supported Graphics APIs** | OpenGL 4.6<br>DirectX 12<br>Vulkan 1.2<br>API support includes:<br>CUDA, OpenCL 1.2 |
| | **Available Graphics Drivers** | Windows 10 64-bit<br>Windows 11 64-bit<br>Linux® 64-bit (selected Enterprise distributions)<br><br>HP qualified drivers may be preloaded or available from the HP support Web site:<br>http://welcome.hp.com/country/us/en/support.html |
| **NVIDIA® T1000 8GB Graphics** | **Form Factor** | Single Slot, Low Profile (2.7" H x 6.1" L) |
| | **Graphics Controller** | Turing architecture<br>Max Power: 50 Watts<br>Cooling Solution: Active fan heatsink |
| | **Bus Type** | PCI Express 3.0 x16 |
| | **Memory** | 8GB GDDR6 Memory<br>Memory Bandwidth: 160 GB/s<br>Memory Interface: 128 bit |
| | **Connectors** | 4x mDP (Mini DisplayPort™) 1.4 Connectors |
| | **Max simultaneous displays** | - 4x 3840 x 2160 @ 120Hz<br>- 4x 5120 x 2880 @ 60Hz<br>- 2x 7680 x 4320 @ 60Hz<br>- supports Multi-Stream Transport (MST) |
| | **Shading Architecture** | DirectX 12 Shader Model 5.1 |
| | **Supported Graphics APIs** | OpenGL 4.6<br>DirectX 12<br>Vulkan 1.2<br>API support includes:<br>CUDA, OpenCL 1.2 |
| | **Available Graphics Drivers** | Windows 10 64-bit<br>Windows 11 64-bit<br>Linux® 64-bit (selected Enterprise distributions)<br><br>HP qualified drivers may be preloaded or available from the HP support Web site:<br>http://welcome.hp.com/country/us/en/support.html |
| **NVIDIA® RTX™ A2000 12GB Graphics** | **Form Factor** | Low-Profile Double Slot (2.7" H x 6.1" L) |
| | **Graphics Controller** | Ampere architecture<br>Power: 70 Watts<br>Cooling: Active Fan Heatsink |

## Technical Specifications - Graphics

| | | |
|---|---|---|
| | **Bus Type** | PCI Express 4.0 x16 |
| | **Memory** | 12GB GDDR6 memory<br>Memory Bandwidth: 288 GB/s<br>Memory Interface: 192 bit<br>Support Error-correcting code (ECC) |
| | **Connectors** | 4x mDP (Mini DisplayPort™) 1.4 Connectors |
| | **Max simultaneous displays** | 4x 4096 x 2160 @ 120 Hz,<br>4x 5120 x 2880 @ 60 Hz<br>2x 7680 x 4320 @ 60 Hz |
| | **Shading Architecture** | Shader Model 6.5 |
| | **Supported Graphics APIs** | OpenGL 4.6<br>DirectX 12<br>Vulkan 1.2<br>API support includes:<br>CUDA, OpenCL 1.2 |
| | **Available Graphics Drivers** | Windows 10 64-bit<br>Windows 11 64-bit<br>Linux® 64-bit (selected Enterprise distributions)<br><br>HP qualified drivers may be preloaded or available from the HP support Web site:<br>http://welcome.hp.com/country/us/en/support.html |
| **NVIDIA® RTX™ A4000 16GB Graphics** | **Form Factor** | Full Height Single Slot (9.5” Length) |
| | **Graphics Controller** | Ampere architecture<br>Power: 140 Watts<br>Cooling: Active Fan Heatsink |
| | **Bus Type** | PCI Express 4.0 x16 |
| | **Memory** | 16GB GDDR6 memory<br>Memory Bandwidth: 448 GB/s<br>Memory Interface: 256 bit<br>Support Error-correcting code (ECC) |
| | **Connectors** | 4x DP 1.4 Connectors |
| | **Max simultaneous displays** | 4x 4096 x 2160 @ 120 Hz,<br>4x 5120 x 2880 @ 60 Hz,<br>2x 7680 x 4320 @ 60 Hz |
| | **Shading Architecture** | Shader Model 6.5 |
| | **Supported Graphics APIs** | OpenGL 4.6<br>DirectX 12<br>Vulkan 1.2<br>API support includes:<br>CUDA, OpenCL 1.2 |
| | **Available Graphics Drivers** | Windows 10 64-bit<br>Windows 11 64-bit<br>Linux® 64-bit (selected Enterprise distributions)<br><br>HP qualified drivers may be preloaded or available from the HP support Web site:<br>http://welcome.hp.com/country/us/en/support.html |

## Technical Specifications - Graphics

| | | |
|---|---|---|
| **NVIDIA® RTX™ A4500 20GB Graphics** | **Form Factor** | Full Height Double Slot (10.5" Length) |
| | **Graphics Controller** | Ampere architecture<br>Power: 200 Watts<br>Cooling: Active Fan Heatsink |
| | **Bus Type** | PCI Express 4.0 x16 |
| | **Memory** | 20GB GDDR6 memory<br>Memory Bandwidth: 640 GB/s<br>Memory Interface: 320 bit<br>Support Error-correcting code (ECC) |
| | **Connectors** | 4x DP 1.4 Connectors |
| | **Max simultaneous displays** | 4x 4096 x 2160 @ 120 Hz,<br>4x 5120 x 2880 @ 60 Hz,<br>2x 7680 x 4320 @ 60 Hz |
| | **Shading Architecture** | Shader Model 6.5 |
| | **Supported Graphics APIs** | OpenGL 4.6<br>DirectX 12<br>Vulkan 1.2<br>API support includes:<br>CUDA, OpenCL 1.2 |
| | **Available Graphics Drivers** | Windows 10 64-bit<br>Windows 11 64-bit<br>Linux® 64-bit (selected Enterprise distributions)<br><br>HP qualified drivers may be preloaded or available from the HP support Web site:<br>http://welcome.hp.com/country/us/en/support.html |
| **NVIDIA® RTX™ A5000 24GB Graphics** | **Form Factor** | Full Height Double Slot (10.5" Length) |
| | **Graphics Controller** | Ampere architecture<br>Power: 230 Watts<br>Cooling: Active Fan Heatsink |
| | **Bus Type** | PCI Express 4.0 x16 |
| | **Memory** | 24GB GDDR6 memory<br>Memory Bandwidth: 768 GB/s<br>Memory Interface: 384 bit<br>Support Error-correcting code (ECC) |
| | **Connectors** | 4x DP 1.4 Connectors |
| | **Max simultaneous displays** | 4x 4096 x 2160 @ 120 Hz,<br>4x 5120 x 2880 @ 60 Hz,<br>2x 7680 x 4320 @ 60 Hz |
| | **Shading Architecture** | Shader Model 6.5 |
| | **Supported Graphics APIs** | OpenGL 4.6<br>DirectX 12<br>Vulkan 1.2<br>API support includes:<br>CUDA, OpenCL 1.2 |
| | **Available Graphics Drivers** | Windows 10 64-bit<br>Windows 11 64-bit<br>Linux® 64-bit (selected Enterprise distributions) |

| | | |
|---|---|---|
| | | HP qualified drivers may be preloaded or available from the HP support Web site:<br>http://welcome.hp.com/country/us/en/support.html |
| **AMD® Radeon™ Pro W7600 8GB** | **Form Factor** | Full-Height Single Slot (4.38" ”eight x 9.5” ”ength) |
| | **Max Power Consumption** | 130W |
| | **GPU Memory** | 8GB GDDR6<br>Memory Bandwidth: 288 GB/s<br>Memory Width: 128-bit |
| | **Connectors** | 4x DP 2.1<br>Requires : 1x 6-pin PCIe Aux Power |
| | **Maximum Resolution** | 4x @ 3840x2160 (4K)<br>4x @ 5120x2880 (5K)<br>2x @ 7680x4320 (8K) |
| | **Bus Type** | PCI Express 4.0 x8 |
| | **Available Graphics Drivers** | Windows 10<br>Windows 11 |
| **MD® Radeon™ Pro W7500 8GB** | **Form Factor** | Full-Height Single Slot (4.38" ”eight x 8.5" ”ength) |
| | **Max Power Consumption** | 70W |
| | **GPU Memory** | 8 GB GDDR6<br>Memory Bandwidth: 173 GB/s<br>Memory Width: 128-bit |
| | **Connectors** | 4x DP 2.1 |
| | **Maximum Resolution** | 4x @ 3840x2160 (4K)<br>4x @ 5120x2880 (5K)<br>2x @ 7680x4320 (8K) |
| | **Bus Type** | PCI Express 4.0 x8 |
| | **Available Graphics Drivers** | Windows 10<br>Windows 11 |
| **AMD Radeon™ RX 6700 XT** | **Form Factor** | Dual slot, Full Length (254mm L x 38mm W x 108.65mm H) |
| | **Graphics Controller** | AMD Radeon™ RX 6700 XT Graphics<br>GPU: 2560 Navi2 Stream Processors<br>Memory: 12GB GDDR6<br>Power: 230 Watts, Standard graphics 8pin + 6pin auxiliary power<br>Cooling: Active, Dual Axial fan |
| | **Bus Type** | PCI Express 4.0 x16 |
| | **Connectors** | 3DP 1.4 + HDMI 2.1 Outputs |
| | **Maximum Resolution** | DisplayPort™ 1.4 with DSC:<br>- up to 4x 5210 x 3200 x 24 bpp @ 60Hz, uncompressed<br>- up to 7680 x 4320, compressed<br>Display Outputs 3 DP + 1 HMDI |
| | **Shading Architecture** | Microsoft DirectX 12 Shader Model 6.1 |
| | **Supported Graphics APIs** | OpenGL 4.6<br>DirectX 12 Feature Level 12_1<br>Vulkan 1.1<br>OpenCL 2.2 |

## Technical Specifications - Graphics

| | | |
|---|---|---|
| **Available Graphics Drivers** | Windows 11<br>Linux® 64-bit (selected distributions)<br>Typically, latest drivers will be available from amd.com | |

**Notes:** This is a Prosumer or Consumer graphics card, and not a Professional graphics card. As such, it does not have formal professional application validation, but is intended per AMD to function properly for game development, real-time engine, and many prosumer application workloads. Customers using Prosumer or Consumer graphic cards are likely to experience higher acoustics in comparison with Professional graphic cards. The higher acoustics observed with non-professional graphics is expected, as HP Workstations' designs do not have control in this area.

| | | | |
|---|---|---|---|
| **HP 9.5mm Slim DVD Writer** | **Description** | 9.5mm height, tray-load | |
| | **Mounting Orientation** | Either horizontal or vertical | |
| | **Interface Type** | SATA/ATAPI | |
| | **Dimensions** (WxHxD) | 128 x 9.5 x 127mm | |
| | **Supported Media Types** | DVD+R<br>DVD+RW<br>DVD+R DL<br>DVD-R DL<br>DVD-R<br>DVD-RW<br>CD-R<br>CD-RW | |
| | **Disc Capacity** | **DVD-ROM** | 8.5 GB DL or 4.7 GB standard |
| | **Access Times** | **Full Stroke DVD** | < 200 ms (seek) |
| | | **Full Stroke CD** | < 200 ms (seek) |
| | **Maximum Data Transfer Rates** | **CD ROM Read** | CD-ROM, CD-R Up to 24X<br>CD-RW Up to 24X |
| | | **DVD ROM Read** | DVD+RW Up to 8X<br>DVD-RW Up to 8X<br>DVD+R DL Up to 8X<br>DVD-R DL Up to 8X<br>DVD-ROM Up to 8X<br>DVD-ROM DL Up to 8X<br>DVD+R Up to 8X<br>DVD-R Up to 8X |
| | **Power** | **Source** | SATA DC power receptacle |
| | | **DC Power Requirements** | 5 VDC ± 5%-100 mV ripple p-p |
| | | **DC Current** | 5 VDC -< 800 mA typical, <1600 mA maximum |
| | **Operating Environmental** (all conditions non-condensing) | **Temperature** | 41° to 122° F (5° to 50° C) |
| | | **Relative Humidity** | 10% to 80% |
| | | **Maximum Wet Bulb Temperature** | 84° F (29° C) |
| | **Operating Systems Supported** | Windows 11, Windows 10, Windows 7 Professional 64-bit, Windows Vista Business 64*, Windows 2000.<br>Linux®. | |
| | **Kit Contents** | HP SATA DVD Writer drive, installation guide. | |

Technical Specifications - Graphics

| | | | |
|---|---|---|---|
| | **Approvals** | USB-IF, WHQL, Compliant with USB Mass Storage Class Bulk only Transport Specification Rev. 1.0,<br>Compliant Intel Front Panel I/O Connectivity Design Guide V. 1.3, FCC, CE, BSMI, C-Tick, VCCI, MIC, cUL, TUVT | |

**NOTE:** Actual speeds may vary. No support for DVD-RAM (DVD Writer). Does not permit copying of commercially available DVD movies or other copyright protected materials. Intended for creation and storage of your original material and other lawful uses. Double Layer discs can store more data than single layer discs. However, double-layer discs burned with this drive may not be compatible with many existing single-layer DVD drives and players.

| | | | |
|---|---|---|---|
| **HP 9.5mm Slim DVD-ROM Drive** | **Description** | 9.5mm height, tray-load | |
| | **Mounting Orientation** | Either horizontal or vertical | |
| | **Interface Type** | SATA / ATAPI | |
| | **Dimensions** (WxHxD) | 128 x 9.5 x 127mm | |
| | **Disc Capacity** | **DVD-ROM** | Single layer: Up to 4.7 GB<br>Double layer: Up to 8.5 GB |
| | **Access Times** | **DVD-ROM Single Layer** | < 110 ms (typical) |
| | | **CD-ROM Mode 1** | < 110 ms (typical) |
| | | **Full Stroke DVD** | < 230 ms (typical) |
| | | **Full Stroke CD** | < 220 ms (typical) |
| | **Power** | **Source** | SATA DC power receptacle |
| | | **DC Power Requirements** | 5 VDC ± 5%-100 mV ripple p-p |
| | | **DC Current** | 5 VDC – <800mA typical, < 1600 mA maximum |
| | **Operating Environmental** (all conditions non-condensing) | **Temperature** | 41° to 122° F (5° to 50° C) |
| | | **Relative Humidity** | 10% to 80% |
| | | **Maximum Wet Bulb Temperature** | 84° F (29° C) |
| | **Operating Systems Supported** | Windows 11, Windows 10, Windows 7 Professional 64-bit,<br><br>Windows Vista Business 64*, Windows 2000.<br>Linux®. | |
| | **Kit Contents** | 9.5mm Slim DVD-ROM Drive, slim SATA data/power cable, installation guide | |
| | **Approvals** | USB-IF, WHQL, Compliant with USB Mass Storage Class Bulk only Transport Specification Rev. 1.0,<br>Compliant Intel Front Panel I/O Connectivity Design Guide V. 1.3, FCC, CE, BSMI, C-Tick, VCCI, MIC, cUL, TUVT | |

**NOTE:** Actual speeds may vary. No support for DVD-RAM (DVD Writer). Does not permit copying of commercially available DVD movies or other copyright protected materials. Intended for creation and storage of your original material and other lawful uses. Double Layer discs can store more data than single layer discs. However, double-layer discs burned with this drive may not be compatible with many existing single-layer DVD drives and players.

## Technical Specifications - Networking and Communications

| | | |
|---|---|---|
| **Integrated Intel® I219LM PCIe GbE Controller (Intel® vPro® with Intel® AMT 16.0[1])** | **Connector** | RJ-45 |
| | **Cabling** | Twisted pair up to 100m |
| | **Controller** | Intel® I219LM GbE platform LAN connect networking controller |
| | **Memory** | 3 KB Tx and 3KB Rx FIFO packet buffer memory |
| | **Data Rates Supported** | 10/100/1000 Mbps |
| | **Compliance** | 802.1as/1588, 802.1p, 802.1Q, 802.3, 802.3ab, 802.3az, 802.3i, 802.3u, 802.3z |
| | **Bus Architecture** | PCI Express and SMBus |
| | **Data Transfer Mode** | PCIe-based interface for active state operation (S0 state) and SMBus for host and management traffic (Sx low power state) |
| | **Power Requirement** | Requires 3.3V (integrated regulators for core Vdc) |
| | **Boot ROM Support** | Yes |
| | **Network Transfer Mode** | Full-duplex; Half-duplex |
| | **Network Transfer Rate** | 10BASE-T (half-duplex) 10 Mbps<br>10BASE-T (full-duplex) 20 Mbps<br>100BASE-TX (half-duplex) 100 Mbps<br>100BASE-TX (full-duplex) 200 Mbps<br>1000BASE-T (full-duplex) 2000 Mbps |
| | **Management Capabilities** | vPro®, WOL, auto MDI crossover, PXE, Muti-port teaming, RSS, ACPI, Advanced cable diagnostic, loopback modes,<br>AMT 16.0 support, Circuit Breaker, VLAN, Multicast Listener Discovery (MLD) |

[1]Requires activation and a system with a corporate network connection, an Intel® AMT enabled chipset, and network hardware and software. For notebooks, Intel AMT may be unavailable or limited over a host OS-based VPN, when connecting wirelessly, on battery power, sleeping, hibernating, or powered off. Results dependent upon hardware, setup, and configuration. For more information, visit: https://www.intel.com/content/www/us/en/architecture-and-technology/intel-active-management-technology.html

| | | |
|---|---|---|
| **HP 1-Port 1GbE Flex IO NIC** | **Connector** | RJ-45 |
| | **Cabling** | 1GbE over Category 5e (or better) up to 100m |
| | **Controller** | Realtek RTL8153 |
| | **Data Rates Supported** | 10/100/1000 Mbps |
| | **Compliance** | 802.3 (LAN)<br>802.3u (100BASE-TX)<br>802.3ab (1000BASE-T)<br>802.3x (Ethernet Flow Control)<br>802.1Q (Virtual LAN)<br>802.3az (Energy Efficient Ethernet) |
| | **Bus Architecture** | USB |
| | **Power Requirement** | Requires 3.3V (integrated regulators for core Vdc) |
| | **Boot ROM Support** | Yes |
| | **Network Transfer Mode** | Full-duplex; Half-duplex |
| | **Network Transfer Rate** | 10BASE-T (half-duplex) 10 Mbps<br>10BASE-T (full-duplex) 20 Mbps<br>100BASE-TX (half-duplex) 100 Mbps |

## Technical Specifications - Networking and Communications

| | | |
|---|---|---|
| | | 100BASE-TX (full-duplex) 200 Mbps<br>1000BASE-T (full-duplex) 2000 Mbps |
| | **Operating Temperature** | 32° to 131° F (0° to 55° C) |
| | **Dimensions (HxW)** | 1.5 in x 1.5 in. x 0.75 in (3.81 cm x 3.81 cm x 1.9 cm) |
| | **Operating System Driver Support** | Windows 11 64-bit<br>Windows 10 64-bit<br>Linux® |
| **Intel® X550-T2 2-Port 10GbE NIC** | **Connector** | Dual-port RJ-45 |
| | **Cabling** | 10GbE: Cat6a (or better) up to 100m<br>5GbE and below: Cat5e (or better) up to 100m |
| | **Controller** | Intel® Ethernet Controller X550 |
| | **Network Transfer Rates Supported** | 10GbE, 5GbE, 2.5GbE, 1GbE, 100MbE |
| | **Data Path Width** | PCIe Gen3x4 |
| | **Power Requirement** | 11.2W (typical) 13.0 (Maximum) |
| | **Operating Temperature** | 32° to 131° F (0° to 55° C) |
| | **Dimensions** (HxW) | 5.1 x 2.7 in (without brackets) |
| | **Operating System Driver Support** | Windows 11 64-Bit<br>Windows 10 64-bit<br>Linux® |
| | **Kit Contents** | • Intel® X550-T2 2-Port 10GbE NIC with standard height bracket attached<br>• Low-profile bracket<br>• Product Literature |
| **Intel® I350-T4 4-Port 1GbE NIC** | **Connector** | 4 RJ-45 |
| | **Cabling** | Cat5e (or better) up to 100m |
| | **Controller** | Intel® Ethernet I350 Controller |
| | **Network Transfer Rates Supported** | 1GbE, 100MbE, 10MbE |
| | **Data Path Width** | PCIe Gen2.1x4 |
| | **Power Requirement** | 5W (typical) |
| | **Operating Temperature** | 32° to 131° F (0° to 55° C) |
| | **Dimensions** (HxW) | 2.75 x 5.5 inches (without brackets) |
| | **Operating System Driver Support** | Windows 11<br>Windows 10<br>Linux® |
| | **Kit Contents** | • Intel® I350-T4 4-Port 1GbE NIC with standard height bracket attached<br>• Low-profile bracket<br>• Product Literature |
| **HP Flex 1GbE Fiber LC Single Port** | **Connector** | Fiber |
| | **Cabling** | 1GbE over Category OM1 (or better) up to 100m |
| | **Controller** | Microchip LAN7801 |

## Technical Specifications - Networking and Communications

| | | |
|---|---|---|
| | **Data Rates Supported** | 100/1000 Mbps |
| | **Compliance** | IEEE 802.1p priority encoding/tagging (QoS, CoS)<br>IEEE 802.1q VLAN tagging<br>IEEE 802.3x flow control |
| | **Bus Architecture** | USB |
| | **Power Requirement** | Requires 3.3V (integrated regulators for core Vdc) |
| | **Boot ROM Support** | Yes |
| | **Network Transfer Mode** | Full-duplex; Half-duplex |
| | **Network Transfer Rate** | 100BASE-X (half-duplex) 100 Mbps<br>1000BASE-X (half-duplex) 1000 Mbps<br>1000BASE-X (full-duplex) 2000 Mbps |
| | **Operating Temperature** | 32° to 158° F (0°C to 70°C) |
| | **calvin** | 1.5 in x 1.7 in. x 0.75 in (3.84 cm x 4.3 cm x 1.9 cm) |
| | **Operating System Driver Support** | Windows 11 64-Bit<br>Windows 10 64-bit<br>Linux® |
| **Intel® I225-T1 1-Port 2.5GbE NIC** | **Connector** | RJ-45 |
| | **Cabling** | Cat5e (or better) up to 85m |
| | **Controller** | Intel® Ethernet I225 Controller |
| | **Network Transfer Rates Supported** | 2.5GbE, 1GbE, 100MbE, 10MbE |
| | **Data Path Width** | PCIe Gen3.1x1 |
| | **Power Requirement** | 1.9W (typical) |
| | **Operating Temperature** | 32° to 158° F (0°C to 70°C) |
| | **Dimensions (HxW)** | 2.7 in x 2.57 in. (68.7mm x 65.3mm) |
| | **Operating System Driver** | Windows 11 64-Bit<br>Windows 10 64-bit<br>Linux® |
| | **Kit Contents** | • Intel® I225-T1 1-Port 2.5GbE NIC with standard height bracket attached Low-profile bracket<br>• Product Literature |
| **Intel® Wi-Fi 6E* AX211 802.11ax, BT 5.3, M.2 With Internal Antenna** | **WLAN Standards** | 802.11abgn+acR2+axR2(Pre-Standard) MIMO 2x2<br>High performance, low power dual band Pre-Standard-802.11ax R2 2x2, both with 160MHz channel support – Wi-Fi 6E |
| | **Antenna** | 2x2 Dual-Band (internal) |
| | **Bluetooth Standards** | 5.2 |
| | **Operating Temperature** | 32° to 176° F (0° to 80° C) |
| | **Interface** | M.2 CNVio2 |
| | **Dimensions** | M.2 2230 |
| | **Kit Contents** | Not Available |

**NOTE:** The AX211 with internal antenna only support WIFI 6

*Wi-Fi 6E requires a Wi-Fi 6E router, sold separately, to function in the 6GHz band. Availability of public wireless access points limited. Wi-Fi 6E is backwards compatible with prior 802.11 specs. And available in countries where Wi-Fi 6E is supported.

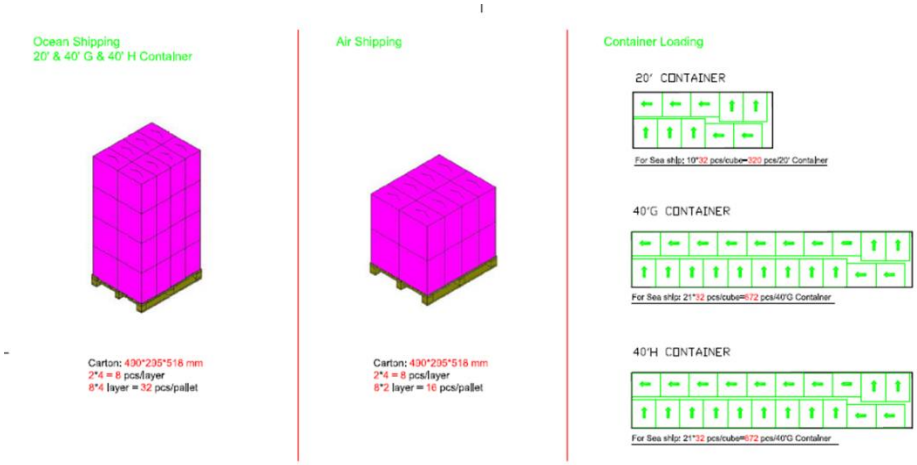
Technical Specifications - Networking and Communications

| | | |
|---|---|---|
| **Intel® Wi-Fi 6E* AX211 802.11ax, BT 5.3, M.2 With External Antenna** | **WLAN Standards** | 802.11abgn+acR2+axR2(Pre-Standard) MIMO 2x2<br>High performance, low power dual band Pre-Standard-802.11ax R2 2x2, both with 160MHz channel support – Wi-Fi 6E |
| | **Antenna** | 2x2 Dual-Band (External) |
| | **Bluetooth Standards** | 5.2 |
| | **Operating Temperature** | 32° to 176° F (0° to 80° C) |
| | **Interface** | M.2 CNVio2 |
| | **Dimensions** | M.2 2230 |
| | **Kit Contents** | ANTENNA, External, Dipole, WLAN, WIFI 6E |
| | **NOTE:** The AX211 with external antenna support WIFI 6E<br>*Wi-Fi 6E requires a Wi-Fi 6E router, sold separately, to function in the 6GHz band. Availability of public wireless access points limited. Wi-Fi 6E is backwards compatible with prior 802.11 specs. And available in countries where Wi-Fi 6E is supported. | |
| **Intel® Wi-Fi 7 BE200** | **WLAN Standards** | 802.11abgn+acR2+axR2+be+dehikrv |
| | **Antenna** | 2x2 Dual-Band (External) |
| | **Bluetooth Standards** | 5.4 |
| | **Operating Temperature** | 32° to 176° F (0° to 80° C) |
| | **Interface** | M.2: PCIe, USB |
| | **Dimensions** | M.2 2230 |
| | **Kit Contents** | ANTENNA, External, Dipole, WLAN, WIFI 7 |
| | **NOTE:** Not available with 12th Gen Intel ADL processors; Wireless access point and Internet service required and sold separately. Availability of public wireless access points limited. Wi-Fi 7 (802.11BE) functionality requires Windows 11 24H2, select Intel® processor, and a Wi-Fi 7 router, sold separately. Wi-Fi 7 is backwards compatible with prior 802.11 specs. Available in countries where Wi-Fi 7 is supported. | |

## Palletization

Ocean Shipping uses a 20’ x 40’ x 40’ (490mm x 295mm x 518mm) container with 4 layers; 2x4=8 pieces per layer for a total of 32 pieces per pallet
Air shipping uses 490mm x 295mm x 518mm carton with 2 layers; 2x4=8 pieces per layer for a total of 16 pieces per pallet.

## Technical Specifications - Networking and Communications




| Date of change: | Version History: | | Description of change: |
|---|---|---|---|
| March 8, 2022 | From v1 to v2 | Changed | Format |
| March 16, 2022 | From v2 to v3 | Changed | Social and Environmental Responsibility section |
| May 6, 2022 | From v3 to v4 | Changed | Processors, Graphics, Networking and Communications sections |
| June 1, 2022 | From v4 to v5 | Changed | Operating Systems and SATA Hard Drives sections |
| June 15, 2022 | From v5 to v6 | Changed | Networking and Communications section |
| July 1, 2022 | From v6 to v7 | Changed | Graphics section |
| July 8, 2022 | From v7 to v8 | Changed | System Board section |
| August 1, 2022 | From v8 to v9 | Changed | SATA Hard Drives, Other Hardware sections |
| August 4, 2022 | From v9 to v10 | Changed | Format |
| September 1, 2022 | From v10 to v11 | Changed | Storage / Hard Drives, Graphics, Optical and Removable Storage Networking and Communications sections |
| October 1, 2022 | From v11 to v12 | Changed | Graphics, Networking and Communications sections |
| November 1, 2022 | From v12 to v13 | Changed | Graphics Adapters section |
| February 6, 2023 | From v13 to v14 | Changed | Processors section |
| March 1, 2023 | From v14 to v15 | Changed | Manageability section |
| March 30, 2023 | From v15 to v16 | Changed | Processors section |
| April 25, 2023 | From v16 to v17 | Changed | Power Supply, Social and Environmental Responsibility sections |
| May 1, 2023 | From v17 to v18 | Changed | Other Hardware section |
| June 1, 2023 | From v18 to v19 | Changed | Graphics, Social and Environmental Responsibility, Palletization sections |
| July 1, 2023 | From v19 to v20 | Changed | Networking and Communications, Other Hardware, HP BIOS sections |
| July 5, 2023 | From v20 to v21 | Changed | System Board section |
| August 1, 2023 | From v21 to v22 | Changed | Social and Environmental Responsibility section |
| August 1, 2023 | From v22 to v23 | Changed | ENVIRONMENTAL DATA section |
| September 15, 2023 | From v23 to v24 | Changed | Networking and Communications |
| October 1, 2023 | From v24 to v25 | Changed | Graphics, Input Devices sections |
| November 1, 2023 | From v25 to v26 | Changed | Graphics, Input Devices sections |
| December 1, 2023 | From v26 to v27 | Changed | Graphics, Other Hardware, Social and Environmental Responsibility sections |
| December 11, 2023 | From v27 to v28 | Changed | Optical and Removable Storage section |
| December 21, 2023 | From v28 to v29 | Changed | Graphics section |
| February 1, 2024 | From v29 to v30 | Changed | Social and Environmental Responsibility section |
| March 1, 2024 | From v30 to v31 | Changed | Graphics, System Configurations, Declared Noise Emissions and Networking and Communications sections |
| March 12, 2024 | From v31 to v32 | Changed | Processors section |

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