

Overview

HP Z8 Fury G5 Workstation



Front View

1. Integrated Front Handle
2. Power Button
3. HDD Activity LED
4. Headphone/microphone combo
5. Front I/O Premium²:
2 SuperSpeed USB Type-C™ 20 Gbps signaling rate (USB Power Delivery 3.0),
2 SuperSpeed USB Type-A 5 Gbps signaling rate [left-most Type-A port supports BC1.2 (Battery Charging)]

Front I/O Entry:
4 SuperSpeed USB Type-A 5 Gbps signaling rate [left-most Type-A ports supports BC1.2 (Battery Charging)]
6. SD Card Reader
7. 2x External 5.25" bay¹
8. 9.5mm Optical Drive Bay

¹Only 1 external 5.25" drive configurable from factory

²Premium Front IO is shown on photography

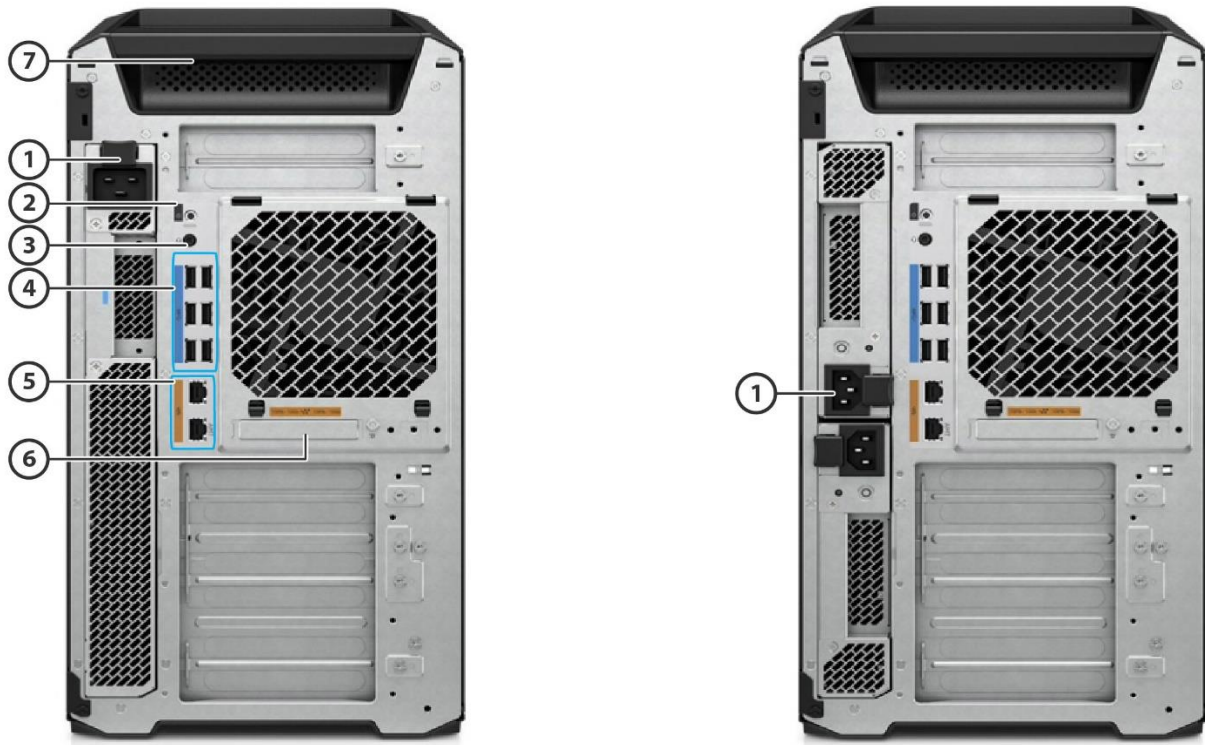
Overview



Internal View

1. Intel® Xeon® W-3400 processor (Sapphire Rapids)
2. 16 DIMM slots for DDR5 ECC Memory
3.
 - Slot 1: PCIe x16 Gen5
 - Slot 2: PCIe x4 Gen5
 - Slot 3: PCIe x16 Gen5
 - Slot 4: PCIe x4 Gen4
 - Slot 5: PCIe x16 Gen4
 - Slot 6: PCIe x8 Gen3
 - Slot 7: PCIe x16 Gen4
 - Slot 8: PCIe x4 Gen4
4. 2 PCIe x8 Gen4 configurable with 4x Z Turbo M.2 SSDs
5. 6 SATA ports
6. 3 Internal USB ports. 1 single USB2.0 port, 1 dual USB2.0 port, 1 USB3.0 port (for the SD card reader).
7. 4 Internal 3.5" bays
8. 2 External 5.25" bays and Slimline Optical Drive
9. 2 Internal NVMe connector to front removable M.2 carrier

Overview



Rear View

- Choice of 90% Efficient Power Supplies:
 - Single 1125W @110V or 1450W @200V
 - Dual 1125W @110V or 1450W @200V (configurable in redundant mode or 2250W aggregate mode)
- Rear Power Button
- Audio in/out
- 6 SuperSpeed USB Type-A 5 Gbps signaling rate
- 2 RJ-45 integrated LAN ports (1 GbE AMT, 1GbE)
- 2 10GbE LAN ports (optional)
- Integrated Rear Handle

Form Factor Tower

Operating Systems Preinstalled:

- Windows 11 Pro 64 for Workstations²
- Windows 11 Pro for Workstations (preinstalled with Windows 10 Pro for Workstations Downgrade)^{2,3}
- Ubuntu 22.04 LTS⁴
- HP Linux[®]-ready (minimal OS ready for customer OS installation)⁵

License Only:

- Red Hat[®] Enterprise Linux[®] Desktop Workstation (includes paper license with 1 year support; no preinstalled OS)⁶

Supported:

- Windows 11, version 22H2, 21H2²
- Windows 10, version 22H2, 21H2²
- Red Hat[®] Enterprise Linux[®] Workstation 8 & 9⁶
- SUSE Linux[®] Enterprise Desktop 15⁶

Overview

- Ubuntu 20.04 & 22.04 LTS⁵

Web-supported only:

- Windows 11 Enterprise^{2,1}
- Windows 10 Enterprise^{2,1}

¹ Windows Enterprise sold separately and requires that customer have an enterprise license from Microsoft.

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>.

³This 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.

⁵A 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.

⁶For 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>

Overview

Processors

Name ¹	Cores	Threads	Frequency (GHz)			Cache (MB)	Max Memory Speed (MT/s)		TDP (W)
			Base Clock Speed	Intel® Turbo Boost Max Single-Core Frequency ²	Intel® Turbo Boost Max Tech 3.0 Frequency ²		1 DIMM per Channel	2 DIMM per Channel	
Intel® Xeon® W9-3495X	56	112	1.9	4.6	4.8	105	4800	4400	350
Intel® Xeon® W9-3475X	36	72	2.2	4.6	4.8	82.5	4800	4400	300
Intel® Xeon® W7-3465X	28	56	2.5	4.6	4.8	75	4800	4400	300
Intel® Xeon® W7-3455	24	48	2.5	4.6	4.8	67.5	4800	4400	270
Intel® Xeon® W7-3445	20	40	2.6	4.6	4.8	52.5	4800	4400	270
Intel® Xeon® W5-3435X	16	32	3.1	4.5	4.7	45	4800	4400	270
Intel® Xeon® W5-3433	16	32	2.0	4.0	4.2	45	4400	4400	220
Intel® Xeon® W5-3425	12	24	3.2	4.4	4.6	30	4800	4400	270
Intel® Xeon® W5-3423	12	24	2.0	4.0	4.2	30	4400	4400	220

Notes:

- Xeon W-3400 processors all feature Intel® vPro® Technology³
- Xeon W-3400 processors all support Hyper-Threading
- Xeon W-3400 processors do not offer integrated graphics

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.

² Intel Turbo Boost Max (ITBM) performance varies depending on hardware, software and overall system configuration. See <http://www.intel.com/technology/turboboost> for more information.

³ 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>

Overview

Color	Black
Convertibility	No
Expansion Slots (see system board section for more details)	<ul style="list-style-type: none">•Slot 1: PCIe x16 Gen5•Slot 2: PCIe x4 Gen5•Slot 3: PCIe x16 Gen5•Slot 4: PCIe x4 Gen4•Slot 5: PCIe x16 Gen4•Slot 6: PCIe x8 Gen3•Slot 7: PCIe x16 Gen4•Slot 8: PCIe x4 Gen4
Expansion Bays (see storage section for more details)	4 internal 3.5" bays (All 4 include acoustic dampening rail assemblies) 2 external 5.25" bays (175mm depth limit) 1 dedicated 9.5mm slim optical disk drive bay
Front I/O	Front I/O Premium: 2 SuperSpeed USB Type-C™ 20 Gbps signaling rate (USB Power Delivery 3.0), 2 SuperSpeed USB Type-A 5 Gbps signaling rate, 1 headphone/microphone combo, SD card reader (optional). [left-most Type-A ports supports BC1.2 (Battery Charging)] Front I/O Entry: 4 SuperSpeed USB Type-A 5 Gbps signaling rate, 1 headphone/microphone combo, SD card reader (optional). [left-most Type-A ports supports BC1.2 (Battery Charging)]
Internal I/O [5]	3 Internal USB ports and 6 SATA ports
Rear I/O	Audio in/out, 6 SuperSpeed USB Type-A 5 Gbps signaling rate, 2 RJ-45 integrated LAN ports (1 GbE AMT, 1 GbE)
Optional I/O	2 10GbE LAN ports
On-board RAID Support	SATA RAID 0 Striped Array SATA RAID 1 Mirrored Array SATA RAID 10 Striped/Mirrored SATA RAID 5 Parity Array
Chassis Dimensions (H x W x D)	Footprint: H: 17.5" [444.5mm] W: 8.5" [215.9mm] D: 21.7" [551.2mm] (measured to the rear of service panel) Maximum: H: 17.5" [444.5mm] W: 8.5" [215.9mm] D: 21.85" [555.2mm] (measured to the embossment for the rear chassis fans)
Packaged Dimensions	H: 25" (636mm) W: 13.1" (332mm) D: 28.9" (734mm)
Palletization Profile	4 units x 3 layers = 12 units per pallet 1200x1000x2034mm (pallet included)
Rack Dimensions	5U
Weight	Exact weights depend upon configuration (System weight only). Minimum: 22kg (48.9lbs.) Typical: 23.1kg (50.9lbs.) Maximum: 36kg (79.4lbs.)
Temperature	Operating: 5° to 40°C (40° to 104°F) ¹ Non-operating: -40° to 60°C (-40° to 140°F) 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 Maximum rate of change: 10 °C/hr No direct sustained sunlight

Overview

¹40°C has been validated for configs up to a 300W CPU, 2x NVIDIA® RTX A4000 graphics cards, 8x64GB RAM, 4x 2TB M.2 storage, 2x 2TB HDD storage, and 1125W full-height PSU

Humidity

Operating: 10% to 85% RH, non-condensing, 35° C maximum wet bulb
Non-operating: 10% to 90%, non-condensing, 35° C maximum wet bulb

Maximum Altitude (non-pressurized)⁶

Operating (with Rotational Hard Drives): 3,048 m (10,000 feet)
Operating (with only Solid-State Drives): 5,000 m (16,404 feet)

Non-operating: 9,144m (30,000ft)

NOTE: Above 1524 m (5,000 feet) altitude, maximum operating temperature is reduced by 1° C (1.8° F) per 305 m (1,000 feet) elevation increase

Power Supply

Choice of 80 Plus Gold (90% efficiency at 50% load) Power Supplies:

- Single 1125W @110V or 1450W @200V ([Delta Efficiency Report](#))
- Dual 1125W @110V or 1450W @200V ([Delta Efficiency Report](#)) (configurable in redundant mode or 2250W aggregate mode)

NOTE: not all configurations are supported on all power supplies. Configuration support depends on total system power budget and having sufficient number or type of PCIe supplemental power connectors. Confirm power supply and configuration support using configurator on [hp.com](#).

- 1125W supports up to 600W of auxiliary graphics power (dependent on system configuration)
- 1450W supports up to 900W of auxiliary graphics power (dependent on system configuration)
- 2250W supports up to 1200W of auxiliary graphics power (dependent on system configuration)

NOTE: updating graphics after purchase may require additional power distribution cables and/or auxiliary graphics adapters to support the new graphics configuration.

Workstation ISV Certifications

See the latest list of certifications at <http://www.hp.com/united-states/campaigns/workstations/partnerships.html>

Chipset

Intel® W790 chipset

Memory

16 DIMM slots, supporting up to 2TB RDIMMs, DDR5 4800 MT/s speed depending on the system configuration

Supported Components

Processors

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Intel® Xeon® W-3400 processors				
Intel® Xeon® W9-3495X	Y	N		
Intel® Xeon® W9-3475X	Y	N		
Intel® Xeon® W7-3465X	Y	N		
Intel® Xeon® W7-3455	Y	N		
Intel® Xeon® W7-3445	Y	N		
Intel® Xeon® W5-3435X	Y	N		
Intel® Xeon® W5-3433	Y	N		
Intel® Xeon® W5-3425	Y	N		
Intel® Xeon® W5-3423	Y	N		

SATA Hard Drives

	Factory Configured	Option Kit	Option Kit Part Number
1TB 7200RPM SATA 3.5in Enterprise HDD	Y	Y	WOR10AA
2TB 7200RPM SATA 3.5in Enterprise HDD	Y	Y	ZZ274AA
4TB 7200RPM SATA 3.5in Enterprise HDD	Y	Y	K4T76AA/AT
8TB 7200RPM SATA 3.5in Enterprise HDD	Y	Y	ZZ273AA
12TB 7200RPM SATA-6G 3.5in Enterprise HDD	Y	Y	5S461AA
1TB 7200RPM SATA 3.5" Enterprise HDD (not-made-in-China)	Y	N	
2TB 7200RPM SATA 3.5in Enterprise HDD (not-made-in-China)	Y	N	

PCIe Solid State Drives

	Factory Configured	Option Kit	Option Kit Part Number
Z Turbo 512GB 2280 PCIe-4x4 TLC SSD	Y	Y	38T80AA
Z Turbo 512GB 2280 PCIe-4x4 SED OPAL2 TLC M.2 SSD	Y	Y	38T81AA
Z Turbo 512GB 2280 PCIe-4x4 TLC SSD (not-made-in-China)	Y	N	
Z Turbo 512GB 2280 PCIe-4x4 TLC Z8 Kit SSD	N	Y	360H7AA
Z Turbo 512GB 2280 PCIe-4x4 SED OPAL2 TLC M.2 Z8 Kit SSD	N	Y	360H2AA
Z Turbo 1TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 SSD	Y	Y	38T76AA
Z Turbo 1TB 2280 PCIe-4x4 TLC SSD	Y	Y	38T77AA
Z Turbo 1TB 2280 PCIe-4x4 TLC SSD (not-made-in-China)	Y	N	
Z Turbo 1TB 2280 PCIe-4x4 TLC Z8 Kit SSD	N	Y	360H5AA
Z Turbo 1TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 Z8 Kit SSD	N	Y	360H4AA
Z Turbo 2TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 SSD	Y	Y	38T79AA
Z Turbo 2TB 2280 PCIe-4x4 TLC SSD	Y	Y	38T75AA
Z Turbo 2TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 Z8 Kit SSD	N	Y	360H1AA
Z Turbo 4TB 2280 PCIe-4x4 TLC M.2 SSD	Y	Y	5S496AA/AT
Z Turbo 4TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 SSD	Y	Y	5S497AA/AT
Z Turbo 4TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 Z8 Kit SSD	Y	Y	5S4A0AA

Supported Components

HP Z Turbo Drive Dual Pro

HP Z Turbo Drive Dual Pro PCIe-4x4 NVMe Carrier ¹	Y	Y	56Q86AA
HP Z Turbo Drive Dual Pro 512GB TLC SSD	Y	N	
HP Z Turbo Drive Dual Pro 1TB TLC SSD	Y	N	
HP Z Turbo Drive Dual Pro 2TB TLC SSD	Y	N	
HP Z Turbo Drive Dual Pro 4TB TLC SSD	Y	N	

Intel® Virtual RAID on CPU (Intel® VROC) for NVMe

Intel VROC NVMe SSD Premium Ctlr Module ²	N	Y	3FJ81AA
Intel VROC NVMe SSD Standard Ctlr Module ³	N	Y	3FJ80AA

Note 1: Kit includes dual pro carrier and heatsink. Requires separate purchase of Z Turbo PCIe 4x4 M.2 SSD modules.

Note 2: Enables RAID 0, 1 & 10

Note 3: Enables RAID 0, 1 & 10 plus RAID 5 with write hole closure options

NOTE: Internal M.2 PCIe SSDs are installed using HP Personality Card (up to 2 Personality Cards per system). Each Personality Card can support two M.2 drives.

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
Graphics Cable Adapters	HP DisplayPort to HDMI Adapter	Y	Y	2JA63AA	
	HP DisplayPort to DVI Adapter (Bulk 90)	N	Y	FH973A6	
	HP DisplayPort to VGA Adapter	N	Y	AS615AA/AT	
	HP DisplayPort to VGA Adapter	N	Y	F7W97AA	
	HP miniDP-to-DP Adapter Cable (single)	Y	Y	2MY05AA	
	HP miniDP-to-DP Adapter Cable (2-pack)	Y	N		
	HP miniDP-to-DP Adapter Cable (4-pack)	Y	N		
	HP miniDP-to-DP Adapter Cable (8-pack)	Y	N		
	HP miniDP-to-DP Adapter Cable (Bulk 12)	N	Y	2KW87A6	
	HP Graphics Power Cable CPU-8p to CPU-8p ²	N	Y	6J6H7AA	
	HP Graphics Power Cable CPU-8p to x2 PCIe 8p(6+2) ²	N	Y	6J6H8AA	
Ultra High-End Graphics	NVIDIA 3D Stereo Bracket	N	Y	K0A25AA	
	NVIDIA® RTX 6000 Ada 48GB	Y	Y	79C23AA/AT	4
	NVIDIA® RTX A6000 48GB	Y	Y	2S6U3AA/AT	4
	AMD Radeon Pro W6800 32 GB	Y	Y	340K7AA	2
	NVIDIA® RTX A5000 24GB	Y	Y	20X23AA/AT	4
High-End Graphics	NVIDIA® Quadro® Sync II	N	Y	1WT20AA	
	NVIDIA® RTX A4500 20GB	Y	Y	5S458AA/AT	4
	NVIDIA® RTX A4000 16GB*	Y	Y	20X24AA/AT	4
Midrange Graphics	NVIDIA® Long-Life RTX A4000E 16GB*	Y	Y	6H7J7AA/AT	4
	NVIDIA® RTX A2000 12GB	Y	Y	5Z7D9AA/AT	4

Supported Components

Component	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
NVIDIA® Long-Life RTX A2000E 12GB	Y	N		4
NVIDIA® T1000 8GB	Y	Y	5Z7D8AA/AT	6
NVIDIA® Long-Life T1000E 8GB	Y	Y	6V9V4AA/AT	6
AMD® Radeon™ Pro W6600 8GB	Y	Y	340K5AA	3
Entry Graphics NVIDIA® T400 4GB	Y	Y	5Z7E0AA/AT	4
AMD® Radeon™ RX 6400 4GB	Y	Y	6Q3U4AA/AT	1
NVIDIA T1000 4GB	Y	Y	20X22AA/AT	4
Intel Arc Pro A40 6GB	Y	Y	6E3Y8AA	1

*Only supported with full-height 1x 1125W PSU or 1x 1450W PSU. Cannot configure with half-height 2x PSU configurations.

Note 2: Required for select graphics configurations.

Memory

Memory Configuration	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
16GB (1x16GB) DDR5 4800 DIMM ECC REG Memory (not-made-in-China)	Y	N		
32GB (2x16GB) DDR5 4800 DIMM ECC REG Memory	Y	N		
32GB (2x16GB) DDR5 4800 DIMM ECC REG Memory (not-made-in-China)	Y	N		
64GB (4x16GB) DDR5 4800 DIMM ECC REG Memory	Y	N		
64GB (4x16GB) DDR5 4800 DIMM ECC REG Memory (not-made-in-China)	Y	N		
64GB (2x32GB) DDR5 4800 DIMM ECC REG Memory	Y	N		
96GB (6x16GB) DDR5 4800 DIMM ECC REG Memory	Y	N		
128GB (8x16GB) DDR5 4800 DIMM ECC REG Memory	Y	N		
128GB (4x32GB) DDR5 4800 DIMM ECC REG Memory	Y	N		
192GB (6x32GB) DDR5 4800 DIMM ECC REG Memory	Y	N		
256GB (16x16GB) DDR5 4800 DIMM ECC REG Memory	Y	N		
256GB (8x32GB) DDR5 4800 DIMM ECC REG Memory	Y	N		
256GB (4x64GB) DDR5 4800 DIMM ECC REG Memory	Y	N		
256GB (2x128GB) DDR5 4800 DIMM ECC REG Memory	Y	N		
512GB (16x32GB) DDR5 4800 DIMM ECC REG Memory	Y	N		
512GB (8x64GB) DDR5 4800 DIMM ECC REG Memory	Y	N		
512GB (4x128GB) DDR5 4800 DIMM ECC REG Memory	Y	N		
1TB (16x64GB) DDR5 4800 DIMM ECC REG Memory	Y	N		
1TB (8x128GB) DDR5 4800 DIMM ECC REG Memory	Y	N		
2TB (16x128GB) DDR5 4800 DIMM ECC REG Memory	Y	N		
After Market Options				
16GB (1x16GB) DDR5 4800 DIMM ECC REG Memory	Y	Y	340K1AA	
32GB DDR5 (1x32GB) 4800 DIMM ECC REG Memory	N	Y	340K2AA	
64GB DDR5 (1x64GB) 4800 DIMM ECC REG Memory	N	Y	340K3AA	
128GB DDR5 (1x128GB) 4800 DIMM ECC REG Memory	N	Y	69D46AA	

Supported Components

NOTE: When configuring the system with 2 DIMMS per channel (DPC), max memory speed will decrease from 4800MHz to 4400MHz.

Supported Components

Multimedia and Audio Devices

	Factory Configured	Option Kit	Option Kit Part Number
HyperX Cloud Mix Wireless Gaming Headset	N	Y	4P5K9AA
HyperX Cloud Core Gaming Headset	N	Y	4P4F2AA
HyperX Cloud Flight Wireless Gaming Headset	N	Y	4P5L4AA
HyperX Cloud Stinger Core Gaming Headset	N	Y	4P4F4AA
HyperX SoloCast - USB Microphone	N	Y	4P5P8AA
Integrated Realtek ALC3205-CG Audio	Y	N	

Optical and Removable Storage

	Factory Configured	Option Kit	Option Kit Part Number
HP CRU QX448 Removable with 185mm Cable (Qty 2) Frame/Carrier ^{1, 4}	Y	Y	5B0U6AA
HP DX175 Removable HDD Frame/Carrier ^{2, 4}	Y	Y	1ZX71AA
HP DX175 Removable HDD Spare Carrier ^{2, 4}	N	Y	1ZX72AA
HP CRU Secure High Performance Storage Module with 2TB M.2 SSD ³	Y	Y	56Q87AA
HP CRU Secure High Performance Storage Module with 1TB M.2 SSD ³	Y	Y	56Q88AA
HP CRU Secure High Performance Storage Module with 512GB M.2 SSD ³	Y	Y	56Q89AA
HP 9.5mm Slim DVD-ROM Drive	Y	Y	K3R63AA
HP 9.5mm Slim BDXL Blu-Ray Writer Drive	Y	Y	K3R65AA
HP 9.5mm Slim SuperMulti DVD Writer	Y	Y	K3R64AA

Note 1: Requires separate purchase of HP CRU Secure High Performance Storage (SHIPS) Module(s).

Note 2: Only supports 4TB or lower capacity HDDs.

Note 3: HP CRU SHIPS Module Kit contains select M.2 SSD for install into a factory configured or after market option front removable storage carrier (HP CRU QX428 Frame/Carrier).

Note 4: available in Summer 2023

Networking and Communications

	Factory Configured	Option Kit	Option Kit Part Number
HP Dual Port 10GbE NIC G2 ²	Y	Y	360K6AA
Intel® X550 10GBASE-T Dual Port NIC	Y	Y	1QL46AA
Intel® I225-T1 Single Port 2.5GbE PCIe NIC	Y	Y	406L9AA
Intel® Ethernet I350-T4 4-Port 1Gb NIC	N	Y	W8X25AA
Allied Telesis AT-2914SX/LC-901 1GB LC Fiber NIC	Y	Y	1C7Q2AA
Allied Telesis AT-2911T/2-901 Dual Port 1GbE NIC	Y	Y	6E3Y9AA/AT
NVIDIA® Mellanox® ConnectX-6 DX Dual Port 10/25GbE SFP28 NIC ¹	Y	Y	436M8AA
Intel AX210 Wi-Fi 6E non-vPro + Bluetooth® 5.2 wireless card with External Antenna WLAN	Y	Y	340L7AA

Note 1: 3rd party transceivers sold separately. You must have a transceiver installed to connect this card to a network.

Note 2: available in Fall 2023

Supported Components

Racking and Physical Security

	Factory Configured	Option Kit	Option Kit Part Number
HP Z640/Z840/Z8 G4 Rail Rack Kit	N	Y	2FZ77AA/AT
HP Z8 Rack Rail Upgrade Kit	N	Y	2FZ76AA/AT

Input Devices

	Factory Configured	Option Kit	Option Kit Part Number
HP 320K Wired Keyboard	Y	Y	9SR37AA/ET/UT
HP 125 Wired Keyboard	Y	Y	266C9AA/ET/UT
HP 975 USB+BT Dual-Mode Wireless Keyboard	N	Y	3Z726AA/ET/UT
HP 455 Programmable Wireless Keyboard	N	Y	4R177AA/ET/UT/A6
HP Wired Desktop 320MK Mouse and Keyboard	N	Y	9SR36AA/ET/UT
HP 655 Wireless Keyboard and Mouse Combo	N	Y	4R009AA/ET/UT/A6
HP Wired 320M Mouse	Y	Y	9VA80AA/ET/UT
HP Creator 935 Black Wireless Mouse	N	Y	1D0K8AA/ET/UT
HP 128 LSR Wired Mouse	Y	Y	265D9AA/ET/UT
HP 125 Wired Mouse	N	Y	265A9AA/ET/UT
HP Business Slim Smartcard Keyboard	Y	Y	Z9H48AA/AT

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

Other Hardware

	Factory Configured	Option Kit	Option Kit Part Number
HP Dual Thunderbolt4 PCIe x4 Low Profile Card	Y	Y	340L1AA
HP Type-C SuperSpeed USB 20Gbps Front IO v2 Premium Module	Y	Y	38T92AA
1125/1450W Z8 Fury EPA90 Redundant Power Supply	Y	Y	6E3Z5AA
HP Internal Serial+PS/2 Port	Y	Y	56Q78AA
HP USB 2.0 Type-A Port Adapter Kit ⁴	Y	Y	79C24AA
HP SD Card Reader Zx G4	Y	Y	2VK54AA
HP 2.5in HDD/SSD 2-in-1 Optical Bay Bracket	N	Y	K4T74AA
HP 2.5in to 3.5in HDD Adapter Kit	N	Y	J5T63AA/A6
HP Optical Bay HDD Mounting Bracket ³	N	Y	NQ099AA
HP C13 1.83m Power Cord Kit (halogen-free)	Y	N	
HP C13 1.83m Power Cord Kit	Y	Y	6Z1T9AA

Note 3: NQ099AA HP Optical Bay HDD Mounting Bracket is required as a separate purchase for HDD option kits installed into an external bay.

Note 4: The USB 2.0 Type-A Port Adapter Kit has a single USB 2.0 type A connector.

Software

	Factory Configured	Option Kit	Support Notes
HP Anyware	Y	N	

Supported Components

HP Performance Advisor	Y	N	1
HP PC Hardware Diagnostics UEFI (Windows OS only)	Y	N	2
HP PC Hardware Diagnostics Windows	Y	N	
HP Wolf Security	Y	N	3
HP Notifications	Y	N	
HP Desktop Support Utility	Y	N	
HP Documentation	Y	N	
myHP	Y	N	
HP Easy Clean	Y	N	
Kingsoft WPS Office	Y	N	4
Z by HP Data Science Stack Manager	Y	N	5, 6
WSL2/Ubuntu Data Science Stack	Y	N	5
HP Image Assistant	N	N	
HP Support Assistant	N	N	
HP Smart Health	N	N	

Note 1: Supported with Windows only. Also available as a free download from <http://www.hp.com/go/performanceadvisor>

Note 2: Windows OS only

Note 3: Not available in Russia

Note 4: Not available in China

Note 5: Only available with NVIDIA® graphics

Note 6: Only available with Ubuntu

Operating Systems Windows 11 Pro for Workstations^{1,2}

Windows 11 Pro for Workstations (preinstalled with Windows 10 Pro for Workstations Downgrade)^{1,2,3}

Ubuntu 22.04 LTS⁴

HP Linux®-ready

¹ Windows Enterprise sold separately and requires that customer have an enterprise license from Microsoft.

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>.

³This 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.

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

Supported Components

<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

Key features of the HP BIOS include:

- Deployment and manageability – HP BIOS provides several technologies that help integrate the HP Z8 Fury G5 Workstation into the enterprise, such as PXE, remote recovery, remote configuration, remote control, and BIOS (F10) Setup support for 15 languages.
- Network firmware updates – Update your BIOS via the cloud or standardize on a BIOS version hosted on an Enterprise network.
- Stability – HP BIOS supports the HP stable product roadmap by releasing only critical BIOS changes to the factory and advanced change notification.
- Class 3 UEFI specification version 2.7
- Absolute Persistence agent – For tracking and tracing services, available in select countries, separate software and purchase of a subscription is required.
- Thermal and power management – The HP BIOS provides and enables thermal and power management technologies so component temperatures are managed for high reliability and to assist in operating the HP Workstation computer in any enterprise environment.
- Acoustic performance – Industry leading acoustic emissions across the range of operating conditions.
- Serviceability – HP BIOS provides diagnostic and detailed service information.
- Upgrades and recovery – HP BIOS provides numerous ways to upgrade HP Workstation computers, including BIOS updates from within Windows (HP Firmware Update and Recovery), Capsule update, HP Client Manager, and fail-safe recovery. In addition, the HP BIOS Configuration Utility enables replication of BIOS settings within Windows while the Replicated Setup feature provides the same capability within BIOS (F10) Setup. The BIOS Configuration Utility is available from the HP support website.
- HP BIOS uses PKI signing of the BIOS for trusted BIOS upgrades and recovery. 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

- 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.

Supported Components

SOFTWARE COMPONENTS AND APPLICATIONS WITH WINDOWS

BIOS

HP BIOSphere Gen6¹³
HP DriveLock & Automatic DriveLock
BIOS Update via Network
Master Boot Record Security
Power On Authentication
Absolute Persistence Module²³
Pre-boot Authentication
HP Wireless Wakeup

Software

HP Desktop Support Utility
HP Performance Advisor¹
HP Privacy Settings
HP Notifications
myHP

Manageability Features

HP Driver Packs²
HP System Software Manager (SSM)
HP BIOS Config Utility (BCU)
HP Client Catalog
HP Manageability Integration Kit Gen6³

Client Security Software

HP Wolf Security (Including HP Sure Click & HP Sure Sense)²²
HP Pro Wolf Security (Including Credential Manager)¹⁸
HP Client Security Manager Gen 7⁴
HP Sure Run⁹
HP Sure Recover¹⁰
HP Power On Authentication
Microsoft Defender⁷

Security Management

HP Security Update Service (SUS)
Secure Erase¹⁶
TPM 2.0 Embedded Security Chip(Common Criteria EAL4+ Certified)²⁴
SATA port disablement (viaBIOS)
Serial, USB enable/disable (viaBIOS)
Power-on password (viaBIOS)
Setup password (viaBIOS)
Support for chassis padlocks and cable lock devices
Integrated hood sensor⁰
HP Sure Start Gen4⁸

¹ HP Performance Advisor Software - HP 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.

Supported Components

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

¹³ HP BIOSphere Gen6 features may vary depending on the platform and configurations.

¹⁶ Secure Erase - For the methods outlined in the National Institute of Standards and Technology Special Publication 800-88 "Clear" sanitation method. HP Secure Erase does not support platforms with Intel® Optane.

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 - End-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.

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

²³ Absolute agent is shipped turned off, and will be activated when customers activate a purchased subscription.

Subscriptions can be purchased for terms ranging multiple years. Service is limited, check with Absolute for availability outside the U.S. The Absolute Recovery Guarantee is a limited warranty. Certain conditions apply. For full details visit: <http://www.absolute.com/company/legal/agreements/computrace-agreement>. Data Delete is an optional service provided by Absolute Software. If utilized, the Recovery Guarantee is null and void. In order to use the Data Delete service, customers must first sign a Pre-Authorization Agreement and either obtain a PIN or purchase one or more RSA SecurID tokens from Absolute Software.

²⁴ Firmware TPM is version 15.21. Hardware TPM is v2.0.

System Technical Specifications

System Board

System Board Form Factor	Approximately 416.56 x 373.38 mm (16.4 x 14.7 inches)	
Processor Socket	Single LGA-4677	
CPU Bus Speed	DMI Gen4 x 8 lanes	
Chipset	Intel W790 Alder Lake – WS PCH	
Super I/O Controller	Nuvoton SIO21	
Memory Expansion Slots	16 DDR5 RDIMM memory slots	
Memory Type Supported	DDR5, RDIMM (Registered) ECC, RDIMMs and 3DS RDIMMs	
Memory Modes	Non-Interleaving for single channel. Interleaving when multiple channels are populated	
Memory Speed Supported	4800MT/s for 1DPC and 4400MHz for 2DPC; DDR5	
Memory Protection	ECC on data	
Maximum Memory	2TB	
Memory Configuration (Supported)	16GB, 32GB, 64GB RDIMMs and 128GB 3DS RDIMM. RDIMMs and 3DS RDIMMs cannot be mixed in the same system. 64GB RDIMMs cannot be mixed with any other module capacities in the same system.	
NVDIMM Memory	No	
PCI Express Connectors	Standard PCIe Slots <ul style="list-style-type: none"> • 2 PCI Express Gen5 slot x16 mechanical/ x16 electrical (full height, full length) • 1 PCI Express Gen5 slot x4 mechanical/ x4 electrical (full height, full length) • 2 PCI Express Gen4 slot x16 mechanical/ x16 electrical (full height, full length) • 2 PCI Express Gen4 slot x4 mechanical/ x4 electrical (full height, full length) • 1 PCI Express Gen3 slot x8 mechanical/ x8 electrical (full height, full length) Personality Slots: <ul style="list-style-type: none"> • 2 PCI Express Gen4 slot x8 mechanical/ x8 electrical (full height, half length) (supports two x4 M.2 devices per personality slot) Other PCIe Connections <ul style="list-style-type: none"> • 2 Front NVMe Storage (SlimSAS PCIe Gen4 x8) (each PCIe connection supports two x4 M.2 devices for a total system support of four x4 M.2 devices via QX448) • 1 10GbE (PCIe Gen3 x4) 	
Supported Drive Interfaces	SATA Integrated RAID	Number of SATA ports: 6 Intel® SATA controller: primary SATA On-board RAID Support Intel® VROC® SATA RAID 0, 1, 5, and 10 supported on Windows 10 and 11, RHEL 8.6 and later, SLE 15 SP4 and later Intel® VROC® NVMe RAID 0, 1, 5, and 10 supported with presence of appropriate VROC upgrade module (after-market kits) on Windows 10 and 11, RHEL 8.6 and later, SLE 15 SP4 and later Factory Configured RAID: None
	Integrated Graphics	No
	Network Controller	Intel WGI210LAT and WGI219LM. WGI219LM LOM provides Management capabilities: WOL, PXE 2.1, DASH 1.1 and AMT
	External SATA (eSATA)	No
	Serial	1 internal header (requires optional Serial Port Adapter Kit)
	2nd Serial	No

System Technical Specifications

	HD Integrated Audio	Yes
USB Connector(s)	Front	<p>Front I/O Entry: 4 USB 3.1 Gen1 Type-A (left-most port supports Battery Charging 1.2)</p> <p>Front I/O Premium: 2x USB 3.2 Gen2x2 Type-C™ (Power Delivery 3.0) 2x USB 3.1 Gen1 Type-A (left-most port supports Battery Charging 1.2)</p> <ul style="list-style-type: none"> • USB Type-C Ports provide 3 Amps @ 5 Volts • Charging USB Type-A port provides 1.5 Amps @ 5 Volts • Standard USB Type-A Ports provide 900mA @ 5 Volts
	Rear	4x USB 3.1 Gen1 Type-A with USB hub and 2x USB 3.2 Gen 1 Type-A without hub.
	Internal	<p>1 USB 3.2 Gen1 header, with a single 12-pin shrouded connector. This header supports a USB Media Card reader.</p> <p>1 USB 2.0 single port header</p> <p>1 USB 2.0 dual port header</p>
Flash ROM		Yes
CPU Fan Header		Yes
Memory Fan Header		Yes (dual header)
Chassis Fan Header		3 front, one rear and one Aux Fan Header (dual)
Front PCI Fan Header		Yes (connects to AUX fan header)
Front Control Panel/Speaker Header		Yes
CMOS Battery Holder - Lithium		Yes
Integrated Trusted Platform Module		<p>Integrated TPM 2.0.</p> <p>Convertible to FIPS 140-2 Certified Mode through firmware v15.21.</p> <p>The TPM module is disabled where restricted by law.</p>
Power Supply Headers		Yes
Power Switch, Power LED & Hard Drive LED Header		Yes
Clear Password Jumper		Yes
Keyboard/Mouse		USB and PS/2 (option)

¹Maximum memory capacities assume 64-bit operating systems, such as Genuine Windows® 11 Professional 64 bit, Red Hat Linux 64-bit.

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

System Technical Specifications

System Configurations		
Example Configuration #1	Processor Info	Intel® Xeon® w5-3423 2.1GHz 12C 220W
	Memory Info	64GB DDR5 (4x16GB) RegRAM
	Graphics Info	1x NVIDIA® A2000
	Disks/Optical/Floppy	1x 4TB Internal M.2 SSD + 1x DVDRW SATA
	PSU	1x 1125W Full Height
	Other	N/A

Energy Consumption (Watts)	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	118.527	116.568	118.754	116.635	118.445	116.415
Windows Busy Typ (S0)	315.78		310.87		313.42	
Windows Busy Max (S0)	346.73		342.51		345.88	
Sleep (S3)	5.196	5.193	5.201	5.195	5.192	5.187
Off (S5)	1.591	1.578	1.593	1.579	1.587	1.575
Zero Power Mode (EuP)	0.186		0.252		0.185	

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)	404.414	397.73	405.188	397.958	404.134	397.207
Windows Busy Typ (S0)	1077.441		1060.688		1069.389	
Windows Busy Max (S0)	1183.043		1168.644		1180.143	
Sleep (S3)	17.728	17.718	17.745	17.725	17.715	17.698
Off (S5)	5.428	5.384	5.453	5.387	5.414	5.373
Zero Power Mode (EuP)	0.634		0.859		0.631	

Example Configuration #2	Processor Info	Intel® Xeon® w5-3435X 3.1GHz 16C 270W
	Memory Info	64GB DDR5 (4x16GB) RegRAM
	Graphics Info	1x NVIDIA® Quadro A4000
	Disks/Optical/Floppy	1x 1TB Internal SATA HDD + 2x 4TB Internal M.2 SSD + 1x DVDRW SATA
	PSU	1x 1125W Full Height
	Other	N/A

Energy Consumption (Watts)	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	123.644	121.267	123.845	121.486	123.241	120.891
Windows Busy Typ (S0)	473.23		469.61		472.28	
Windows Busy Max (S0)	495.31		488.24		491.81	
Sleep (S3)	5.24	5.177	5.325	5.197	5.185	5.114
Off (S5)	1.613	1.597	1.618	1.603	1.604	1.582
Zero Power Mode (EuP)	0.186		0.259		0.186	

		115 VAC	230 VAC	100 VAC
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System Technical Specifications

Heat Dissipation (Btu/hr)		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	421.873		413.763		422.559	
	Windows Busy Typ (S0)	1614.661		1602.309		1611.4194	
	Windows Busy Max (S0)	1689.997		1665.875		1678.056	
	Sleep (S3)	17.879	17.664	18.168	17.732	17.691	17.448
	Off (S5)	5.503	5.448	5.521	5.469	5.473	5.397
	Zero Power Mode (EuP)	0.634		0.883		0.634	
	Example Configuration #3	Processor Info	Intel® Xeon® w7-3455 2.5GHz 24C 270W				
	Memory Info	256GB DDR5 (16x16GB) RegRAM					
	Graphics Info	2x NVIDIA® Quadro A4000					
	Disks/Optical/Floppy	2x 1TB Internal SATA HDD + 2x 4TB Internal M.2 SSD + 1x DVDRW SATA					
	PSU	2x 1125W Redundant					
	Other	N/A					

Energy Consumption (Watts)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	161.93		158.45		162.05	
	Windows Busy Typ (S0)	547.49		538.57		543.44	
	Windows Busy Max (S0)	688.541		670.132		694.74	
	Sleep (S3)	7.231	7.013	7.235	7.018	7.224	7.009
	Off (S5)	2.622	2.285	2.635	2.289	2.587	2.267
	Zero Power Mode (EuP)	0.236		0.291		0.235	

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)	552.506		540.631		552.915	
	Windows Busy Typ (S0)	1868.035		1837.601		1854.217	
	Windows Busy Max (S0)	2349.301		2286.491		2370.452	
	Sleep (S3)	24.672	23.928	24.685	23.945	24.648	23.914
	Off (S5)	8.946	7.796	8.991	7.810	8.827	7.735
	Zero Power Mode (EuP)	0.805		0.992		0.801	

Example Configuration #4	Processor Info	Intel Xeon w7-3465X 2.5GHz 28C 300W					
	Memory Info	512GB DDR5 (16x32GB) RegRAM					
	Graphics Info	2x NVIDIA® Quadro A6000					
	Disks/Optical/Floppy	4x 4TB Internal SATA HDD + 2x 4TB Internal M.2 SSD + 1x DVDRW SATA					
	PSU	2x 1125W Half Height (Aggregate)					
	Other	N/A					

Energy Consumption (Watts)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	185.683		182.315		186.023		

System Technical Specifications

	Windows Busy Typ (S0)	802.106		792.69		800.97	
	Windows Busy Max (S0)	1093.001		1067.263		1092.547	
	Sleep (S3)	7.704	7.028	7.725	7.103	7.686	6.997
	Off (S5)	2.678	2.546	2.682	2.551	2.666	2.535
	Zero Power Mode (EuP)	0.233		0.290		0.231	

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)	633.550		622.058		634.710	
		Windows Busy Typ (S0)	2736.786		2704.658		2732.909	
		Windows Busy Max (S0)	3729.319		3641.501		3727.77	
		Sleep (S3)	26.286	23.979	26.357	24.235	26.224	23.873
		Off (S5)	9.137	8.686	9.151	8.704	9.096	8.649
		Zero Power Mode (EuP)	0.794		0.989		0.788	

Example Configuration #5	Processor Info	Intel Xeon w9-3495X 1.9GHz 56C 350W
	Memory Info	1024GB DDR5 (16x64GB) RegRAM
	Graphics Info	4x NVIDIA® Quadro A6000
	Disks/Optical/Floppy	4x 4TB Internal M.2 + 4x 4TB External M.2 + 1x DVDRW SATA
	PSU	2x 1125W Half Height (Aggregate)
	Other	N/A

Energy Consumption (Watts)		115 VAC		230 VAC		100 VAC		
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	
		Windows Idle (S0)	398.352		390.385		399.87	
		Windows Busy Typ (S0)	932.35		918.74		933.412	
		Windows Busy Max (S0)	TBD		TBD		TBD	
		Sleep (S3)	18.478	18.354	18.641	18.335	18.335	18.284
		Off (S5)	2.261	2.156	2.312	2.174	2.268	2.155
		Zero Power Mode (EuP)	0.230		0.291		0.231	

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)	1359.177		1331.993		1364.356	
		Windows Busy Typ (S0)	3181.178		3134.741		3184.801	
		Windows Busy Max (S0)	TBD		TBD		TBD	
		Sleep (S3)	63.047	62.624	63.603	62.559	62.559	62.385
		Off (S5)	7.714	7.356	7.888	7.417	7.738	7.352
		Zero Power Mode (EuP)	0.788		0.993		0.788	

NOTE: The numbers in this table are from actual measurements on a single system. There will be some variation from unit to unit.

NOTE: The busy power number and associated BTU/hr number for each configuration will be a strong function of the actual application software run on the system. There can be a great deal of variation in this number.

System Technical Specifications

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	47-66 Hz
ENERGY STAR® certified (Config Dependent)	Yes
CECP Compliant @ 220V	Yes
FEMP Standby Power Compliant	Yes, with Wake-on-LAN disabled: <1W in S5 - Power 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 - Power Off)	Yes
ErP Lot 6- Tier 2 Compliance @ 230V (<0.5W in S5 - Power Off)	Yes

Declared Noise Emissions (Entry-level, Mid-level, and High-end configurations; tested on floor)			
System Configuration (Entry level)	Processor Info	Intel Sapphire Rapids 12C 220W	
	Memory Info	4 x 16GB DDR5-4800 RDIMM	
	Graphics Info	1 x NVIDIA RTX A2000	
	Disks/Optical	2 x 512GB SSD / Blu-ray DVD+/-RW	
	Power Supply	1125W Full Height	
Declared Noise Emissions		Sound Power (LWAd, bels)	Deskside Sound Pressure (LpAm, decibels)
	Idle	3.3	15
	Hard drive Operating (Drive Random Seek)	3.3	15
	Active mode	3.3	16
System Configuration (Mid-level)	Processor Info	Intel Sapphire Rapids 36C 300W	
	Memory Info	4 x 16GB DDR5-4800 RDIMM	
	Graphics Info	1 x NVIDIA RTX A4000	
	Disks/Optical	2 x 512GB SSD + 1TB HDD / Blu-ray DVD+/-RW	
	Power Supply	1125W Full Height	
Declared Noise Emissions		Sound Power (LWAd, bels)	Deskside Sound Pressure (LpAm, decibels)
	Idle	3.4	16
	Hard drive Operating (Drive Random Seek)	4.0	20

System Technical Specifications

	Active mode	3.7	18
System Configuration (High-end)	Processor Info	Intel Sapphire Rapids 56C 350W	
	Memory Info	16 x 64GB DDR5-4800 RDIMM	
	Graphics Info	4 x NVIDIA RTX A6000	
	Disks/Optical	4 x 4TB SSD + 4 x 8TB HDD / Blu-ray DVD+/-RW	
	Power Supply	2 x 1125W Half Height	
Declared Noise Emissions		Sound Power (LWAd, bels)	Deskside Sound Pressure (LpAm, decibels)
	Idle	4.3	28
	Hard drive Operating (Drive Random Seek)	4.5	29
	Active mode	4.4	28

Environmental Requirements

Temperature

Operating: 5° to 40°C (40° to 104°F)¹
 Non-operating: -40° to 60°C (-40° to 140°F)

¹40°C has been validated for configs up to a 300W CPU, 2x NVIDIA® RTX A4000 graphics cards, 8x64GB RAM, 4x 2TB M.2 storage, 2x 2TB HDD storage, and 1125W full-height PSU

Humidity

Operating: 10% to 85% RH, non-condensing
 Non-operating: 10% to 90% RH, non-condensing

Maximum Altitude

Operating (with Rotational Hard Drives): 3,048 m (10,000 feet)
 Operating (with only Solid-State Drives): 5,000 m (16,404 feet)

Non-operating: 9,144 m (30,000 feet)

Dynamic

Shock

Operating: ½-sine: 40g, 2-3ms (~62 cm/sec)
 Non-operating: ½-sine: 160 cm/s, 2-3ms (~105g)
 square: 422 cm/s, 20g

NOTE: Values represent individual shock events and do not indicate repetitive shock events

Vibration

Operating random: 0.5g (rms), 5-300 Hz, up to 0.0025g²/Hz
 Non-operating random: 2.0g (rms), 5-500 Hz, up to 0.0150 g²/Hz

NOTE: Values do not indicate continuous vibration.

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)

System Technical Specifications

Physical Security and Serviceability

Access Panel	Tool-less Includes system board and memory information
Optical Drive	Tool-less, 2nd Optical Drive requires a 5.25" bay carrier
Hard Drives	Tool-less
Expansion Cards	Tool-less
Processor Socket	Screw-in processor coolers
Blue User Touch Points	Yes, on tool-less internal chassis mechanisms
Color-coordinated Cables and Connectors	Yes
Memory	Tool-less
System Board	Tool-less, retained by Front Card Guide and Top Memory Fan Holder
Power and HD LED on Front of Computer	Yes
Configuration Record SW	Yes
Over-Temp Warning on Screen	Yes
Dual Function Front Power Switch	Yes, causes a fail-safe power off when held for 4 seconds
Padlock Support	No
Cable Lock Support	Yes, Kensington Cable Lock (optional): Prevents entire system theft only. 3mm x 7mm slot at rear of system
Universal Chassis Clamp Lock Support	No
Chassis Interlock Sensor	Yes Sensor detects when the access panel has been removed. The access panel must be installed for the system to power ON. Removal of the access panel during operation will power OFF the system.
Solenoid Lock and Hood Sensor	No
Rear Port Control Cover	No
Serial, USB, Audio, Network, Enable/Disable Port Control	Yes, enables or disables serial, USB, audio, and network ports
Removable Media Write/Boot Control	Yes, prevents ability to boot from removable media on supported devices (and can disable writes to media)
Power-On Password Setup Password	Yes, prevents an unauthorized person from booting up the workstation Yes, prevents an unauthorized person from changing the workstation configuration
3.3V Aux Power LED on System PCA	No
NIC LEDs (integrated) (Green & Amber)	Yes
CPUs and Heatsinks	A torx driver (T30) is needed to remove the processor heatsink. CPU attached to heatsink via tool-less clip
Power Supply Diagnostic LED	Yes
Front Power Button	Yes
Front Power LED	Yes, white (normal), red (fault)

System Technical Specifications

Front Hard Drive Activity LED	Yes, white
Front ODD Activity LED	Yes, on device
Internal Speaker	Yes
System/Emergency ROM Flash Recovery	Recovers corrupted system BIOS.
Cooling Solutions	Air cooled forced convection
Power Supply Fans	2x - Dual Side Inlet Blowers for each power supply
CPU Heatsink Fan	Base: 92 mm x 92 mm x 25 mm Performance: 108 mm x 108 mm x 25 mm
Chassis Fan	Rear: 120 mm x 38 mm Front Lower: 120 mm x 25.4 mm Front Middle: 92 mm x 25.4 mm Front Upper: 92 mm x 25 mm
Memory Heatsink Fan	Memory: 2x 80 mm x 25 mm
HP PC Hardware Diagnostics UEFI	HP PC Hardware Diagnostics (UEFI) enables hardware level testing outside the operating system on many components. The diagnostics can be invoked by pressing F2 at POST, and is available as a download from HP Support.
Access Panel Key Lock	Yes, left access panel
ACPI-Ready Hardware	Advanced Configuration and Power Management Interface (ACPI). <ul style="list-style-type: none">• Allows the system to wake from a low power mode.• Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system.
Integrated Chassis Handles	Yes, front and rear
Power Supply	Tool-less, rear access direct-connect (blind-mate)
PCI Card Retention	Yes, rear (all), middle (full-height cards), front (cards with extender)
Flash ROM	Yes
Diagnostic Power Switch LED on board	Yes
Clear Password Jumper	Yes
Clear CMOS Button	Yes
CMOS Battery Holder	Yes
DIMM Connectors	Yes

Service, Support, and Warranty

On-site Warranty and Service¹: One-year, limited warranty and service offering delivers on-site, next business-day² service for parts and labor and includes free telephone support³ 8am - 5pm. Global coverage² 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

PCIe 5.0 Support	Full BIOS support for PCI Express through industry standard interfaces. Supported speeds and slot information vary.
ATA/ATAPI	AT Attachment 6 with Packet Interface (ATA/ATAPI-6), Revision 3b
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 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 Reference Specification, Version 3.2
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: <ul style="list-style-type: none">• NORMAL - normal temperature ranges.• ALERTED - excessive temperatures are detected. Raises a flag so action can be taken to avoid shutdown or provide for a smoother system shutdown.• SHUTDOWN - excessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs.

System Technical Specifications

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). Enables an operating system to control system power consumption based on the dynamic workload. Makes it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system. 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 - ACPI 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. 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, bifurcation, speed) 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
CD Boot	"El Torito" Bootable CD-ROM Format Specification Version 1.0
EHCI	Enhanced Host Controller Interface for Universal Serial Bus, Revision 1.0
PCI Express	PCI Express Base Specification, Revision 2.0 PCI Express Base Specification, Revision 3.0 PCI Express Base Specification, Revision 4.0 PCI Express Base Specification, Revision 5.0
SATA	Serial ATA Specification, Revision 1.0a Serial ATA 3 Gb/s: Serial ATA Specification, Revision 2.5 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 9672). Common Criteria EAL4+ certified. FIPS 140-2 Certification TCG TPM Certified products list: http://www.trustedcomputinggroup.org/certification/tpm-certified-products/
UHCI	Universal Host Controller Interface Design Guide, Revision 1.1

System Technical Specifications

USB	<ul style="list-style-type: none"> Universal Serial Bus Revision 1.1 Specification Universal Serial Bus Revision 2.0 Specification Universal Serial Bus Revision 3.1 Specification Universal Serial Bus Revision 3.2 Specification USB Battery Charging specification, Revision 1.2 USB Power Delivery specification Revision 3.0
SMBIOS	System Management BIOS Reference Specification, Version 3.2

Social and Environmental Responsibility

Eco-Label Certifications & Declarations

This product is low halogen except for HP Z Turbo Quad Pro PCIe TLC SSD, power cords, cables, and peripherals. Service parts obtained after purchase may not be Low Halogen. CRU QX448 removable storage frames are not 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 registered in the United States. See <http://www.epeat.net> for registration status in your country.
- TCO Certified
- China Energy Conservation Program (CECP)
- China State Environmental Protection Administration (SEPA)
- Taiwan Green Mark
- Korea Eco-label
- Japan PC Green label*

Sustainable Impact Specifications

- Ocean-bound plastic in System fan, CPU fan
- 40% post-consumer recycled plastic
- 10% recycled metal
- Low halogen
- Outside Box and corrugated cushions are 100% sustainably sourced and recyclable
- Recycled Plastic cushions

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
Normal Operation (Sort idle)	124.28 W	124.89 W	N/A
Normal Operation (Long idle)	122.88 W	123.22 W	N/A
Sleep	4.57 W	4.94 W	N/A
Off	1.62 W	1.65 W	N/A

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.

System Technical Specifications

Heat Dissipation*	115VAC, 60Hz	230VAC, 50Hz	100VAC, 50Hz
Normal Operation (Short idle)	425 BTU/hr	427 BTU/hr	N/A
Normal Operation (Long idle)	420 BTU/hr	421 BTU/hr	N/A
Sleep	16 BTU/hr	17 BTU/hr	N/A
Off	6 BTU/hr	6 BTU/hr	N/A

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

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

	Sound Power (L _{WAd} , bels)	Sound Pressure (L _{pAm} , decibels)
Typically Configured – Idle	3.3	15
Fixed Disk – Random writes	3.3	15
Active Mode	3.3	16

Longevity and Upgrading

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

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 91.7% recycle-able when properly disposed of at end of life.

Packaging Materials External:

PAPER/Corrugated 2070 g

Internal:

PLASTIC/EPE (Expanded 900 g

Polyethylene)

PLASTIC/Polyethylene low density 46 g

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.

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.

System Technical Specifications

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.

System Technical Specifications

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.
- Plastic cushions are made from >90% recycled plastic.
- Recycled metal is expressed as a percentage of the total weight of the metal according to ISO 14021 definitions for metal parts over 25 grams

Manageability

Industry Standard Specifications

This product meets the following industry standard specifications for manageability functionality:

- DASH 1.2 (via Intel® LAN on motherboard)

Intel® Active Management Technology (AMT)

Intel® Active Management Technology (AMT) 16.10

An advanced set of remote management features and functionality providing IT administrators the latest and most effective tools to remotely discover, heal, and protect networked client systems regardless of the system's health or power state. AMT 16.10 includes the following advanced management functions:

- Power Management (on, off, reset, graceful shutdown, sleep and hibernate)
 - Support in Max Power Savings (Shutdown and Hibernate Modes)
- Hardware Inventory (includes BIOS and firmware revisions)
- Hardware Alerting
- Agent Presence
- System Defense Filters
- Serial Over LAN (SOL)
- USB Redirect (Media Redirection)
- ME Wake-on-LAN (WOL), even with Maximum Power Savings Enabled
- DASH 1.2 compliance

System Technical Specifications

- IPv6 Support
- Fast Call for Help - a client inside or outside the firewall may initiate a call for help via BIOS screen, periodic connections, or alert triggered connection
- Remote Scheduled Maintenance - pre-schedule when the system connects to the IT or service provider console for maintenance.
- Remote Alerts - automatically alert IT or service provider if issues arise
- Access Monitor - Provides oversight into Intel® AMT actions to support security requirements
- PC Alarm Clock
- Microsoft NAP Support
- Host Base set-up and configuration
- Management Engine (ME) firmware roll back
- Local Time Sync to UTC
- Remote Memory Dump Command – Creates memory dump for debug

Intel® vPro™ Technology Yes, when configured with an Intel® vPro™ supporting processor.

Technical Specifications - Stable & Consistent Offerings

Stable & Consistent Offerings

Global Series SKUs

As part of its commitment to hardware, software, and solution innovation, HP is proud to introduce this breakthrough platform configuration stability to HP Workstation customers. HP Stable & Consistent Offerings are built on the foundation of a carefully chosen set of hardware and software designed and tested to work with all HP Z Workstation platforms through their end of life. These components and their corresponding HP Workstation platform compatibility are outlined in this section.

Stable & Consistent Offerings

HP Stable & Consistent Offerings are available worldwide to all HP Workstation customers—no special programs, no additional cost—no kidding. Simply select your hardware and software components when you customize your HP Workstation and be assured that you'll be able to buy that same configuration throughout the lifecycle of the product.

Processors**Product #****Offering**

6M6F2AV

Intel Xeon W5-3425

6M6F4AV

Intel Xeon W5-3435X

Graphics**Product #****Offering**

6W8P2AV

NVIDIA Long-Life T1000E

6W8N9AV

NVIDIA Long-Life RTX A2000E

6W8P0AV

NVIDIA Long-Life RTX A4000E

6B4F1AV

AMD Radeon RX 6400

3F5P0AV

AMD Radeon Pro 6600

Storage**Product #****Offering**

3F5V2AV

Z Turbo 1TB PCIe-4x4 2280 TLC M.2 Solid State Drive

3F6V3AV

1TB 7200RPM SATA 3.5in Enterprise

Technical Specifications - Storage Drives

STORAGE/HARD DRIVES

Performance PCIe SSDs for HP Workstations	Z Turbo 512GB 2280 PCIe-4x4 TLC SSD	Capacity	512GB
		Protocol	PCIe
		Form Factor	M.2
		Controller	NVMe
		NAND Type	3D TLC
		Endurance	300TBW (TB Written)
		Reliability	1.5M hours
		Rated for 24/7/365 operation	No
		Interface	PCI Express 4.0 x4 electrical
		Operating Temperature	32° to 158° F (0° to 70° C)
		Performance	Sequential Read up to 6400MB/s*
			Sequential Write up to 3400MB/s*
			Random Read up to 600K IOPS*
	Random Write up to 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.

Z Turbo 512GB 2280 PCIe-4x4 SED OPAL2 TLC M.2 SSD	Capacity	512GB
	Protocol	PCIe
	Form Factor	M.2
	Controller	NVMe
	NAND Type	3D TLC
	Endurance	300TBW (TB Written)
	Reliability	1.5M hours
	Rated for 24/7/365 operation	No
	Interface	PCI Express 4.0 x4 electrical
	Operating Temperature	32° to 158° F (0° to 70° C)
	Performance	Sequential Read up to 6400MB/s*
		Sequential Write up to 3400MB/s*
		Random Read up to 600K IOPS*
	Random Write up to 600K IOPS*	
Self-Encrypting Drive Support	OPAL 2	

*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.

Z Turbo 1TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 SSD	Capacity	1TB
	Protocol	PCIe
	Form Factor	M.2
	Controller	NVMe
	NAND Type	3D TLC
	Endurance	400TBW (TB Written)
	Reliability	1.5M hours

Technical Specifications - Storage Drives

Rated for 24/7/365 operation	No								
Interface	PCI Express 4.0 x4 electrical								
Operating Temperature	32° to 158° F (0° to 70° C)								
Performance	<table> <tr> <td>Sequential Read</td> <td>up to 6500MB/s*</td> </tr> <tr> <td>Sequential Write</td> <td>up to 5000MB/s*</td> </tr> <tr> <td>Random Read</td> <td>up to 800K IOPS*</td> </tr> <tr> <td>Random Write</td> <td>up to 800K IOPS*</td> </tr> </table>	Sequential Read	up to 6500MB/s*	Sequential Write	up to 5000MB/s*	Random Read	up to 800K IOPS*	Random Write	up to 800K IOPS*
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*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.

Z Turbo 1TB 2280 PCIe-4x4 TLC SSD	<table> <tr> <td>Capacity</td> <td>1TB</td> </tr> <tr> <td>Protocol</td> <td>PCIe</td> </tr> <tr> <td>Form Factor</td> <td>M.2</td> </tr> <tr> <td>Controller</td> <td>NVMe</td> </tr> <tr> <td>NAND Type</td> <td>3D TLC</td> </tr> <tr> <td>Endurance</td> <td>400TBW (TB Written)</td> </tr> <tr> <td>Reliability</td> <td>1.5M hours</td> </tr> <tr> <td>Rated for 24/7/365 operation</td> <td>No</td> </tr> <tr> <td>Interface</td> <td>PCI Express 4.0 x4 electrical</td> </tr> <tr> <td>Operating Temperature</td> <td>32° to 158° F (0° to 70° C)</td> </tr> <tr> <td>Performance</td> <td> <table> <tr> <td>Sequential Read</td> <td>up to 6500MB/s*</td> </tr> <tr> <td>Sequential Write</td> <td>up to 5000MB/s*</td> </tr> <tr> <td>Random Read</td> <td>up to 800K IOPS*</td> </tr> <tr> <td>Random Write</td> <td>up to 800K IOPS*</td> </tr> </table> </td> </tr> </table>	Capacity	1TB	Protocol	PCIe	Form Factor	M.2	Controller	NVMe	NAND Type	3D TLC	Endurance	400TBW (TB Written)	Reliability	1.5M hours	Rated for 24/7/365 operation	No	Interface	PCI Express 4.0 x4 electrical	Operating Temperature	32° to 158° F (0° to 70° C)	Performance	<table> <tr> <td>Sequential Read</td> <td>up to 6500MB/s*</td> </tr> <tr> <td>Sequential Write</td> <td>up to 5000MB/s*</td> </tr> <tr> <td>Random Read</td> <td>up to 800K IOPS*</td> </tr> <tr> <td>Random Write</td> <td>up to 800K IOPS*</td> </tr> </table>	Sequential Read	up to 6500MB/s*	Sequential Write	up to 5000MB/s*	Random Read	up to 800K IOPS*	Random Write	up to 800K IOPS*
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*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.

Z Turbo 1TB 2280 PCIe-4x4 TLC SSD	<table> <tr> <td>Capacity</td> <td>1TB</td> </tr> <tr> <td>Protocol</td> <td>PCIe</td> </tr> <tr> <td>Form Factor</td> <td>M.2</td> </tr> <tr> <td>Controller</td> <td>NVMe</td> </tr> <tr> <td>NAND Type</td> <td>3D TLC</td> </tr> <tr> <td>Endurance</td> <td>400TBW (TB Written)</td> </tr> <tr> <td>Reliability</td> <td>1.5M hours</td> </tr> <tr> <td>Rated for 24/7/365 operation</td> <td>No</td> </tr> <tr> <td>Interface</td> <td>PCI Express 4.0 x4 electrical</td> </tr> <tr> <td>Operating Temperature</td> <td>32° to 158° F (0° to 70° C)</td> </tr> <tr> <td>Performance</td> <td> <table> <tr> <td>Sequential Read</td> <td>up to 6500MB/s*</td> </tr> <tr> <td>Sequential Write</td> <td>up to 5000MB/s*</td> </tr> <tr> <td>Random Read</td> <td>up to 800K IOPS*</td> </tr> <tr> <td>Random Write</td> <td>up to 800K IOPS*</td> </tr> </table> </td> </tr> </table>	Capacity	1TB	Protocol	PCIe	Form Factor	M.2	Controller	NVMe	NAND Type	3D TLC	Endurance	400TBW (TB Written)	Reliability	1.5M hours	Rated for 24/7/365 operation	No	Interface	PCI Express 4.0 x4 electrical	Operating Temperature	32° to 158° F (0° to 70° C)	Performance	<table> <tr> <td>Sequential Read</td> <td>up to 6500MB/s*</td> </tr> <tr> <td>Sequential Write</td> <td>up to 5000MB/s*</td> </tr> <tr> <td>Random Read</td> <td>up to 800K IOPS*</td> </tr> <tr> <td>Random Write</td> <td>up to 800K IOPS*</td> </tr> </table>	Sequential Read	up to 6500MB/s*	Sequential Write	up to 5000MB/s*	Random Read	up to 800K IOPS*	Random Write	up to 800K IOPS*
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Technical Specifications - Storage 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.

Z Turbo 2TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 SSD	Capacity	2TB	
	Protocol	PCIe	
	Form Factor	M.2	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	500TBW (TB Written)	
	Reliability	1.5M hours	
	Rated for 24/7/365 operation	No	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	up to 6500MB/s*
		Sequential Write	up to 5000MB/s*
		Random Read	up to 800K IOPS*
		Random Write	up to 800K IOPS*
Self-Encrypting Drive Support	OPAL 2		

*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.

Z Turbo 2TB 2280 PCIe-4x4 TLC SSD	Capacity	2TB	
	Protocol	PCIe	
	Form Factor	M.2	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	500TBW (TB Written)	
	Reliability	1.5M hours	
	Rated for 24/7/365 operation	No	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	up to 6500MB/s*
		Sequential Write	up to 5000MB/s*
		Random Read	up to 800K IOPS*
		Random Write	up to 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.

Z Turbo 4TB 2280 PCIe-4x4 TLC M.2 SSD	Capacity	4TB
	Protocol	PCIe
	Form Factor	M.2
	Controller	NVMe
	NAND Type	3D TLC

Technical Specifications - Storage Drives

Endurance	600TBW (TB Written)	
Reliability	1.5M hours	
Rated for 24/7/365 operation	No	
Interface	PCI Express 4.0 x4 electrical	
Operating Temperature	32° to 158° F (0° to 70° C)	
Performance	Sequential Read	up to 6500MB/s*
	Sequential Write	up to 5000MB/s*
	Random Read	up to 700K IOPS*
	Random Write	up to 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.

Z Turbo 4TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 SSD

Capacity	4TB	
Protocol	PCIe	
Form Factor	M.2	
Controller	NVMe	
NAND Type	3D TLC	
Endurance	600TBW (TB Written)	
Reliability	1.5M hours	
Rated for 24/7/365 operation	No	
Interface	PCI Express 4.0 x4 electrical	
Operating Temperature	32° to 158° F (0° to 70° C)	
Performance	Sequential Read	up to 6500MB/s*
	Sequential Write	up to 5000MB/s*
	Random Read	up to 700K IOPS*
	Random Write	up to 700K IOPS*
Self-Encrypting Drive Support	OPAL 2	

*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.

Performance PCIe SSDs for HP Dual Pro Carrier

HP Z Turbo Drive Dual Pro 512GB SSD

Capacity	512GB	
Protocol	PCIe	
Form Factor	M.2	
Controller	NVMe	
NAND Type	3D TLC	
Endurance	300TBW (TB Written)	
Reliability	1.5M hours	
Rated for 24/7/365 operation	No	
Interface	PCI Express 4.0 x4 electrical	
Operating Temperature	32° to 158° F (0° to 70° C)	
Performance	Sequential Read	up to 6400MB/s*
	Sequential Write	up to 3400MB/s*

Technical Specifications - Storage Drives

Random Read	up to 600K IOPS*
Random Write	up to 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 Drive Dual Pro 1TB SSD	Capacity	1TB	
	Protocol	PCIe	
	Form Factor	M.2	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	400TBW (TB Written)	
	Reliability	1.5M hours	
	Rated for 24/7/365 operation	No	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	up to 6500MB/s*
		Sequential Write	up to 5000MB/s*
		Random Read	up to 800K IOPS*
		Random Write	up to 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 Drive Dual Pro 2TB SSD	Capacity	2TB	
	Protocol	PCIe	
	Form Factor	M.2	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	500TBW (TB Written)	
	Reliability	1.5M hours	
	Rated for 24/7/365 operation	No	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	up to 6500MB/s*
		Sequential Write	up to 5000MB/s*
		Random Read	up to 800K IOPS*
		Random Write	up to 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 Drive Dual Pro 4TB SSD	Capacity	4TB
	Protocol	PCIe
	Form Factor	M.2
	Controller	NVMe
	NAND Type	3D TLC

Technical Specifications - Storage Drives

Endurance	500TBW (TB Written)	
Reliability	1.5M hours	
Rated for 24/7/365 operation	No	
Interface	PCI Express 4.0 x4 electrical	
Operating Temperature	32° to 158° F (0° to 70° C)	
Performance	Sequential Read	up to 6500MB/s*
	Sequential Write	up to 5000MB/s*
	Random Read	up to 800K IOPS*
	Random Write	up to 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.

SATA Hard Drives for HP Workstations

1TB 7200RPM SATA 3.5in Enterprise HDD	Capacity	1TB	
	Protocol	SATA	
	Form Factor	3.5"	
	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	YES	
	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	128MB	
	Cache	Adaptive	
	Seek Time (typical reads, includes controller overhead, including settling)	Single Track	0.32 ms *
		Average	7.45 ms *
		Full Stroke	14.2 ms *
	Rotational Speed	7,200 rpm	
	Logical Blocks	1,953,525,168	
Operating Temperature	41° to 131° F (5° to 55° C)		
Performance	Sequential Read	up to 226MB/s*	
	Sequential Write	up to 226MB/s*	

*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 7200RPM SATA 3.5in Enterprise HDD	Capacity	2TB
	Protocol	SATA
	Form Factor	3.5"
	Controller	AHCI

Technical Specifications - Storage Drives

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	YES	
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	128MB	
Cache	Adaptive	
Seek Time (typical reads, includes controller overhead, including settling)	Single Track	0.7 ms *
	Average	8.5 ms *
	Full Stroke	15.7 ms *
Rotational Speed	7,200 rpm	
Logical Blocks	3,907,029,168	
Operating Temperature	41° to 131° F (5° to 55° C)	
Performance	Sequential Read	up to 226MB/s*
	Sequential Write	up to 226MB/s*

*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 7200RPM SATA 3.5in Enterprise HDD	Capacity	4TB		
	Protocol	SATA		
	Form Factor	3.5"		
	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	YES		
	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	256MB		
	Cache	Adaptive		
	Seek Time (typical reads, includes controller)	Single Track	0.7 ms *	
		Average	8.5 ms *	
	Full Stroke	15.7 ms *		

Technical Specifications - Storage Drives

overhead, including settling)

Rotational Speed	7,200 rpm	
Logical Blocks	7,814,037,168	
Operating Temperature	41° to 131° F (5° to 55° C)	
Performance	Sequential Read	up to 226MB/s*
	Sequential Write	up to 226MB/s*

*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 7200RPM SATA 3.5in Enterprise HDD

Capacity	8TB	
Protocol	SATA	
Form Factor	3.5"	
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	YES	
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	256MB	
Cache	Adaptive	
Seek Time (typical reads, includes controller overhead, including settling)	Single Track	0.7 ms *
	Average	8.5 ms *
	Full Stroke	15.7 ms *
Rotational Speed	7,200 rpm	
Logical Blocks	15,628,053,168	
Operating Temperature	41° to 140° F (5° to 60° C)	
Performance	Sequential Read	up to 226MB/s*
	Sequential Write	up to 226MB/s*

*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.

12TB 7200RPM SATA-6G 3.5in Enterprise HDD

Capacity	12TB	
Protocol	SATA	
Form Factor	3.5"	
Controller	AHCI	
Reliability	2.0M hours	
Rated Power On Hours	8760/yr	

Technical Specifications - Storage Drives

Annualized Failure Rate (based on Rated POH)	<0.62%
Rated for 24/7/365 operation	YES
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	256MB
Cache	Adaptive
Seek Time (typical reads, includes controller overhead, including settling)	Single Track 0.7 ms *
	Average 8.5 ms *
	Full Stroke 15.7 ms *
Rotational Speed	7,200 rpm
Logical Blocks	23,437,770,752
Operating Temperature	41° to 140° F (5° to 60° C)
Performance	Sequential Read up to 226MB/s*
	Sequential Write up to 226MB/s*

*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

GRAPHICS

NVIDIA® RTX™ 6000 Ada 48GB	Form Factor	Full-Height Dual Slot (4.4" Height x 10.5" Length) Weight: 1230 grams / 2.71 lbs (with extender)
	Max Power Consumption	Power: 300 Watts Cooling: Active
	GPU Memory	48GB GDDR6 memory ECC Memory Bandwidth: Up to 960 GB/s Memory Width: 384 bits
	Connectors	4x DisplayPort 1.4a Quadro Sync II connector Stereo Sync Requires CEM 5.0 16-pin auxiliary power adapter
	Maximum Resolution	7680x4320 @ 120Hz
	Bus Type	PCI Express 4.0 x16
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

NVIDIA® RTX™ A6000 48GB	Form Factor	Full-Height Dual Slot (4.4" Height x 10.5" Length) Weight: 1230 grams / 2.71 lbs (with extender)
	Max Power Consumption	Power: 300 Watts Cooling: Active
	GPU Memory	48GB GDDR6 memory ECC optional Memory Bandwidth: Up to 768 GB/s Memory Width: 384 bit
	Connectors	4x DisplayPort 1.4a Quadro Sync II connector NVLink® Stereo Sync Requires 8-pin auxiliary power
	Maximum Resolution	7680x4320 @ 120Hz
	Bus Type	PCI Express 4.0 x16
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

NVIDIA® RTX™ A5000 24GB	Form Factor	Full-Height Dual Slot (4.4" Height x 10.5" Length) Weight: 1049 grams + 80 grams extender
	Max Power Consumption	Power: 230W Cooling: Active
	GPU Memory	24GB GDDR6 memory ECC optional Memory Bandwidth: Up to 768 GB/s Memory Width: 384 bit
	Connectors	4x DisplayPort 1.4a Quadro Sync II connector NVLink® Stereo Sync Requires 8-pin auxiliary power

Technical Specifications - Graphics

Maximum Resolution	7680x4320 @ 120Hz
Bus Type	PCI Express 4.0 x16
Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

NVIDIA® RTX A4500 20GB

Form Factor	Full-Height Dual Slot (4.4" Height x 10.5" Length) Weight: 1049 grams + 80 grams extender
Max Power Consumption	Power: 200W Cooling: Active
GPU Memory	20GB GDDR6 memory Memory Bandwidth: Up to 640 GB/s Memory Width: 320 bit
Connectors	4x DisplayPort 1.4a Quadro Sync II connector NVLink® Stereo Sync Requires 8-pin auxiliary power
Maximum Resolution	7680x4320 @ 120Hz
Bus Type	PCI Express 4.0 x16
Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

NVIDIA® RTX A4000 16GB

Form Factor	Full-Height Single Slot (4.4" Height x 9.5" Length) Weight: 500 grams
Max Power Consumption	Power: 140W Cooling: Active
GPU Memory	16GB GDDR6 memory Memory Bandwidth: Up to 448 GB/s Memory Width: 256 bit
Connectors	4x DisplayPort 1.4a Quadro Sync II connector Stereo Sync Requires 6-pin auxiliary power
Maximum Resolution	7680x4320 @ 120Hz
Bus Type	PCI Express 4.0 x16
Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

NVIDIA® Long-Life RTX A4000E 16GB

Form Factor	Full-Height Single Slot (4.4" Height x 9.5" Length) Weight: 500 grams
Max Power Consumption	Power: 140W Cooling: Active
GPU Memory	16GB GDDR6 memory Memory Bandwidth: Up to 448 GB/s Memory Width: 256 bit

Technical Specifications - Graphics

Connectors	4x DisplayPort 1.4a Quadro Sync II connector Stereo Sync Requires 6-pin auxiliary power
Maximum Resolution	7680x4320 @ 120Hz
Bus Type	PCI Express 4.0 x16
Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

NVIDIA® RTX A2000 12GB	Form Factor	Half-Height Dual Slot (2.713" Height x 6.6" Length) Weight: 306 grams
	Max Power Consumption	Power: 70W Cooling: Active
	GPU Memory	12GB GDDR6 memory Memory Bandwidth: Up to 288 GB/s Memory Width: 192 bit
	Connectors	4x mini-DisplayPort 1.4a
	Maximum Resolution	7680x4320 @ 120Hz
	Bus Type	PCI Express 4.0 x16
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

NVIDIA® Long-Life RTX A2000E 12GB	Form Factor	Half-Height Dual Slot (2.713" Height x 6.6" Length) Weight: 306 grams
	Max Power Consumption	Power: 70W Cooling: Active
	GPU Memory	12GB GDDR6 memory Memory Bandwidth: Up to 288 GB/s Memory Width: 192 bit
	Connectors	4x mini-DisplayPort 1.4a
	Maximum Resolution	7680x4320 @ 120Hz
	Bus Type	PCI Express 4.0 x16
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

NVIDIA® T1000 8GB	Form Factor	Half-Height Single Slot (2.713" Height x 6.137" Length) Weight: 132.6 grams
	Max Power Consumption	Power: 50W Cooling: Active
	GPU Memory	8GB GDDR6 memory Memory Bandwidth: Up to 160 GB/s Memory Width: 128 bit

Technical Specifications - Graphics

Connectors	4x mini-DisplayPort 1.4a
Maximum Resolution	7680x4320 @ 120Hz
Bus Type	PCI Express 3.0 x16
Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

NVIDIA® Long-Life T1000E 8GB

Form Factor	Half-Height Single Slot (2.713" Height x 6.137" Length) Weight: 132.6 grams
Max Power Consumption	Power: 50W Cooling: Active
GPU Memory	8GB GDDR6 memory Memory Bandwidth: Up to 160 GB/s Memory Width: 128 bit
Connectors	4x mini-DisplayPort 1.4a
Maximum Resolution	7680x4320 @ 120Hz
Bus Type	PCI Express 3.0 x16
Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

NVIDIA® T1000 4GB

Form Factor	Half-Height Single Slot (2.713" Height x 6.137" Length) Weight: 132.6 grams
Max Power Consumption	Power: 50W Cooling: Active
GPU Memory	4GB GDDR6 memory Memory Bandwidth: Up to 160 GB/s Memory Width: 128 bit
Connectors	4x mini-DisplayPort 1.4a
Maximum Resolution	7680x4320 @ 120Hz
Bus Type	PCI Express 3.0 x16
Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

NVIDIA® T400 4GB

Form Factor	Half-Height Single Slot (2.713" Height x 6.137" Length) Weight: 123.5 grams
Max Power Consumption	Power: 30W Cooling: Active
GPU Memory	4GB GDDR6 memory Memory Bandwidth: Up to 80 GB/s Memory Width: 64 bit
Connectors	3x mini-DisplayPort 1.4a
Maximum Resolution	7680x4320 @ 120Hz
Bus Type	PCI Express 3.0 x16

Technical Specifications - Graphics

Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit
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AMD® Radeon™ Pro W6800 32GB	Form Factor	Full-Height Dual Slot (4.4" Height x 10.5" Length) Weight: 850 grams
	Max Power Consumption	Power: 261W Cooling: Active
	GPU Memory	32GB GDDR6 memory Memory Bandwidth: Up to 512 GB/s Memory Width: 256 bit
	Connectors	6x mini-DisplayPort 1.4 Requires 8-pin+6-pin auxiliary power
	Maximum Resolution	7680x4320 @ 60Hz
	Bus Type	PCI Express 4.0 x16
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

AMD® Radeon™ Pro W6600 8GB	Form Factor	Full-Height Single Slot (4.38" Height x 9.50" Length) Weight: 132.6 grams
	Max Power Consumption	Power: 122W Cooling: Active
	GPU Memory	8GB GDDR6 memory Memory Bandwidth: Up to 224 GB/s Memory Width: 128 bit
	Connectors	4x DisplayPort 1.4 Requires 6-pin auxiliary power
	Maximum Resolution	7680x4320 @ 60Hz
	Bus Type	PCI Express 4.0 x16 (x8 electrical)
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

AMD® Radeon™ RX 6400 4GB	Form Factor	Half-Height Single Slot (4.4" Height x 10.5" Length) Weight: 155 grams
	Max Power Consumption	Power: 50W Cooling: Active
	GPU Memory	4GB GDDR6 memory Memory Bandwidth: Memory Width:
	Connectors	1x DisplayPort 1.4a 1x HDMI
	Maximum Resolution	7680x4320 @ 60Hz
Bus Type	PCI Express 4.0 x4	

Technical Specifications - Graphics

Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit
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Intel® Arc Pro A40 6GB	Form Factor	Half-Height Single Slot (2.7" Height x 6.6" Length) Weight: 220 grams
	Max Power Consumption	Power: 50W Cooling: Active
	GPU Memory	4GB GDDR6 memory Memory Bandwidth: 192GB Memory Width: 96 bit
	Connectors	4x mini- DisplayPort 1.4
	Maximum Resolution	7680x4320 @ 60Hz
	Bus Type	PCI Express 4.0 x8
	Available Graphics Drivers	Windows 11 Windows 10

Notes for all graphics cards:

- Some graphics and GPU compute cards can consume a great deal of power, thus combinations of cards with other components may exceed a particular power supply's output capability.
- Some graphics and GPU compute cards require supplemental power cables.
- Not all chassis/PSU configurations have enough supplemental power cables of the correct type for all graphics configurations.
- Refer to the Power Supply section within Overview for more information.

OPTICAL AND REMOVABLE STORAGE

HP 9.5mm Slim Blu-Ray 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	BD-ROM BD-R BD-RE DVD+R DVD+RW DVD+R DL DVD-R DL DVD-R DVD-RW CD-R CD-RW	
	Disc Capacity	DVD-ROM	8.5 GB DL or 4.7 GB standard

Technical Specifications - Graphics

	Blu-ray	25 GB (single-layer) 50 GB (dual-layer) 100/128 GB (BDXL)
	Full Stroke DVD	< 230 ms (seek)
	Full Stroke CD	< 220 ms (seek)
	Blu-ray	< 230 ms (seek) (Full Stroke Blu-ray)
	Startup Time	(Time to drive ready from tray loading) BD-ROM (SL/DL) 25S / 28S BD-R (SL/DL) 25S / 28S BD-RE (SL/DL) 25S / 28S DVD-ROM (SL/DL) 18S / 18S DVD-R (SL/DL) 25S / 25S DVD-RW 25S DVD+R (SL/DL) 25S / 25S DVD+RW 25S CD-ROM 15S
Maximum Data Transfer Rates	CD ROM Read	CD-ROM, CD-R Up to 24X CD-RW Up to 24X
	DVD ROM Read	DVD+RW Up to 8X DVD-RW Up to 8X DVD+R DL Up to 8X DVD-R DL Up to 8X DVD-ROM Up to 8X DVD-ROM DL Up to 8X DVD+R Up to 8X DVD-R Up to 8X
	Blu-ray	BD-ROM Up to 6X BD-ROM DL Up to 6X BD-R Up to 6X BD-R DL Up to 6X BD-R Up to 6X BD-RE SL/DL Up to 6X
Power	Source	SATA DC power receptacle
	DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p
	DC Current	5 VDC -900 mA typical, 2000mA 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, Red Hat® Enterprise Linux® (RHEL) 8, 9 Desktop/Workstation SUSE Linux® Enterprise Desktop 15 Ubuntu 20.04, 22.04 LTS	
	No driver is required for this device. Native support is provided by the operating system.	
Kit Contents	9.5mm Slim BDXL Blu-Ray Writer, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide	

Technical Specifications - Graphics

As Blu-ray is a new format containing new technologies, certain disc, digital connection, compatibility and/or performance issues may arise, and do not constitute defects in the product. Flawless playback on all systems is not guaranteed. In order for some Blu-ray titles to play, they may require a DVI or HDMI digital connection and your display may require HDCP support. HD-DVD movies cannot be played on this workstation.

NOTE: HD-DVD disks cannot be played on the DVD-ROM drive. No support for DVD-RAM. Actual speeds may vary. Don't copy copyright-protected materials. Double Layer discs can store more data than single layer discs. Discs burned with this drive may not be compatible with many existing single-layer DVD drives and players. Flawless playback on all systems is not guaranteed.

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 DVD+RW DVD+R DL DVD-R DL DVD-R DVD-RW CD-R CD-RW
	Disc Capacity	DVD-ROM 8.5 GB DL or 4.7 GB standard
		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 CD-RW Up to 24X
		DVD ROM Read DVD+RW Up to 8X DVD-RW Up to 8X DVD+R DL Up to 8X DVD-R DL Up to 8X DVD-ROM Up to 8X DVD-ROM DL Up to 8X DVD+R Up to 8X 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. Red Hat® Enterprise Linux® (RHEL) 8, 9 Desktop/Workstation SUSE Linux® Enterprise Desktop 15 Ubuntu 20.04, 22.04 LTS	

Technical Specifications - Graphics

* No driver is required for this device. Native support is provided by the operating system

Kit Contents HP SATA DVD Writer drive, installation guide.

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	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 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 -< 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 8.1, Windows 7 Professional 64-bit Red Hat® Enterprise Linux® (RHEL) 8, 9 Desktop/Workstation SUSE Linux® Enterprise Desktop 15 Ubuntu 20.04, 22.04 LTS		

No driver is required for this device. Native support is provided by the operating system.

Kit Contents 9.5mm Slim DVD-ROM Drive, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide

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

NETWORKING AND COMMUNICATIONS

NVIDIA® Mellanox® ConnectX-6 DX Dual Port 10/25GbE SFP28 NIC	Connector	2 x SFP28 Transceiver Cage (Dual Port)*
	Cabling	Depends on transceiver pairing. Typically OM4 or higher MMF LC fiber optic cabling with LC SFP28 Transceivers.
	Controller	ConnectX6-DX
	Memory	256Mbit SPI Quad Flash Device
	Data Rates Supported	1/10/25GbE
	Compliance	<ul style="list-style-type: none"> – IEEE 802.3by 25 Gigabit Ethernet – IEEE 802.3ae 10 Gigabit Ethernet – IEEE 802.3ap based auto-negotiation and KR startup – IEEE 802.3ad, 802.1AX Link Aggregation – IEEE 802.1Q, 802.1P VLAN tags and priority – IEEE 802.1Qau (QCN) – Congestion Notification – IEEE 802.1Qaz (ETS) – IEEE 802.1Qbb (PFC) – IEEE 802.1Qbg – IEEE 1588v2 – Jumbo frame support (9.6KB) – Safety: CB/cTUVus/CE – EMC: CE/FCC/VCCI/RCM – RoHS Compliant – KCC – CAN ICES-3 (B) – NM EN 55035/55032 (Morocco) – UKCA
	Bus Architecture	PCIe Gen 4 x8
	Data Transfer Mode	PCI Express - stores and accesses Ethernet fabric connection information and packet data
	Power Requirements	11.5 Watts (typical)
	Network Transfer Rate	1Gbps, 10Gbps, 25Gbps
	NOTE: Network Transfer Rate depends on transceiver model.*	
Kit Contents	NVIDIA® Mellanox® ConnectX-6 DX Dual Port 10/25GbE SFP28 NIC	

*3rd party transceivers sold separately. You must have a transceiver installed in order to connect this card to a network.

HP Dual Port 10GBase-T NIC Module G2	Networking Interface	2 RJ-45
	System Interface	Cabled from Dedicated Rear I/O Slot
	Networking Speeds Supported	10Gbps, 5Gbps, 2.5Gbps, 1Gbps, 100Mbps, 10Mbps
	Cabling (up to 100m)	Cat5e (or higher) for 1Gbps Cat6a (or higher) for 10Gbps
	Power Consumption (active-typical)	5.5W at 1Gbps 11.2W at 10Gbps

Technical Specifications - Networking and Communications

Physical Dimensions	0.875 in x 3 in x 2.75 in
Connect Speed LED Indicators	Link/Activity LED <ul style="list-style-type: none"> • Off = No link • Blinking = Activity Speed LED <ul style="list-style-type: none"> • Amber = 1Gbps • Green = 10Gbps
Operating Temperature	0 °C to 55 °C (32 °F to 131 °F)

NOTE: available Fall 2023

Intel® X550 10GBASE-T Dual Port NIC	Connector Cabling	2 x RJ-45 Cat5 (or higher) for 100Mbps Cat5e (or higher) for 1Gbps, 2.5Gbps, or 5Gbps Cat6 (or higher) for 10Gbps up to 55m Cat6a (or higher) for 10Gbps up to 100m
	Controller	Intel X550-AT2
	Memory	Jumbo Frames up to 15.5KB, 64 Tx and 64Rx Queues per port, 160KB/port of programmable memory transmit buffers
	Data Rates Supported	100Mbps (BASE-TX), 1Gbps (BASE-T, 2.5Gbps, 5Gbps, 10Gbps)
	Compliance	802.1q (VLAN), 802.1Qbb, 802.1p, 802.1Qaz
	Bus Architecture	PCIe 3x4
	Data Transfer Mode	PCIe Gen 3 x4 based interface
	Power Requirements	3.9W at 100Mbps 5.5W at 1Gbps 11.2W at 10Gbps
	Boot ROM Support	Yes
	Network Transfer Mode	Auto negotiation between 1GbE, 2.5GbE, 5GbE and 10GbE
	Management Capabilities	DMI 2.0 Support, Windows Management Instrumentation (WMI) and SNMP, PXE 2.0 through boot ROM, Multi-mode I/O Virtualization, VxLAN, VMDq, VLAN support with VLAN tag insertion
	Kit Contents	Intel® X550 10GBASE-T Dual Port NIC

Intel® I225-T1 Single Port 2.5GbE PCIe NIC	Connector Cabling	RJ-45 (Single Port) Cat5e (or better) up to 100m
	Controller	Intel® Ethernet I225 Controller
	Memory	Jumbo Frames up to 9.5KB, 4 Tx and Rx Queues,
	Data Rates Supported	2.5GbE, 1GbE, 100MbE, 10MbE
	Compliance	IEEE 802.3 auto negotiation, 802.3x, 802.3z
	Bus Architecture	PCIe Gen 3.1x1
	Data Transfer Mode	PCIe-based interface for active state operation
	Power Requirements	1.9 Watts (typical)
	Management Capabilities	WOL, PXE 2.1, Power Management Protocol Offload (proxying), MAC Power Management, Active State Power Management,
	Kit Contents	Intel® I225-T1 1-Port 2.5GbE NIC with standard height bracket attached

Technical Specifications - Networking and Communications

and Low-profile bracket included
Product Literature

Intel® Ethernet I350-T4V2 4-Port 1Gb NIC	Connector	4x RJ-45 (Quad Port)
	Cabling	Cat3 (or higher) for 10Mbps Cat5 (or higher) for 100Mbps Cat5e (or higher) for 1Gbps up to 100m
	Controller	Intel® I350
	Memory	Jumbo Frames up to 9.5KB, 8 Tx/Rx Queue pairs per port, Main Internal memory is Error Code Correcting
	Data Rates Supported	10Mbps, 100Mbps, 1Gbps
	Compliance	IEEE 802.3 auto negotiation, 802.3, 802.3u, 802.3ab, 802.3x, 802.3z, IEEE1588 protocol and 802.1AS implementation, 802.3az EEE
	Bus Architecture	PCI Express 2.1 x4
	Data Transfer Mode	PCIe-based interface for active state operation
	Power Requirements	5W
	Network Transfer Mode	Multi-speed, full, and half-duplex
	Network Transfer Rate	10BASE-T 100BASE-Tx 1000BASE-T
	Management Capabilities	WOL, PXE 2.1, UEFI, Power Management Protocol Offload (proxying), MAC Power Management, Active State Power Management, VLAN, ACPI
	Kit Contents	Intel® Ethernet I350-T4V2 4-Port 1Gb NIC with full-height bracket installed Low-profile bracket included

Allied Telesis AT-2911T/2-901 Dual Port 1GbE NIC	Connector	2 x RJ-45 (Dual Port)
	Cabling	Cat3 (or higher) for 10Mbps Cat5 (or higher) for 100Mbps Cat5e (or higher) for 1Gbps up to 100m
	Memory	17 Rx and 16 Tx queues
	Data Rates Supported	10/100/1000 Mbps
	Compliance	IEEE 802.1p (Quality of Service), IEEE 802.1Q (VLANs), IEEE 802.2 (LLC), IEEE 802.3ac (MAC), IEEE 802.3x (Flow control auto-negotiation), IEEE 802.3z (1000 Base-X), IEEE 802.3ad (Link aggregation), IEEE 802.3ab (10/100/1000T) RoHS, UL, FCC/EN55022 Class A, TUV, EN55024, CE, C-TICK, VCCI
	Bus Architecture	PCIe 2x1
	Data Transfer Mode	PCIe-based interface
	Power Requirements	2.4 Watts (typical)
	Management Capabilities	VLAN support, Link aggregation LACP, Link aggregation smart switch, Failover, Smart Load Balancing (SLB), iSCSI boot support, Windows Management Instrumentation (WMI), PXE 2.1, SNMP
	Kit Contents	Allied Telesis AT-2911T/2-901 Dual Port 1GbE NIC with low-profile bracket attached and standard bracket included

Connector	LC Fiber (Single Port)
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Technical Specifications - Networking and Communications

Allied Telesis AT-2914SX/LC 1GbE LC Fiber NIC	Cabling	50/125 µm (core/cladding) multimode fiber optic cable up to 500m 62.5/125 µm (core/cladding) multimode fiber optic cable up to 220m
	Memory	Jumbo Frames up to 9.6KB
	Data Rates Supported	1000SX (1GbE Fiber at 850nm Wavelength)
	Compliance	IEEE 802.1p (Quality of Service), IEEE 802.1Q (VLANs), IEEE 802.2 (LLC), IEEE 802.3ac (MAC), IEEE 802.3x (Flow control auto-negotiation), IEEE 802.3z (1000 Base-X), IEEE 802.3ad (Link aggregation) RoHS, UL, FCC/EN55022 Class A, TUV, EN55024, CE, C-TICK, VCCI
	Bus Architecture	PCIe x1
	Data Transfer Mode	PCIe-based interface
	Power Requirements	1.5 Watts (typical)
	Network Transfer Rate	1000SX only (1GbE Fiber at 850nm Wavelength)
	Management Capabilities	UEFI, Smart Load Balancing and failover, Link aggregation (IEEE802.3ad), Generic trunking (FEC/GEC) / IEEE 802.3ad-draft static, VLAN Support
	Kit Contents	Allied Telesis AT-2914SX/LC 1GB LC Fiber NIC with low-profile bracket attached and standard height bracket included

Intel® AX210 Wi-Fi 6E non-vPro + Bluetooth® 5.2 wireless card with External Antenna WLAN	Connector	Wireless
	Cabling	N/A
	Controller	Intel® AX210
	Data Rates Supported	Wi-Fi 6e (2.4GHz/5GHz/6GHz)
	Compliance	Wi-Fi Alliance* Wi-Fi Alliance CERTIFIED 6, WiFi CERTIFIED a/b/g/n/ac, WMM, WMM-Power Save, WPA2, WPA3, Wi-Fi Direct, and Wi-Fi Agile Multiband IEEE WLAN Standard 802.11-2016, 802.11a, b, d, e, g, h, l, k, n, r, u, v, w, ac, and ax, Bluetooth® 5.2
	Bus Architecture	PCIe G3x1 for WLAN, USB3.1G1 for BT
	Management Capabilities	Authentication Protocols: 802.1X EAP-TLS, EAP-TTLS/MSCHAPv2, PEAPv0 - MSCHAPv2 (EAP-SIM, EAP-AKA, EAP-AKA') Encryption: 128-bit AES-CCMP, 256-bit AES-GCMP UEFI
Kit Contents	Intel® AX210 Wi-Fi 6 + Bluetooth® 5.2 PCIe NIC External Dipole Antenna Installation Instructions	

*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.

Date of change:	Version History:		Description of change:
March 1, 2023	From v1 to v2	Changed	Optical and Removable Storage, Networking and Communications sections and Changed Format
March 30, 2023	From v2 to v3	Changed	Image page 1
April 1, 2023	From v3 to v4	Changed	Format
May 1, 2023	From v4 to v5	Changed	Power Supply section
May 2, 2023	From v5 to v6	Changed	Social and Environmental Responsibility section
June 1, 2023	From v6 to v7	Changed	Graphics, Storage, Networking and Communications, Social and Environmental Responsibility, Overview sections

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