

Overview

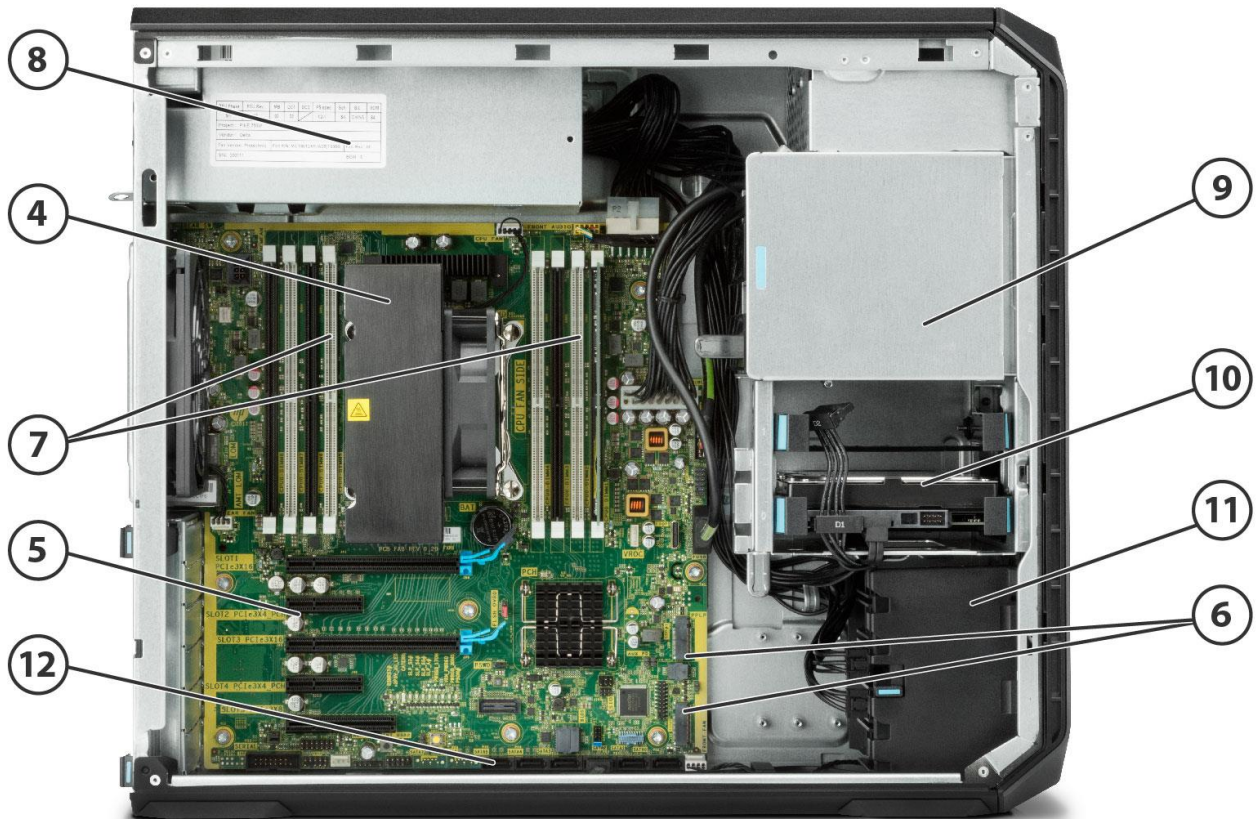
HP Z4 G4 Workstation



Front view

1. Front I/O module options
 - Premium (optional): power button, 2 USB 3.1 G1 Type-A, 2 USB 3.1 G2 Type-C™, Headset/Mic, Media Card Reader (optional) (Left-most Type-A port has charging capability)
 - Standard (shown here): power button, 4 USB 3.1 G1 Type-A (left-most Type-A port has charging capability), Headset/Mic, Media Card Reader (optional)
2. Front handle
3. 2 x 5.25" external drive bays

Overview



Internal view

- | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| 4. Intel® Xeon® Processors: W-2100 family | 9. 2 x 5.25" external drive bays |
| 5. 2 PCIe G3 x16, 2 PCIe G3 x4, 1 PCIe G3 x8 | 10. 2 x 2.5"/3.5" internal drive bays |
| 6. 2 PCIe G3 x4 M.2 for SSDs | 11. Fan and front card guide option |
| 7. 8 DIMM slots; DDR4-2666 ECC Registered RAM | 12. 6 x 6Gb/s SATA ports |
| 8. PSU options: <ul style="list-style-type: none">- 465W 90% efficient with 0 graphics power adapters- 750W 90% efficient with 2 graphics power adapters- 1000W 90% efficient with up to 4 graphics power dongles* | |

* Available the first half of 2018

Overview



Rear view

- 13. Rear power button
- 14. Rear handle
- 15. Padlock loop
- 16. Kensington lock slot

- 17. Rear I/O (top to bottom):
 - audio in/out, Keyboard/Mouse PS/2
 - 6 USB 3.1 G1 Type-A
 - 2 x 1GbE ports
- 18. Side panel barrel keylock (optional)

Overview

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Form Factor Operating Systems

Minitower

Preinstalled:

- Windows 10 Pro 64 for Workstations
- HP Linux-ready (minimal OS ready for customer OS installation)
- Red Hat® Enterprise Linux Desktop Workstation (Paper license with 1 year support; no preinstalled OS)

Supported:

- Windows 7 Professional 64-bit (downgrade media available by request from HP Support)*
- Red Hat Enterprise Linux Desktop 7.4
- SUSE Linux Enterprise Desktop 12 SP3
- Ubuntu 16.04 LTS

Notes: For detailed OS/hardware support information for Linux, see: http://www.hp.com/support/linux_hardware_matrix

*Windows 10 is preinstalled. Windows 7 media is only available upon request from HP Customer Support. 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.

Available Processors

Name	Cores	Clock Speed (GHz)	Cache (MB)	Memory Speed (MT/s)	Hyper-Threading	Featuring Intel® vPro™ Technology	Intel® Turbo Boost Technology ¹	TDP (W)
Intel® Xeon® W-2195 processor	18	2.3	24.75	2666	YES	YES	3.2, 4.3	140
Intel® Xeon® W-2155 processor	10	3.3	13.75	2666	YES	YES	4.0, 4.5	140
Intel® Xeon® W-2145 processor	8	3.7	11.00	2666	YES	YES	4.3, 4.5	140
Intel® Xeon® W-2135 processor	6	3.7	8.25	2666	YES	YES	4.4, 4.5	140
Intel® Xeon® W-2133 processor	6	3.6	8.25	2666	YES	YES	3.8, 3.9	140
Intel® Xeon® W-2125 processor	4	4.0	8.25	2666	YES	YES	4.4, 4.5	120
Intel® Xeon® W-2123 processor	4	3.6	8.25	2666	YES	YES	3.7, 3.9	120
Intel® Xeon® W-2104 processor	4	3.2	8.25	2400	NO	YES	N/A	120
Intel® Xeon® W-2102 processor	4	2.9	8.25	2400	NO	YES	N/A	120

¹The specifications shown in this column represent the following: (all core maximum turbo frequency, one core maximum turbo frequency). Processors that do not have turbo functionality are denoted as N/A.

Available Processors

Overview

Disclaimers	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.
Color	Black
Convertibility	No
Expansion Slots (see system board section for more details)	<p>Slot 0: Mechanical-only, for use with devices that require only rear bulkhead mounting</p> <p>Slot 1: PCI Express Gen3 x16 - CPU</p> <p>Slot 2: PCI Express Gen3 x4 - PCH with open-ended connector*</p> <p>Slot 3: PCI Express Gen3 x16 - CPU</p> <p>Slot 4: PCI Express Gen3 x4 - PCH with open-ended connector*</p> <p>Slot 5: PCI Express Gen3 x8 - CPU with open-ended connector*</p> <p>M.2 Slot 1: M.2 PCIe Gen 3 x4 - CPU up to 80mm storage devices</p> <p>M.2 Slot 2: M.2 PCIe Gen 3 x4 - CPU up to 80mm storage devices</p> <p>* Open-ended connector allows a greater bandwidth (e.g. x16) card to be installed physically into a lower bandwidth connector/slot.</p> <p>Note: Thunderbolt™ 3 PCIe card support available the first half of 2018</p>
Expansion Bays (see storage section for more details)	<p>2 internal 2.5"/3.5" bays (with acoustic dampening rail assemblies pre-installed)</p> <p>2 external 5.25" bays</p> <ul style="list-style-type: none"> • 3rd and 4th 3.5" HDD each occupy one external bay • 3rd and 4th 2.5" HDD/SSD occupy a single external bay within a 2:1 carrier
Front I/O	<ul style="list-style-type: none"> • Base: Power button, 1 Headset audio port, 4 USB 3.1 G1 Type A (1 charging) • Premium (optional): Power button, 1 Headset audio port, 2 USB 3.1 G2 Type C™, 2 USB 3.1 G1 Type A (1 charging) • Optional: SD reader
Internal I/O	1 USB 3.1 G1 (aka USB 3.0) single-port header, 1 USB 2.0 single-port header and 1 USB 2.0 dual-port header
Rear I/O	6 USB 3.1 G1 (aka USB 3.0) Type A ports, 2 GbE LAN ports (1x supporting Intel AMT), Audio: 1 Line out, 1 Line in (Line in can be retasked as microphone), 1 PS/2 mouse port, 1 PS/2 keyboard port, 1 Rear power button Optional: 1 serial port (cable up to rear bulkhead)
Interfaces Supported	SD card reader (optional) 6-channel SATA interface (6 @ 6.0 Gb/s)

Overview

	6 channels are eSATA configurable for use with eSATA CTO/AMO Kit (No hot plug / hot swap supported) USB 2.0, USB 3.1 G1 (aka USB 3.0), USB 3.1 G2 (optional)
On-board RAID Support	SATA RAID 0 Striped Array Configuration SATA RAID 1 Mirrored Array Configuration SATA RAID 10 Striped/Mirrored Configuration
Chassis Dimensions (H x W x D)	H: 15.2" (386mm) W: 6.65" (169mm) D: 17.5" (445mm)
Packaged Dimensions	H: 22.5" (572mm) W: 12.4" (314mm) D: 22.2" (563mm)
Rack Dimensions	4U
Weight	Exact weights depend upon configuration (System weight only). Minimum: 10.2 kg (22.4 lbs.) Standard: 11.3 kg (24.9 lbs.) Maximum: 17.3 kg (38.2 lbs.)
Temperature	Operating: 5° to 35°C (40° to 95°F) Non-operating: -40° to 60°C (-40° to 140°F) 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
Humidity	Operating: 10% to 85% relative humidity, non-condensing, 35° C maximum wet bulb Non-operating: 10% to 90% relative humidity, non-condensing, 35° C maximum wet bulb
Maximum Altitude (non-pressurized)	Operating: 3,048m (10,000ft) 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	ENTRY 465 watts wide-ranging, active Power Factor Correction, 90% Efficient, with no 6-pin graphics power cables The Z4 G4 465W power supply efficiency report can be found at this link: https://plugloadsolutions.com/psu_reports/HP%20INC_DPS-465AB-3%20A_465W_ECOS%204939_Report.pdf HIGH-END 750 watts wide-ranging, active Power Factor Correction, 90% Efficient, with 2x 6-pin graphics power cables The Z4 G4 750W power supply efficiency report can be found at this link: https://plugloadsolutions.com/psu_reports/HP%20INC_DPS-750AB-36%20A_750W_ECOS%204938_Report.pdf NOTE: 1000 W internal power supply, up to 90% efficiency, active PFC available the first half of 2018
Workstation ISV Certifications	See the latest list of certifications at http://www8.hp.com/us/en/campaigns/workstations/industries-and-partners.html

Supported Components

Processors

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Intel® Xeon® W-2100 Series CPU				
Intel® Xeon® W-2195 2.3 2666 18C CPU	Y	N		
Intel® Xeon® W-2155 3.3 2666 10C CPU	Y	N		
Intel® Xeon® W-2145 3.7 2666 8C CPU	Y	N		
Intel® Xeon® W-2135 3.7 2666 6C CPU	Y	N		
Intel® Xeon® W-2133 3.6 2666 6C CPU	Y	N		
Intel® Xeon® W-2125 4.0 2666 4C CPU	Y	N		
Intel® Xeon® W-2123 3.6 2666 4C CPU	Y	N		
Intel® Xeon® W-2104 3.2 2400 4C CPU	Y	N		
Intel® Xeon® W-2102 2.9 2400 4C CPU	Y	N		

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.

Monitors / Displays

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Z Display Z22n G2		Y	1JS05AA	
HP Z Display Z23n G2		Y	1JS06AA	
HP Z Display Z24i G2		Y	1JS08AA	
HP Z Display Z24n G2		Y	1JS09AA	
HP Z Display Z24nf G2		Y	1JS07AA	
HP Z Display Z27n G2		Y	1JS10AA	
HP Z Display Z27s (4K display)		Y	J3G07AA	

Supported by all operating systems available from HP
Screen size measured diagonally

Storage / Hard Drives

SAS Hard Drives

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
SAS Hard Drives for HP Workstations				
HP 300GB 15k SAS SFF	Y	Y	L5B74AA	
NOTE: SAS controller add-in card required				

Supported Components

SATA Hard Drives

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
SATA (Serial ATA) Hard Drives for HP Workstations				
500GB SATA 7200RPM 6Gb/s 3.5" HDD	Y	Y	LQ036AA	
500GB SATA 7200RPM 6Gb/s OPAL2 SFF 3.5" HDD	Y	Y	D8N29AA	
1TB SATA 7200RPM 3.5" HDD	Y	Y	LQ037AA	
1TB SATA 7200RPM Ent 3.5" HDD	Y	Y	WOR10AA	
2TB SATA 7200RPM HDD	Y	Y	QB576AA	
4TB SATA 7200RPM Ent 3.5" HDD	Y	Y	K4T76AA	

NOTES:

Up to (4) 3.5-inch 7200 rpm SATA drives: 500 GB, 1.0, 2.0, 4.0, 16TB max total

SATA Solid State Drives

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Solid State Drives (SSDs) for Workstations				
HP 256GB SATA SSD	Y	Y	A3D26AA	
HP 512GB SATA SSD	Y	Y	D8F30AA	
HP 1TB SATA SSD	Y	Y	F3C96AA	
HP 2TB SATA SSD	Y	Y	Y6P08AA	
HP 256GB SATA SED OPAL2 SSD	Y	Y	G7U67AA	
HP 512GB SATA SED OPAL2 SSD	Y	Y	N8T26AA	
HP 240GB SATA Enterprise SSD	Y	Y	T3U07AA	
HP 480GB SATA Enterprise SSD	Y	Y	T3U08AA	

Supported Components

PCIe Solid State Drives

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
PCIe SSDs for HP Workstations				
HP Z Turbo Drive 256GB MLC Z4/Z6 G4 SSD Kit	Y	Y	1PD56AA	1
HP Z Turbo Drive 512GB MLC Z4/Z6 G4 SSD Kit	Y	Y	1PD57AA/AT	1
HP Z Turbo Drive 1TB MLC Z4/Z6 G4 SSD Kit	Y	Y	1PD58AA	1
HP Z Turbo Drive 256GB TLC Z4/Z6 G4 SSD Kit	Y	Y	1PD59AA/AT	1
HP Z Turbo Drive 512GB TLC Z4/Z6 G4 SSD Kit	Y	Y	1PD60AA	1
HP Z Turbo Drive 1TB TLC Z4/Z6 G4 SSD Kit	Y	Y	1PD61AA	1
HP Z Turbo Drive 256GB Z4/Z6 G4 SED Kit	Y	Y	TBD	1
HP Z Turbo Drive 512GB Z4/Z6 G4 SED Kit	Y	Y	TBD	1
HP Z Turbo Drive Quad Pro				
HP Z Turbo Drive Quad Pro 2x256GB PCIe® SSD	Y	Y	N2M98AA	1, 2
HP Z Turbo Drive Quad Pro 2x512GB PCIe® SSD	Y	Y	N2M99AA	1, 2
HP Z Turbo Drive Quad Pro 2x1TB PCIe® SSD	Y	Y	T9H99AA	1, 2
HP Z Turbo Drive Quad Pro 256GB SSD module	N	Y	N2N00AA	1, 3
HP Z Turbo Drive Quad Pro 512GB SSD module	N	Y	N2N01AA	1, 3
HP Z Turbo Drive Quad Pro 1TB SSD module	N	Y	T9J00AA	1, 3

Note 1: All PCIe SSDs require the Z4 G4 Fan & Front Card Kit, available as CTO (1MY89AV) and AMO (1XM33AA)

Note 2: Dual M.2 SSD modules plus carrier

Note 3: M.2 SSD module only, designed to be installed into Quad Pro carrier

Hard Drive Controllers

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
SAS Controller				
MicroSemi SmartHBA2100-4i4e SAS Controller	Y	Y	1FV90AA	

Graphics

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes	Supported # of cards
Graphics Cable Adapters					
HP DisplayPort to HDMI Adapter	Y	Y	K2K92AA		1
HP DisplayPort to Dual Link DVI Adapter	Y	Y	NR078AA		1
HP DisplayPort to DVI-D Adapter	Y	Y	FH973AA		1
HP DisplayPort to DVI-D Adapter (2-pack)	Y	N			1
HP DisplayPort to DVI-D Adapter (4-pack)	Y	N			1
HP DisplayPort to DVI-D Adapter (6-pack)	Y	N			1
NVIDIA SLI Graphics Connector	Y	Y	PP654A		1
NVIDIA SLI 2-slot Graphics Connector	Y	Y	2YY84AA		1
Entry 3D					

Supported Components

NVIDIA® Quadro® P400 1 st GFX 2GB Graphics	Y	Y	1ME43AA/AT	4	2
NVIDIA® Quadro® P600 1 st GFX 2GB Graphics	Y	Y	1ME42AA/AT	4	2
AMD FirePro™ W2100 2GB Graphics	Y	Y	J3G91AA/AT	3	2
Mid-range 3D					
NVIDIA® Quadro® P1000 1 st GFX 4GB Graphics	Y	Y	1ME01AA/AT	3, 4	2
NVIDIA® Quadro® P2000 1 st GFX 5GB Graphics	Y	Y	1ME41AA/AT	3, 4	2
AMD Radeon™ Pro WX 3100 4GB Graphics	Y	Y	2TF08AA	3, 4	2
AMD Radeon™ Pro WX 4100 4GB Graphics	N	Y	Z0B15AA/AT	3, 4	2
High End 3D					
NVIDIA® Quadro® P4000 1 st GFX 8GB Graphics	Y	Y	1ME40AA/AT	1, 2	2
NVIDIA® Quadro® P5000 1 st GFX 16GB Graphics	Y	Y	Z0B13AA/AT	1, 2	1
NVIDIA® Quadro® P6000 1 st GFX 24GB Graphics	Y	Y	Z0B12AA/AT	1, 2	1
AMD Radeon™ Pro WX 7100 1 st GFX 8GB Graphics	Y	Y	Z0B14AA/AT	1, 2	2
NVIDIA® Quadro® Sync II	Y	Y	1WT20AA		

NOTE 1: Single graphics configuration requires the HP Z4 G4 Fan and Front Card Guide Kit, which is available both CTO (1MY89AV) and AMO (1XM33AA).

NOTE 2: Single graphics configuration requires the 750W chassis.

NOTE 3: Dual graphics configuration requires the HP Z4 G4 Fan and Front Card Guide Kit, which is available both CTO (1MY89AV) and AMO (1XM33AA).

NOTE 4: Dual graphics configuration requires the 750W chassis.

Memory	CTO	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
DDR4-2666 ECC Registered DIMMs					
HP 8GB (1x8GB) DDR4-2666 ECC Reg RAM		Y	Y	1XD84AA/AT	1
HP 16GB (2x8GB) DDR4-2666 ECC Reg RAM		Y			1
HP 24GB (3x8GB) DDR4-2666 ECC Reg RAM		Y			1
32GB (4x8GB) DDR4-2666 ECC Reg RAM		Y			1
64GB (8x8GB) DDR4-2666 ECC Reg RAM		Y			1
16GB (1x16GB) DDR4-2666 ECC Reg RAM		Y	Y	1XD85AA/AT	1
32GB (2x16GB) DDR4-2666 ECC Reg RAM		Y			1
64GB (4x16GB) DDR4-2666 ECC Reg RAM		Y			1
128GB (8x16GB) DDR4-2666 ECC Reg RAM		Y			1
32GB (1x32GB) DDR4-2666 ECC Reg RAM		N	Y	1XD86AA/AT	1, 2
64GB (2x32GB) DDR4-2666 ECC Reg RAM		Y			1, 2
128GB (4x32GB) DDR4-2666 ECC Reg RAM		Y			1, 2
256GB (8x32GB) DDR4-2666 ECC Reg RAM		Y			1, 2

NOTES:

For details on the supported memory configurations on the HP Z4 G4 Workstation, please refer to the System Technical Specifications - System Board section of this document.

Each processor supports up to 4 channels of DDR4 memory. To realize full performance at least 1 DIMM must be inserted into each channel.

Supported Components

The CPUs determine the speed at which the memory is clocked. If an 2400MT/s capable CPU is used in the system, the maximum speed the memory will run at is 2400MT/s, regardless of the specified speed of the memory.

NOTE 1: ONLY registered DDR4 DIMMs are supported. DDR3 DIMMs ARE NOT SUPPORTED.

NOTE 2 Memory configurations using 32GB DIMMs require the HP Z4 Memory Cooling Solution, which is available both CTO (1MY90AV) and AMO (1XM34AA).

Multimedia and Audio Devices

Supported Components

Multimedia and Audio Devices

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Integrated Realtek HD ALC221 Audio	Y	N		

Optical and Removable Storage

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP SlimTray Optical Drives				
HP 9.5mm Slim Blu Ray Disc Writer	Y	Y	K3R65AA	1
HP 9.5mm Slim DVD ROM	Y	Y	K3R63AA	1
HP 9.5mm Slim DVD Writer*	Y	Y	K3R64AA	1
HP SD Card Reader				
HP SD 4 Card Reader	Y	Y	Y0L99AA	

NOTE 1: Installing an optical drive into Z4 G4 requires a 5.25" external bay adapter.

*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.

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

Networking and Communications

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP i350-T2 PCIe Dual Port Gigabit NIC	Y	Y	V4A91AA	
Intel® i350-T4 PCIe 4-Port Gigabit NIC	N	Y	W8X25AA	
Intel® Ethernet I210-T1 PCIe x1 Gb NIC	Y	Y	E0X95AA	
Intel 8265 802.11 a/b/g/n/ac + BT PCIe WLAN	N	Y	1QL48AA	
Intel® X550-T2 10GbE Dual Port NIC	Y	Y	1QL46AA	
Intel® X710-DA2 10GbE SFP+ Dual Port NIC	Y	Y	1QL47AA	
HP 10GbE SFP+ SR Transceiver	Y	Y	C3N53AA	

Racking and Physical Security

Supported Components

Racking and Physical Security

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Z4/Z6 Side Panel Barrel Keylock	Y	N		
HP Solenoid Lock / Hood Sensor	Y	N		
HP Z4/Z6 Depth Adjustable Fixed Rail Rack Kit	N	Y	2HW42AA	
HP Keyed Cable Lock 10mm	N	Y	T1A62AA	

Input Devices

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Wireless Business Slim Keyboard and Mouse	Y	Y	N3R88AA	
Business Slim PS/2 Wired Keyboard	Y	Y	N3R86AA	
USB Business Slim Wired Keyboard	Y	Y	N3R87AA	
USB Premium Wired Keyboard	Y	Y	Z9N40AA	
USB Wired SmartCard CCID Keyboard	Y	Y	E6D77AA	
3Dconnexion CADMouse	Y	Y	M5C35AA	
HP Optical USB Mouse	Y	Y	QY777AA	
HP PS/2 Mouse	Y	Y	QY775AA	
HP USB Hardened Mouse	Y	Y	P1N77AA	

Other Hardware

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP ENERGY STAR® certified Configuration	Y			
HP Z Premium Front I/O 2xUSB-A 2xUSB-C	Y	Y	1XM32AA	
HP Z4 G4 Memory Cooling Solution	Y	Y	1XM34AA	Note 1
HP Z4 G4 Fan and Front Card Guide Kit	Y	Y	1XM33AA	Note 2
HP Internal USB Port Kit	N	Y	EM165AA	Note 3
HP eSATA 2 port PCI Bulkhead Kit	Y	Y	GM110AA	
HP Serial Port Adapter	Y	Y	PA716A	
HP Workstation Mouse Pad	Y			
HP ENERGY STAR® certified Configuration	Y			

Note 1: The HP Z4 G4 Memory Cooling Solution is available to add to any configuration for improved system cooling, but is required for memory configurations using 32GB DIMMs.

Note 2: Fan and Front Card Guide required with the following components:

- Specific graphics configurations (see Graphics section above)
- Any HP Z Turbo Drive configuration
- Any HP Z Turbo Quad Pro configuration

Note 3: The HP Internal USB Port kit has a single USB 2.0 type A connector.

Supported Components

Software

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Sobey Video Editing SW	Y	N		China only
SW HP RGS for Z	Y	N		

Supported Components

Operating Systems

Support Notes

Windows 10 Pro 64 for Workstations

Windows 7 Professional 64-bit

HP Linux® Installer Kit

Red Hat® Enterprise Linux (RHEL) Workstation - Paper License (1yr)

Note 3, 4

Note 2

Note 1

NOTE 1: This second OS must be ordered with the HP Linux Installer Kit as the first OS.

NOTE 2: includes drivers for 64-bit OS versions of RHEL 6 & 7, SUSE Linux Enterprise Desktop 11 and Ubuntu 14.04.

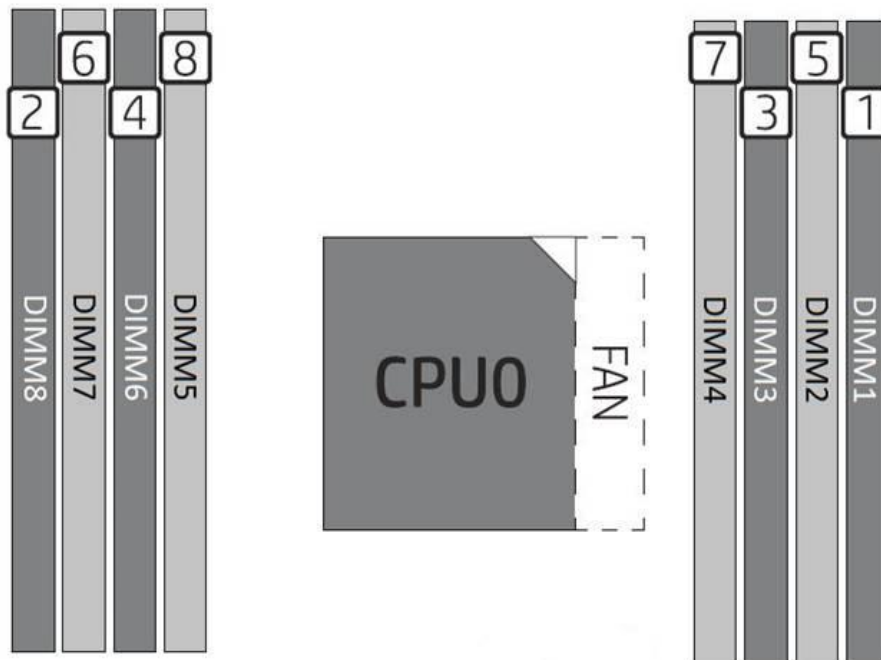
NOTE 3: downgrade media available by request from HP Support.

NOTE 4: Windows 10 is preinstalled. Windows 7 media is only available upon request from HP Customer Support. 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

System Technical Specifications

System Board

System Board Form Factor	Main System Board: 27.7 x 28.0 cm 10.9 x 11.0 inches
Processor Socket	Single LGA2066 R4
Chipset	Intel® C422 Chipset
Super I/O Controller	Nuvoton NPCD315HA0DX (SIO-15)
Memory Expansion Slots	8 DDR4 memory slots
Memory Type Supported	DDR4, RDIMM (Registered), ECC: 8GB, 16GB and 32GB
Memory Modes	Channel Interleaved
Memory Speed Supported	2666MT/s, 2400MT/s, and 2133MT/s
Memory Protection	ECC available on data, parity on address and command
Maximum Memory	Supports up to 256GB
Memory Configuration (Supported)	Only Registered DIMMs are supported.
Memory Load Order	



Note on Maximum Memory Maximum memory capacities assume 64-bit operating systems such as Windows 10 Pro 64-bit, Windows 7 Professional 64-bit. Windows 7 Professional 32-bit supports up to 4GB. Linux 32-bit supports up to 8GB.

PCI Express Connectors **Slot 1 (top):**
PCI Express Gen3 x16 from CPU
Full-height, Full-length (with extender)
Slot 2 (PCH):

System Technical Specifications

PCI Express Gen3 x4 from PCH with open-ended connector** Full-height, Full-length (with extender)

Slot 3:

PCI Express Gen3 x16 from CPU

Full-height, Full-length (with extender)

Slot 4 (PCH):

PCI Express Gen3 x4 from PCH with open-ended connector**

Full-height, Full-length (with extender)

Slot 5:

PCI Express Gen3 x8 from CPU with open-ended connector**

Full-height, Full-length (with extender)

M.2 Slot 1:

PCI Express Gen3 x4 supplied by CPU

Socket Type 3, Key M, H4.2, sizes 2260-D5-M, 2280-D5-M, 22110-D5-M

M.2 Slot 2:

PCI Express Gen3 x4 supplied by CPU

Socket Type 3, Key M, H4.2, sizes 2260-D5-M, 2280-D5-M, 22110-D5-M

** Open-ended connector allows a greater bandwidth (e.g. x16) card to be installed physically into a lower bandwidth connector/slot.

System Technical Specifications

Supported Drive Interfaces	SATA	6 SATA @6Gb/s, supports RAID 0,1, 5, and 10 Factory integrated RAID is Microsoft Windows only Requires Optional PCIe card
	Serial Attached SCSI	
	Factory Configured RAID	<ul style="list-style-type: none"> • RAID 0 configuration - striped array • RAID 1 configuration - mirrored array • RAID 10 striped and mirrored array *HW RAID functionality not supported by Linux. Use SW RAID functionality provided in the Red Hat Operating system instead.
	Integrated Graphics	No
	Network Controller	Intel® I219LM GbE LAN
		Supports the following management functionalities: Intel AMT11.1, TXT, DASH 1.1, WOL, VLAN, Teaming and PXE 2.1
	External SATA (eSATA)	Supported on all SATA ports configurable with optional eSATA* cable kit * hot plug / hot swap not supported with eSATA
	IDE connector	No
	Floppy connector	No
	Serial	1 internal header
	2nd Serial	No
	Parallel	No
	IEEE 1394 Connector(s)	AUX IN (audio)
Front		None
Rear		None
USB Connector(s)	Internal	None
	Front	Front USB depends on which FIO module is selected: <ul style="list-style-type: none"> - Standard: 4 USB 3.1 G1 Type A (1 charging) - Premium: 2 USB 3.1 G2 Type C™, 2 USB 3.1 G1 Type A (1 charging)
	Rear	6 USB 3.1 G1 Type A
	Internal	1 USB 3.1 G1 single-port header 1 USB 2.0 single-port header 1x USB 2.0 dual-port header

System Technical Specifications

HD Integrated Audio	Realtek ALC221			
Flash ROM	Yes			
CPU Fan Header	Yes			
Rear Chassis Fan Header	Yes			
Front PCI Fan Header	Yes			
Front Control Panel/Speaker Header	Yes			
CMOS Battery Holder - Lithium	Yes			
Integrated Trusted Platform Module	Trusted Platform Module (TPM) 2.0 (Infineon SLB 9670) Common Criteria EAL4+ Certified Convertible to FIPS 140-2 Certified mode through firmware v7.80 TPM Certified products list: https://trustedcomputinggroup.org/membership/certification/tpm-certified-products/			
Power Supply Headers	Yes			
Power Switch, Power LED & Hard Drive LED Header	Yes			
Clear Password Jumper	Yes			
Serial Port	1 internal header			
Parallel Port	No			
Keyboard/Mouse	USB or PS/2			
Hood Lock Header	Yes			
Hood Sensor Header	Yes			
Memory Fan	1 Memory Fan Header			
AUX IN (audio)	No			
Power Supply				
Power Supply	750W 90% Efficient, Custom PSU (Wide-Ranging, Active PFC)		465W 90% Efficient, Custom PSU (Wide-Ranging, Active PFC)	
Operating Voltage Range	90–269 VAC		90–269 VAC	
Rated Voltage Range	100-240 VAC	118 VAC	100-240 VAC	118 VAC
Rated Line Frequency	50–60 Hz	400 Hz	50–60 Hz	400 Hz
Operating Line Frequency Range	47–66 Hz	393–407 Hz	47–66 Hz	393–407 Hz
Rated Input Current	100-240V @ 10A	118V @ 10A	100-240V @ 6A	118V @ 6A
Heat Dissipation (Configuration and software dependent)	Typical = 1850 btu/hr Max = 3084 btu/hr		Typical = 1147 btu/hr Max = 1912 btu/hr	
Power Supply Fan	80x25 mm variable speed		80x25 mm variable speed	
ENERGY STAR Qualified (Configuration dependent)	Yes		Yes	
	90% Efficient		90% Efficient	
80 PLUS® Compliant	The Z4 G4 750W power supply efficiency report can be found at this link: https://plugloadsolutions.com/psu_reports/HP%20INC_DPS-750AB-36%20A_750W_ECOS%204938_Report.pdf		The Z4 G4 465W power supply efficiency report can be found at this link: https://plugloadsolutions.com/psu_reports/HP%20INC_DPS-465AB-3%20A_465W_ECOS%204939_Report.pdf	

System Technical Specifications

FEMP Standby Power Compliant @115V (<1W in S5 – Power Off)	Yes	Yes
EuP Compliant @ 230V (<0.5 W in S5 – Power Off)	Yes	Yes
CECP Compliant @ 220V (<4W in S3 – Suspend to RAM)	Yes; Configuration dependent	Yes; Configuration dependent
Power Consumption in sleep mode (as defined by ENERGY STAR) – Suspend to RAM (S3) (Instantly Available PC)	TBD	TBD
Built-in Self Test LED	Yes	Yes
Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)	Yes	Yes

NOTE: 1000 W internal power supply, up to 90% efficiency, active PFC available the first half of 2018

System Technical Specifications

System Configuration

Example Z4 G4 Workstation Configuration #1 ENERGY STAR QUALIFIED	Processor	1x Intel Xeon W-2102 4C 2.9GHz					
	Memory	1x 8GB DDR4-2666 (Registered DIMM)					
	Graphics	1x NVIDIA Quadro P400					
	Disks / Optical	1x 500GB SATA 7200 ; 1x Slim DVD-ROM SATA					
	Power Supply	465W 90% custom PSU					
	Other	N/A					

Energy Consumption		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	42.323		41.338		42.585	
	Windows Busy Typ(S0)	87.841		86.539		86.018	
	Windows Busy Max (S0)	90.231		92.323		90.786	
	Sleep (S3)	3.449	3.440	3.566	3.558	3.530	3.410
	Off (S5)	1.041	1.014	1.242	1.231	1.310	1.180
	Zero Power Mode (ErP)	0.187		0.43		0.174	

Heat Dissipation (Btu/hr)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled
	Windows Idle (S0)	144.406		141.045		145.301	
	Windows Busy Typ(S0)	299.713		295.271		293.493	
	Windows Busy Max (S0)	307.868		315.006		309.761	
	Sleep (S3)	11.767	11.737	12.167	12.140	12.044	11.634
	Off (S5)	3.551	3.459	4.237	4.200	4.469	4.026
	Zero Power Mode (ErP)	0.638		1.467		0.594	

Example Z4 G4 Workstation Configuration #2 ENERGY STAR QUALIFIED	Processor	1x Intel Xeon W-2123 4C 3.6GHz					
	Memory	2x 8GB DDR4-2666 (Registered DIMM)					
	Graphics	1x NVIDIA QuadroP1000					
	Disks / Optical	1x 500GB SATA 7200 ; 1x Slim DVD-ROM SATA					
	Power Supply	750W 90% custom PSU					
	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)	39.947		39.569		40.956	
	Windows Busy Typ(S0)	148.97		147.145		147.645	
	Windows Busy Max (S0)	149.543		150.789		147.845	
	Sleep (S3)	3.615	3.566	3.801	3.798	3.634	3.621
	Off (S5)	1.079	1.016	1.440	1.238	1.320	1.170
	Zero Power Mode (ErP)	0.204		0.430		0.191	

Heat Dissipation (Btu/hr)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled
	Windows Idle (S0)	136.299		135.009		139.741	

System Technical Specifications

Windows Busy Typ(S0)	508.286		502.058		503.764	
Windows Busy Max (S0)	510.241		514.492		504.447	
Sleep (S3)	12.338	12.167	12.969	12.959	12.399	12.355
Off (S5)	3.681	3.466	4.913	4.224	4.504	3.992
Zero Power Mode (ErP)	0.696		1.467		0.651	

Example Z4 G4 Workstation Configuration #3	Processor	1x Intel Xeon W-2133 6C 3.6GHz				
	Memory	4x 8GB DDR4-2666 (Registered DIMM)				
	Graphics	1x NVIDIA QuadroP2000				
	Disks/Optical	2x 1TB SATA7200 ; 1x Slim SuperMulti DVDRW SATA				
	Power Supply	750W 90% custom PSU				
	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)	48.759		46.321		46.578	
	Windows Busy Typ(S0)	211.99		199.56		206.055	
	Windows Busy Max (S0)	209.60		208.66		198.82	
	Sleep (S3)	4.360	4.351	4.538	4.508	4.299	4.277
	Off (S5)	1.039	1.017	1.42	1.219	1.015	0.997
	Zero Power Mode (ErP)	0.203		0.399		0.191	

Heat Dissipation (Btu/hr)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled
	Windows Idle (S0)	166.366		258.047		158.924	
	Windows Busy Typ(S0)	723.309		680.898		703.059	
	Windows Busy Max (S0)	715.155		711.947		678.373	
	Sleep (S3)	14.876	14.845	15.483	15.381	14.668	14.593
	Off (S5)	3.544	3.470	4.845	4.179	3.463	3.402
	Zero Power Mode (ErP)	0.692		1.361		0.651	

Example Z4 G4 Workstation Configuration #4	Processor	1x Intel Xeon W-2155 10C 3.3GHz				
	Memory	8x 32GB DDR4-2666 (Registered DIMM)				
	Graphics	1x NVIDIA QuadroP6000				
	Disks / Optical	4x 2TB SATA 7200 ; 0x ODD				
	Power Supply	750W 90% custom PSU				
	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)	65.959		69.321		68.635	
	Windows Busy Typ(S0)	450.015		389.69		443.795	
	Windows Busy Max (S0)	463.23		456.95		503.125	
	Sleep (S3)	6.336	6.102	6.971	6.189	6.266	6.264
	Off (S5)	1.047	1.036	1.254	1.222	1.014	0.995

System Technical Specifications

	Zero Power Mode (ErP)	0.203		0.399		0.191	
Heat Dissipation (Btu/hr)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled
	Windows Idle (S0)	225.052		236.523		234.183	
	Windows Busy Typ(S0)	1535.451		1329.622		1514.229	
	Windows Busy Max (S0)	1580.541		1559.113		1716.663	
	Sleep (S3)	21.618	20.821	23.785	21.117	21.379	21.372
	Off (S5)	3.572	3.534	4.278	4.169	3.459	3.394
	Zero Power Mode (ErP)	0.692		1.361		0.652	

NOTE: Power consumption measurements do not take advantage of the Intel Turbo Boost Technology. As a result, power consumption measurements may be higher.

DECLARED NOISE EMISSIONS

Declared Noise Emissions (Entry-level and High-end configurations)

System Configuration (Entry level)	Processor Info	Intel® Xeon® W-2125 4.0 2666 4C CPU
	Memory Info	32GB (4x8GB) DDR4-2666 ECC Reg RAM
	Graphics Info	1-NVIDIA® Quadro® P400 2GB
	Disks/Optical	1-500GB SATA 7200RPM 3.5" HDD / 1-HP 9.5mm Slim Blu Ray Disc Writer
	Power Supply	465 W

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		Sound Power (LWAd, bels)	Deskside Sound Pressure (LpAm, decibels)
	Idle	3.2	13
	Hard drive Operating (random reads)	3.4	15

System Configuration (High end)	Processor Info	Intel® Xeon® W-2155 3.3 2666 10C
	Memory Info	128GB (8x16GB) DDR4-2666 ECC Reg RAM
	Graphics Info	1-NVIDIA® Quadro® P6000 24GB
	Disks/Optical	2-4TB SATA 7200RPM Ent 3.5" / 1-HP 9.5mm Slim Blu Ray Disc Writer
	Power Supply	750 W

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		Sound Power (LWAd, bels)	Deskside Sound Pressure (LpAm, decibels)
	Idle	3.5	22
	Hard drive Operating (random reads)	3.7	23

NOTE: Higher noise levels may be experienced with non-HP approved graphic card(s). Some consumer graphics cards have side blowing fans that may heat up thermal sensor(s) on the mother board causing fans to ramp.

System Technical Specifications

ENVIRONMENTAL DATA

Environmental Requirements	Temperature	Operating: 5° to 35° C (40° to 95° F) Non-operating: -40° to 60° C (-40° to 140° F)
	Humidity	Operating: 10% to 85% RH, non-condensing, 35° C maximum wet bulb Non-operating: 10% to 90% RH, non-condensing, 35° C maximum wet bulb
	Maximum Altitude	Operating: 3,048 m (10,000 feet) 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 Non-operating: 9,144 m (30,000 feet)
	Shock (non-repetitive)	Operating: ½-sine: 40g, 2-3ms (~62 cm/sec) Non-operating: ½-sine: 160 cm/s, 2-3ms (~105g) square: 422 cm/s, 20g
	Vibration	Operating random: 0.5g (rms), 5-300 Hz, up to 0.0025g ² /Hz Non-operating random: 2.0g (rms), 5-500 Hz, up to 0.0150 g ² /Hz

Physical Security and Serviceability

Access Panel	Tool-less Includes system board and memory information.
Hard Drives	Tool-less
Expansion Cards	Tool-less
Processor Socket	Tool-less
Blue User Touch Points	Yes, on primary serviceable components.
Color-coordinated Cables and Connectors	Yes
Memory	Tool-less
System Board	Screw-In
Dual Color Power/Failure LED	Yes
HDD Activity LED	Yes
	<i>Note: HDD Activity LED is not dual-color</i>
Configuration Record SW	Yes
Over-Temp Warning on Screen	Yes, at POST screen on reboot
Restore CD/DVD Set	Restores the computer to its original factory shipping image; can be obtained via HP Support.
Dual Function Front Power Switch	Yes, causes a fail-safe power off when held for 4 seconds
Padlock Support	Yes (optional): Locks side cover and secures chassis from theft 7.0 mm (0.2756 in) diameter padlock loop at rear of system
Cable Lock Support	Yes, Kensington Cable Lock (optional): Locks side cover and secures chassis from theft 3 mm x 7 mm slot at rear of system

System Technical Specifications

Universal Chassis Clamp Lock Support	Yes (optional): Locks side cover and locks cables to chassis. Secures chassis from theft and allows multiple units to be chained together when used with optional cable Threaded feature at rear of system
Solenoid Lock and Hood Sensor	Yes (optional) The Solenoid Hood Lock eliminates the need for a physical key by making the chassis lockable through software and a password. You can also lock and unlock the chassis remotely over the network. The Sensor Kit detects when the access panel has been removed
Serial, Parallel, 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
3.3V Aux Power LED on System PCA	Yes, prevents an unauthorized person from changing the workstation configuration
NIC LEDs (integrated) (Green & Amber)	Yes
CPUs and Heatsinks	A T-15 Torx or flat blade screwdriver is needed to remove the CPU heatsink before the CPU can be removed. CPU removal is tool-less
Power Supply Diagnostic LED	Yes
Front Power Button	Yes, ACPI multi-function
Rear Power Button	Yes
Front Power LED	Yes, white (normal), red (fault)
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 heatsinks
Power Supply Fans	80 mm x 80 mm x 25 mm (non-serviceable)
CPU Heatsink Fan	92 mm x 92 mm x 25 mm, 5-wire, PWM
Chassis Fan	Front: (Optional) 92 mm x 92mm x 25 mm, 4-wire, PWM Rear: 120 mm x 120mm x 25 mm, 4-wire, PWM
Memory Heatsink Fan	Dual 60 mm x 60 mm x 25 mm, 6-wire, PWM, Blindmate (optional based on configuration)
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 ESC then F2 upon the PC reboot, and is available as a download from HP Support.
Access Panel Key Lock	Yes, side panel barrel keylock (optional from the factory only)

System Technical Specifications

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
Trusted Platform Module Chip	Infineon TPM 2.0 Certified
Integrated Chassis Handles	Yes, Front handle and dedicated rear recess
Power Supply	Requires T15 Torx or flat blade screwdriver
PCIe Card Retention	Yes, rear (all), middle (all), front (full-length cards with extender, using HP Z4 G4 Fan and Front Card Guide Kit)
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
BIOS	
BIOS 32-bit Services	Standard BIOS 32-bit Service Directory Proposal v0.4
PCI 3.0 Support	Full BIOS support for PCI Express through industry standard interfaces.
ATAPI	ATAPI Removable Media Device BIOS Specification Version 1.0.
BBS	BIOS Boot Specification v1.01.
WMI Support	WMI is Microsoft's implementation of Web-Based Enterprise Management (WBEM) for Windows. WMI is fully compliant with the Distributed Management Task Force (DMTF) Common Information Model (CIM) and WBEM specifications.
BIOS Boot Spec 1.01+	Provides more control over how and from what devices the workstation will boot.
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). BiosConfigUtility.exe utility can then replicate these settings on machines being deployed without entering Computer Configuration Utility (F10 Setup).
SMBIOS	System Management BIOS 2.8, for system management information.
Boot Control	Disables the ability to boot from removable media on supported devices.
Memory Change Alert	Alerts management console if memory is removed or changed.
Thermal Alert	Monitors the temperature state within the chassis. Three modes: <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.
Remote ROM Flash	Provides secure, fail-safe ROM image management from a central network console.

System Technical Specifications

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 5.0 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 14 languages with local keyboard mappings.
Asset Tag	The user or MIS to set a unique tag string in non-volatile memory.
Per-slot Control	Allows I/O slot parameters (option ROM enable/disable, bus latency) to be configured individually.
Adaptive Cooling	Control parameters are set according to detected hardware configuration for optimal acoustics.
Pre-boot Diagnostics	(Pre-video) critical errors are reported via beeps and blinks on the power LED.
Industry Standard Specification Support	
Industry Standard UEFI Specification Revision	Revision Supported by the BIOS 2.5
ACPI	Advanced Configuration and Power Management Interface, Version 5.0
ATA (IDE)	AT Attachment 6 with Packet Interface (ATA/ATAPI-6), Revision 3b
CD Boot	"El Torito" Bootable CD-ROM Format Specification Version 1.0
EDD	- Enhanced Disk Drive Specification Version 1.1 - BIOS Enhanced Disk Drive Specification Version 3.0
EHCI	Enhanced Host Controller Interface for Universal Serial Bus, Revision 1.0
PCI	PCI Local Bus Specification, Revision 2.3 PCI Power Management Specification, Revision 1.1 PCI Firmware Specification, Revision 3.0, Draft .7
PCI Express	PCI Express Base Specification, Revision 2.0 PCI Express Base Specification, Revision 3.0
PMM	POST Memory Manager Specification, Version 1.01
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	PC SDRAM Serial Presence Detect (SPD) Specification, Revision 1.2B

System Technical Specifications

TPM	Trusted Platform Module (TPM) 2.0 (Infineon SLB 9670) Common Criteria EAL4+ Certified Convertible to FIPS 140-2 Certified mode through firmware v7.80 TCG TPM Certified products list: http://www.trustedcomputinggroup.org/certification/tpm-certified-products/
UHCI	Universal Host Controller Interface Design Guide, Revision 1.1
USB	Universal Serial Bus Revision 1.1 Specification Universal Serial Bus Revision 2.0 Specification Universal Serial Bus Revision 3.1 G1 Specification Universal Serial Bus Revision 3.1 G2 Specification
SMBIOS	System Management BIOS Reference Specification, Version 2.8 External BIOS simulator found at: http://h20464.www2.hp.com/index.html

Social and Environmental Responsibility

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

- ENERGY STAR® (energy-saving features available on selected configurations-Windows only)
- US Federal Energy Management Program (FEMP)
- China Energy Conservation Program
- The ECO declaration (TED)

The Z4 G4 is registered EPEAT® Gold in the US and Canada. EPEAT® registration varies by country. See <http://www.epeat.net> for registration status by country. Search keyword generator on HP's 3rd party option store for solar generator accessories at <http://www.hp.com/go/options>

Batteries The battery in this product complies with EU Directive 2006/66/EC
Battery mass: 3g
Battery type: Lithium Metal

The battery in this product does not contain:

- Mercury greater than 5ppm by weight
- Cadmium greater than 10ppm by weight
- Lead greater than 40ppm by weight

Restricted Material Usage This product meets the material restrictions specified in HP's General Specification for the Environment.

HP Inc. is committed to compliance with all applicable environmental laws and regulations, including the European Union Restriction of Hazardous Substances (RoHS) Directive. HP's goal is to exceed compliance obligations by meeting the requirements of the RoHS Directive on a worldwide basis

Low Halogen Statement This product is low-halogen except for power cords, external cables and peripherals. Service parts obtained after purchase may not be low-halogen.

End-of-Life Management and Recycling HP Inc. offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: <http://www.hp.com/recycle> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner. This product is greater than 90% recyclable by weight when properly disposed of at end of life.

System Technical Specifications

HP Inc. Corporate Environmental Information Additional Information

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

[Sustainability Report](#)

[Eco-label certifications ISO 14001 certificates](#)

- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC. [Product Disassembly Instructions](#)
- Plastic parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.

Packaging

HP Workstation product packaging meets the [HP's General Specification for the Environment](#)

- Does not contain restricted substances listed in HP Standard 011-1 General Specification for the Environment
- Does not contain ozone-depleting substances (ODS)
- Does not contain heavy metals (lead, mercury, cadmium or hexavalent chromium) in excess of 100 ppm sum total for all heavy metals listed
- Maximizes the use of post-consumer recycled content materials in packaging materials
- All packaging material is recyclable
- All packaging material is designed for ease of disassembly
- Reduced size and weight of packages to improve transportation fuel efficiency
- Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards formatting

Packaging Materials

Internal

Cushions and plastic bags made of low density polyethylene (LDPE).

External

Outer carton, accessories carton, and insert made of corrugated paper board.

Manageability

Industry Standard Specifications

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

- DASH 1.1 (via Intel® LAN on motherboard)

Intel Active Management Technology (AMT)

Intel® Active Management Technology (AMT) 11.10

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 11.10 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 1.1 compliance
- 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

System Technical Specifications

- 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 The HP Z4 G4 Workstation supports Intel® vPro™ technology when configured as outlined below:

- Intel® Xeon® processor W-2100 product family featuring Intel® vPro™ Technology
- Intel® C422 chipset
- Intel® I219LM GbE LAN

Remote Manageability Software Solutions The HP Z4 G4 Workstation is supported on the following optional remote manageability software consoles:

- LANDesk Management Suite (HP recommended solution)
- Microsoft System Center Configuration Manager

System Software Manager Service, Support, and Warranty

For questions or support for manageability needs, please visit <http://www.hp.com/go/easydeploy>

For questions or support for SSM, please visit: <http://www.hp.com/go/ssm>

On-site Warranty and Service (**Note 1**): Three-years, limited warranty and service offering delivers on-site, next business-day (**Note 2**) service for parts and labor and includes free telephone support (**Note 3**) 8am - 5pm. Global coverage (**Note 2**) ensures that any product purchased in one country and transferred to another, non-restricted country will remain fully covered under the original warranty and service offering. 24/7 operation will not void the HP warranty.

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: <http://www.hp.com/go/lookuptool>. Additional HP Care Pack Services information by product is available at: <http://www.hp.com/hps/carepack>. Service levels and response times for HP Care Packs may vary depending on your geographic location.

Product Change Notification

- Program to proactively communicate Product Change Notifications (PCNs) and Customer Advisories by email to customers, based on a user-defined profile.
- PCNs provide advance notification of hardware and software changes to be implemented in the factory providing time to plan for transition.
- Customer Advisories provide concise, effective problem resolution, greatly reducing the need to call technical support.

Stable & Consistent Offerings

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 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.

HP Stable & Consistent Offerings are available worldwide to all HP Workstation customers—no special programs, no additional cost—no kidding. Simply select your hardware 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
	TBD	Intel® Xeon® W-2125 4.0 2666 4C CPU
	TBD	Intel® Xeon® W-2123 3.6 2666 4C CPU
	TBD	Intel® Xeon® W-2102 2.9 2400 4C CPU

Hard Drives	Product #	Offering
	LQ037AA	1TB SATA 7200 RPM

Graphics	Product #	Offering
	2TF08AA	AMD Radeon™ Pro WX 3100 4GB Graphics

Memory	Product #	Offering
	TBD	TBD
	TBD	TBD
	TBD	TBD
	TBD	TBD
	TBD	TBD
	TBD	TBD
	TBD	TBD

Optical and Removable Storage	Product #	Offering
	TBD	TBD
	TBD	TBD

Technical Specifications - Processors

Intel® Xeon® W-2195 2.3 2666 18C CPU

Intel® Xeon® W-2155 3.3 2666 10C CPU

Intel® Xeon® W-2145 3.7 2666 8C CPU

Intel® Xeon® W-2135 3.7 2666 6C CPU

Intel® Xeon® W-2133 3.6 2666 6C CPU

Intel® Xeon® W-2125 4.0 2666 4C CPU

Intel® Xeon® W-2123 3.6 2666 4C CPU

Intel® Xeon® W-2104 3.2 2400 4C CPU

Intel® Xeon® W-2102 2.9 2400 4C CPU

Technical Specifications - Hard Drives

STORAGE/HARD DRIVES

HP SAS (Serial Attached SCSI) Hard Drives for HP Workstations	HP 300GB SAS 15K SFF HDD	Capacity	300GB	
		Height	5.9 in; 15 cm	
		Width	Media Diameter	3.5 in; 8.9 cm
		Interface	12Gb/s SAS	
		Synchronous Transfer Rate (Maximum)	Up to 1200 MB/s (SAS single port)	
		Buffer	128MB	
		Seek Time (typical reads, includes controller overhead, including settling)	Average	2.0ms
		Rotational Speed	15K rpm	
		Operating Temperature	41° to 131° F (5° to 55° C)	

Technical Specifications - Hard Drives

SATA (Serial ATA) Hard Drives for HP Workstations

500GB SATA 7200 rpm 6Gb/s 3.5" HDD

Capacity	500GB
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	16MB
Seek Time (typical reads, includes controller overhead, including settling)	Single Track 2 ms
	Average 11 ms
	Full Stroke 21 ms
Rotational Speed	7,200 rpm
Logical Blocks	976,773,168
Operating Temperature	41° to 131° F (5° to 55° C)

1TB SATA 7200 rpm 6Gb/s 3.5" HDD

Capacity	1TB
Height	1 in; 2.54 cm
Width	Media Diameter 3.5 in; 8.9 cm
	Physical Size 4 in; 10.17 cm
Interface	Serial ATA (6.0Gb/s), NCQ enabled
Synchronous Transfer Rate (Maximum)	Up to 600 MB/s
Buffer	64MB
Cache	Adaptive
Seek Time (typical reads, includes controller overhead, including settling)	Single Track 2 ms
	Average 11 ms
	Full Stroke 21 ms
Rotational Speed	7,200 rpm
Operating Temperature	41° to 131° F (5° to 55° C)

2.0TB SATA 7200 rpm 6Gb/s 3.5" HDD

Capacity	2.0TB
Height	1 in; 2.54 cm
Width	Media Diameter 3.5 in; 8.9 cm
	Physical Size 4 in; 10.17 cm
Interface	Serial ATA (6.0 Gb/s), NCQ Enabled
Synchronous Transfer Rate (Maximum)	Up to 600 MB/s
Buffer	64MB
Seek Time (typical reads, includes controller overhead, including settling)	Single Track 1.0 ms
	Average 11 ms
	Full Stroke 18 ms
Rotational Speed	7,200 rpm
Logical Blocks	3,907,029,168
Operating Temperature	41° to 131° F (5° to 55° C)

Technical Specifications - Hard Drives

**1TB SATA 7200 rpm
6Gb/s 3.5" HDD
(Enterprise Class)**

Capacity	1TB	
Protocol	SATA	
Form Factor	3.5"	
Controller	AHCI	
Reliability (MTBF)	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	
Physical Size (Height)	1 in; 2.54 cm	
Physical Size (Width)	4 in; 10.17 cm	
Media Diameter	3.5 in; 8.9 cm	
Interface	Serial ATA (6Gb/s), NCQ enabled	
Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
Buffer	128MB	
Seek Time (typical reads, includes controller overhead, including settling)	Single Track	0.32ms
	Average	7.45ms
	Full Stroke	14.2ms
Operating Temperature	41° to 140° F (5° to 60° C)	
Performance	Sequential Read	up to 226MB/s
	Sequential Write	up to 226MB/s
Enterprise Class Features	High Reliability	

Technical Specifications - Hard Drives

4TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)

Capacity	4TB
Height	0.275 in; 0.7 cm
Width	Media Diameter 2.5 in; 6.36 cm
	Physical Size 2.75 in; 6.99 cm
Interface	Serial ATA (6Gb/s), NCQ enabled
Synchronous Transfer Rate (Maximum)	Up to 600MB/s
Buffer	128MB
Seek Time (typical reads, includes controller overhead, including settling)	Single Track 0.7ms
	Average 8.5ms
	Full Stroke 15.7ms
Rotational Speed	7,200 rpm
Operating Temperature	32° to 140° F (0° to 60° C)

500GB SATA 7.2K SED SFF HDD

Capacity	500GB
Height	0.275 in; 0.7 cm
Width	Media Diameter 2.5 in; 6.36 cm
	Physical Size 2.75 in; 6.99 cm
Interface	Serial ATA (6Gb/s)
Synchronous Transfer Rate (Maximum)	Up to 600MB/s
Buffer	32MB
Seek Time (typical reads, includes controller overhead, including settling)	Single Track 1ms
	Average 4.2ms
	Full Stroke 25ms (typical)
Rotational Speed	7,200 rpm
Operating Temperature	32° to 140° F (0° to 60° C)

Technical Specifications - Hard Drives

SATA SSDs for HP Workstations

HP 256GB SATA 6Gb/s SSD

Capacity	256GB
Protocol	SATA
Form Factor	2.5"
Controller	AHCI
NAND Type	3D TLC
Endurance	192TBW (TB Written)
Reliability (MTTF)	1.5M hours
Physical Size (Height)	0.28 in; 0.7 cm
Physical Size (Width)	2.5 in; 6.36 cm
Interface	SATA 6Gb/s
Synchronous Transfer Rate (Maximum)	Up to 600MB/s
Operating Temperature	32° to 158° F (0° to 70° C)
Performance	
	Sequential Read 530MB/s (max)
	Sequential Write 500MB/s (max)
	Random Read 55K IOPS (max)
	Random Write 83K IOPS (max)

HP 256GB SATA 6Gb/s SED Opal 2 SSD

Capacity	256GB
Protocol	SATA
Form Factor	2.5"
Controller	AHCI
NAND Type	3D TLC
Endurance	192TBW (TB Written)
Reliability (MTTF)	1.5M hours
Physical Size (Height)	0.28 in; 0.7 cm
Physical Size (Width)	2.5 in; 6.36 cm
Interface	6Gb/s SATA
Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)
Operating Temperature	32° to 158° F (0° to 70° C)
Performance	
	Sequential Read 530MB/s
	Sequential Write 500 MB/s
	Random Read 55K IOPS
	Random Write 83K IOPS
Self-Encrypting Drive Support	OPAL 2

HP 512GB SATA 6Gb/s SSD

Capacity	512GB
Protocol	SATA
Form Factor	2.5"
Controller	AHCI
NAND Type	3D TLC
Endurance	388TBW (TB Written)
Reliability (MTTF)	1.5M hours
Physical Size (Height)	0.28 in; 0.7 cm

Technical Specifications - Hard Drives

	Physical Size (Width)	2.5 in; 6.36 cm								
	Interface	SATA 6Gb/s								
	Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)								
	Operating Temperature	32° to 158° F (0° to 70° C)								
	Performance	<table border="0"> <tr> <td>Sequential Read</td> <td>530 MB/s</td> </tr> <tr> <td>Sequential Write</td> <td>500 MB/s</td> </tr> <tr> <td>Random Read</td> <td>95K IOPS</td> </tr> <tr> <td>Random Write</td> <td>83K IOPS</td> </tr> </table>	Sequential Read	530 MB/s	Sequential Write	500 MB/s	Random Read	95K IOPS	Random Write	83K IOPS
Sequential Read	530 MB/s									
Sequential Write	500 MB/s									
Random Read	95K IOPS									
Random Write	83K IOPS									
HP 512GB SATA SED SSD	Capacity	512GB								
	Protocol	SATA								
	Form Factor	2.5"								
	Controller	AHCI								
	NAND Type	3D TLC								
	Endurance	388TBW (TB Written)								
	Reliability (MTTF)	1.5M hours								
	Physical Size (Height)	0.28 in; 0.7 cm								
	Physical Size (Width)	2.5 in; 6.36 cm								
	Interface	SATA 6Gb/s								
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s								
	Operating Temperature	32° to 158° F (0° to 70° C)								
	Performance	<table border="0"> <tr> <td>Sequential Read</td> <td>530 MB/s</td> </tr> <tr> <td>Sequential Write</td> <td>500 MB/s</td> </tr> <tr> <td>Random Read</td> <td>95K IOPS</td> </tr> <tr> <td>Random Write</td> <td>83K IOPS</td> </tr> </table>	Sequential Read	530 MB/s	Sequential Write	500 MB/s	Random Read	95K IOPS	Random Write	83K IOPS
Sequential Read	530 MB/s									
Sequential Write	500 MB/s									
Random Read	95K IOPS									
Random Write	83K IOPS									
	Self-Encrypting Drive Support	OPAL 1 and 2								
HP 1TB SATA 6Gb/s SSD	Capacity	1TB								
	Protocol	SATA								
	Form Factor	2.5"								
	Controller	AHCI								
	NAND Type	3D TLC								
	Endurance	400TBW (TB Written)								
	Reliability (MTTF)	1.5M hours								
	Physical Size (Height)	0.28 in; 0.7 cm								
	Physical Size (Width)	2.5 in; 6.36 cm								
	Interface	SATA 6Gb/s								
	Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)								
	Operating Temperature	32° to 158° F (0° to 70° C)								
	Performance	<table border="0"> <tr> <td>Sequential Read</td> <td>530 MB/s</td> </tr> <tr> <td>Sequential Write</td> <td>500 MB/s</td> </tr> <tr> <td>Random Read</td> <td>95K IOPS</td> </tr> <tr> <td>Random Write</td> <td>83K IOPS</td> </tr> </table>	Sequential Read	530 MB/s	Sequential Write	500 MB/s	Random Read	95K IOPS	Random Write	83K IOPS
Sequential Read	530 MB/s									
Sequential Write	500 MB/s									
Random Read	95K IOPS									
Random Write	83K IOPS									

Technical Specifications - Hard Drives

HP 2TB SATA 6Gb/s SSD	Capacity	2TB	
	Protocol	SATA	
	Form Factor	2.5"	
	Controller	AHCI	
	NAND Type	3D TLC	
	Endurance	400TBW (TB Written)	
	Reliability (MTTF)	1.5M hours	
	Physical Size (Height)	0.28 in; 0.7 cm	
	Physical Size (Width)	2.5 in; 6.36 cm	
	Interface	SATA 6Gb/s	
	Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	530 MB/s
		Sequential Write	500 MB/s
		Random Read	95K IOPS
Random Write		83K IOPS	
HP Enterprise Class 240GB SATA SSD	Capacity	240GB	
	Protocol	SATA	
	Form Factor	2.5"	
	Controller	AHCI	
	NAND Type	3D TLC	
	Endurance	2,200TBW (TB Written)	
	Reliability (MTTF)	2.0M hours	
	Physical Size (Height)	0.28 in; 0.7 cm	
	Physical Size (Width)	2.5 in; 6.36 cm	
	Interface	6Gb/s SATA	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	540 MB/s
		Sequential Write	310 MB/s
		Random Read	93K IOPS
Random Write		48K IOPS	
Enterprise Class Features	High Endurance NAND Power Loss Protection End-to-End Data Protection		
HP Enterprise Class 480GB SATA SSD	Capacity	480GB	
	Protocol	SATA	
	Form Factor	2.5"	
	Controller	AHCI	
	NAND Type	3D TLC	
	Endurance	4,400TBW (TB Written)	
	Reliability (MTTF)	2.0M hours	
	Physical Size (Height)	0.28 in; 0.7 cm	

Technical Specifications - Hard Drives

Physical Size (Width)	2.5 in; 6.36 cm	
Interface	6Gb/s SATA	
Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
Operating Temperature	32° to 158° F (0° to 70° C)	
Performance	Sequential Read	540 MB/s
	Sequential Write	460 MB/s
	Random Read	93K IOPS
	Random Write	74K IOPS
Enterprise Class Features	High Endurance NAND Power Loss Protection End-to-End Data Protection	

PCIe SSDs for HP Workstations

HP Z Turbo Drive G2 256GB SSD

Capacity	256GB	
Protocol	PCIe	
Form Factor	M.2	
Controller	NVMe	
NAND Type	MLC	
Endurance	150TB	
Reliability (MTBF)	1.5M hours	
Interface	PCI Express 3.0 x4 electrical x4 physical	
Operating Temperature	32° to 158° F (0° to 70° C)	
Performance	Sequential Read	2800 MB/s
	Sequential Write	1100 MB/s
	Random Read	250K IOPS
	Random Write	180K IOPS

HP Z Turbo Drive G2 512GB SSD

Capacity	512GB	
Protocol	PCIe	
Form Factor	M.2	
Controller	NVMe	
NAND Type	3D MLC	
Endurance	300TB	
Reliability (MTBF)	1.5M hours	
Interface	PCI Express 3.0 x4 electrical x4 physical	
Operating Temperature	32° to 158° F (0° to 70° C)	
Performance	Sequential Read	2800 MB/s
	Sequential Write	1600 MB/s
	Random Read	260K IOPS
	Random Write	260K IOPS

HP Z Turbo Drive G2 1TB SSD

Capacity	1TB
Protocol	PCIe
Form Factor	M.2
Controller	NVMe

Technical Specifications - Hard Drives

NAND Type	3D MLC	
Endurance	600TB	
Reliability (MTTF)	1.5M hours	
Interface	PCI Express 3.0 x4 electrical x4 physical	
Operating Temperature	32° to 158° F (0° to 70° C)	
Performance	Sequential Read	3000 MB/s
	Sequential Write	1700 MB/s
	Random Read	360K IOPS
	Random Write	330K IOPS

Technical Specifications - Hard Drives

HP Z Turbo Drive Quad Pro 2x256GB PCIe SSD	Capacity	512GB
	Protocol	PCIe
	Form Factor	PCIe Card, Full Height PCIe Slot
	Controller	NVMe
	NAND Type	MLC
	Endurance	150TB
	Reliability (MTBF)	1.5M hours
	Interface	PCIe Gen3 x4 architecture
	Operating Temperature	32° to 158° F (0° to 70° C)
	Performance	Sequential Read 2800 MB/s
		Sequential Write 1100 MB/s
		Random Read 250K IOPS
		Random Write 180K IOPS
HP Z Turbo Drive Quad Pro 2x512GB PCIe SSD	Capacity	1TB
	Protocol	PCIe
	Form Factor	PCIe Card, Full Height PCIe Slot
	Controller	NVMe
	NAND Type	MLC
	Endurance	292TB
	Reliability (MTBF)	1.5M hours
	Interface	PCIe Gen3 x4 architecture
	Operating Temperature	32° to 158° F (0° to 70° C)
	Performance	Sequential Read 2800 MB/s
		Sequential Write 1600 MB/s
		Random Read 250 K IOPS
		Random Write 180K IOPS
HP Z Turbo Drive G2 256GB SED SSD	Capacity	256GB
	Protocol	PCIe
	Form Factor	Half-height, half-length
	Controller	NVMe
	NAND Type	MLC
	Endurance	150TBW (TB Written)
	Reliability (MTBF)	1.5M hours
	Interface	PCI Express 3.0 x4 electrical x4 physical
	Operating Temperature	32° to 158° F (0° to 70° C)
	Performance	Sequential Read 2800 MB/s
		Sequential Write 1100 MB/s
		Random Read 250K IOPS
		Random Write 180K IOPS
	Self-Encrypting Drive Support OPAL 2	

Technical Specifications - Hard Drives

HP Z Turbo Drive G2 512GB SED SSD	Capacity	512GB	
	Protocol	PCIe	
	Form Factor	Half-height, half-length	
	Controller	NVMe	
	NAND Type	3D MLC	
	Endurance	300TBW (TB Written)	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	2800 MB/s
		Sequential Write	1600 MB/s
		Random Read	260K IOPS
		Random Write	150K IOPS
	Self-Encrypting Drive Support	OPAL 2	
HP Z Turbo Drive Quad Pro 2x1TB PCIe SSD	Capacity	2TB	
	Protocol	PCIe	
	Form Factor	PCIe Card, Full Height PCIe Slot	
	Controller	NVMe	
	NAND Type	3D MLC	
	Endurance	600TB	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	3000 MB/s
		Sequential Write	1700 MB/s
		Random Read	360K IOPS
		Random Write	330K IOPS
	HP Z Turbo Drive G2 256GB TLC SSD	Capacity	256GB
		Protocol	PCIe
Form Factor		M.2	
Controller		NVMe	
NAND Type		3D TLC	
Endurance		75TBW (TB Written)	
Reliability (MTBF)		1.5M hours	
Interface		PCI Express 3.0 x4 electrical x4 physical	
Operating Temperature		32° to 158° F (0° to 70° C)	
Performance		Sequential Read	2800 MB/s
		Sequential Write	320 MB/s (1100 MB/s max/Turbo)
		Random Read	250K IOPS
		Random Write	180K IOPS
HP Z Turbo Drive G2 512GB TLC SSD		Capacity	512GB
	Protocol	PCIe	

Technical Specifications - Hard Drives

	Form Factor	M.2
	Controller	NVMe
	NAND Type	3D TLC
	Endurance	150TBW (TB Written)
	Reliability (MTBF)	1.5M hours
	Interface	PCI Express 3.0 x4 electrical x4 physical
	Operating Temperature	32° to 158° F (0° to 70° C)
	Performance	
		Sequential Read 2800 MB/s
		Sequential Write 660 MB/s (1600 MB/s max/Turbo)
		Random Read 260K IOPS
		Random Write 260K IOPS
HP Z Turbo Drive G2 1TB TLC SSD	Capacity	1TB
	Protocol	PCIe
	Form Factor	M.2
	Controller	NVMe
	NAND Type	3D TLC
	Endurance	300TBW (TB Written)
	Reliability (MTBF)	1.5M hours
	Interface	PCI Express 3.0 x4 electrical x4 physical
	Operating Temperature	32° to 158° F (0° to 70° C)
	Performance	
		Sequential Read 3000 MB/s
		Sequential Write 1150 MB/s (1700 MB/s max/Turbo)
		Random Read 360K IOPS
		Random Write 330K IOPS

Technical Specifications - Hard Drive Controllers

HARD DRIVE CONTROLLERS

MicroSemi 2100-4i4e 8-port SAS 12Gb/s RAID Card	PCI Bus	8 lanes, PCI Express 3.0	
	RAID Levels	Offers Integrated RAID (0, 1, and 10)	
	PCI Data Burst Transfer Rate	Half Duplex x8, PCIe, 8000 MB/s	
	SAS Bandwidth	Half Duplex	1200 MB/s per lane
	PCI Card Type	3.3V Add-in Card	
	PCI Voltage	12 V ± 10%	
	PCI Power	9.8W typical, Airflow min 200 LFM	
	Bracket	Full height and low profile	
	Certification Level	PCI Express 3.0 compliant	
	SAS Processor	MicroSemi Series 8 SAS Controller	
	Internal Connectors	One x4 internal mini-SASHD (SFF-8643)	
	External Connectors	One x4 external mini-SASHD (SFF-8644)	
	Maximum Number of SCSI Devices	256 Non-RAID SAS/SATA devices	
	LED Indicators	Connector for Drive Activity Light	

Technical Specifications - Graphics

GRAPHICS

NVIDIA® Quadro® P400 1st Form Factor GFX 2GB Graphics

Dimensions: 2.713" H x 5.7" L
Single Slot, Low Profile
Cooling: Active
Weight: 129 grams

Graphics Controller	NVIDIA® Quadro® P400 Graphics Card GP107-825 GPU 256 NVIDIA® CUDA® cores Max Power: 30 Watts
Bus Type	PCI Express 3.0 x16
Memory	Size: 2 GB GDDR5, 2000 MHz Memory Interface: 64-bit Memory Bandwidth: 32 GB/s
Connectors	3mDP Outputs
Maximum Resolution	DisplayPort™ 1.4: - up to 3x 5120 x 2880 x 24 bpp @ 60Hz - supports Multi-Stream Transport (MST)
Image Quality Features	10-bit internal display processing pipeline 10-bit scan-out support
Display Output	3 mDP Connectors
Shading Architecture	Full Microsoft DirectX® 12 Shader Model 5.1
Supported Graphics APIs	OpenGL® 4.5 DirectX® 12 Vulkan™ 1.0 API support includes: CUDA C, CUDA C++, DirectCompute, OpenCL™
Available Graphics Drivers	Microsoft Windows 10 Microsoft Windows 8.1 Microsoft Windows 7 Linux®

HP qualified drivers may be preloaded or available from the HP support Web site:
<http://welcome.hp.com/country/us/en/support.html>

Notes

NVIDIA® Quadro® P600 1st Form Factor GFX 2GB Graphics

Dimensions: 2.713" H x 5.7" L
Single Slot, Low Profile
Cooling: Active
Weight: 129 grams

Graphics Controller	NVIDIA® Quadro® P600 Graphics Card GP107-850 GPU 384 NVIDIA® CUDA® cores Max Power: 40 Watts
Bus Type	PCI Express 3.0 x16

Technical Specifications - Graphics

Memory	Size: 2 GB GDDR5, 2000 MHz Memory Interface: 128-bit Memory Bandwidth: 64 GB/s
Connectors	4mDP Outputs
Maximum Resolution	DisplayPort™ 1.4: - up to 4x 5120 x 2880 x 24 bpp @ 60Hz - supports Multi-Stream Transport (MST)
Image Quality Features	10-bit internal display processing pipeline 10-bit scan-out support
Display Output	4 mDP Connectors
Shading Architecture	Full Microsoft DirectX® 12 Shader Model 5.1
Supported Graphics APIs	OpenGL® 4.5 DirectX® 12 Vulkan™ 1.0 API support includes: CUDA C, CUDA C++, DirectCompute , OpenCL
Available Graphics Drivers	Microsoft Windows 10 Microsoft Windows 8.1 Microsoft Windows 7 Linux®

HP qualified drivers may be preloaded or available from the HP support Web site:

<http://welcome.hp.com/country/us/en/support.html>

Notes

AMD FirePro™ W2100 2GB Graphics

Form Factor	Low Profile, half length (full-height bracket included)
Graphics Controller	AMD FirePro™ W2100 professional graphics based on Oland GPU. GPU: 320 Stream Processors organized into 5 Compute Units GPU Frequency: 630Mhz Power: 26W Cooling: Active
Bus Type	PCI Express® x8, Generation 3.0
Memory	2GB DDR3 memory Memory Bandwidth: up to 28.8 GB/s Memory Width: 128 bit
Connectors	2x Display Port™ 1.2 connectors Factory Configured: No video cable adapter included After market option kit: No video cable adapter included Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.
Maximum Resolution	DisplayPort™ 1.2: - up to 4096x2160 x 24 bpp @ 60Hz

Technical Specifications - Graphics

Dual Link DVI(I) (requires adapter cable):
- up to 2560 x 1600 x 32 bpp @ 60Hz

Single Link-DVI(I)(requires adapter cable):
- up to 1920 x 1200 x 32 bpp @ 60Hz

VGA (requires adapter cable):
- up to 1920 x 1200 x 32 bpp @ 60Hz

Image Quality Features Advanced support for 8-bit, 10-bit, and 16-bit per RGB color component.
High bandwidth scaler for high quality up and downscaling.

Display Output 2 x DisplayPort™ 1.2a
Maximum number of displays: 2

Shading Architecture Shader Model 5.0

Supported Graphics APIs OpenCL™ 1.2, DirectX® 11.2/12, OpenGL® 4.4

OpenGL® 4.4 support with driver release 14.301.xxx
OpenCL™ 1.2 conformance expected with drive release 14.301.xxx

Available Graphics Drivers Windows10 (64-bit and 32-bit)
Windows 8.1 (64-bit and 32-bit)
Windows 7 (64-bit and 32-bit)
Linux®

HP qualified drivers may be preloaded or available from the HP support Web site:
<http://welcome.hp.com/country/us/en/support.html>

Notes Depending on the card model, native DisplayPort™ connectors and/or certified DisplayPort™ active or passive adapters to convert your monitor's native input to your card's DisplayPort™ or Mini-DisplayPort™ connector(s) may be required. See www.amd.com/FirePro™ for details.

**NVIDIA® Quadro® P1000
1st GFX 4GB Graphics**

Form Factor Dimensions:2.713" H x 5.7" L
Single Slot, Low Profile
Cooling: Active
Weight: 129 grams

Graphics Controller NVIDIA® Quadro® P1000 Graphics Card
GP107-860 GPU
640 NVIDIA® CUDA® cores
Max Power: 47 Watts

Bus Type PCI Express 3.0 x16

Memory Size: 4 GB GDDR5, 2500 MHz
Memory Interface: 128-bit memory interface
Memory Bandwidth: 80 GB/s memory bandwidth

Connectors 4mDP Outputs

Maximum Resolution DisplayPort™ 1.4:

Technical Specifications - Graphics

	- up to 4x 5120 x 2880 x 24 bpp @ 60Hz - supports Multi-Stream Transport (MST)
Image Quality Features	10-bit internal display processing pipeline 10-bit scan-out support
Display Output	4 mDP Connectors
Shading Architecture	Full Microsoft DirectX® 12 Shader Model 5.1
Supported Graphics APIs	OpenGL® 4.5 DirectX® 12 Vulkan™ 1.0 API support includes: CUDA C, CUDA C++, DirectCompute, OpenCL™
Available Graphics Drivers	Microsoft Windows 10 Microsoft Windows 8.1 Microsoft Windows 7 Linux®
	HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html

Notes

NVIDIA® Quadro® P2000 1st GFX 5GB Graphics	Form Factor	Dimensions: 4.4"Hx7.9"L Single Slot Cooling: Active Weight: 260 grams
	Graphics Controller	NVIDIA® Quadro® P2000 Graphics Card Power: 75 Watts
	Bus Type	PCI Express 3.0 x16
	Memory	Size: 5GB GDDR5 Memory Bandwidth: 140 GB/s Memory Width: 160-bit
	Connectors	4x DisplayPort™ 1.4
		Factory Configured Option: No adapter included with card After Market Option: No video cable adapter included
	Maximum Resolution	Additional DVI to VGA, DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories. DisplayPort™: - up to 5120 x 2880 x 24 bpp @ 60Hz - supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST) DP 1.3 & 1.4 ready. DL-DVI(I) output: - up to 2560 x 1600 x 32 bpp @ 60 Hz Single Link-DVI(I) output: - up to 1920 x 1200 x 32 bpp @ 60Hz HDMI 2.0 (requires DP to HDMI adapter): 5120 x 2880 x 24 bpp @ 60Hz

Technical Specifications - Graphics

Image Quality Features	12-bit internal display pipeline (hardware support for 12-bit scanout on supported panels, applications and connection)
Display Output	<p>Stereoscopic 3D display support including NVIDIA® 3D Vision™ technology, NVIDIA® Mosaic and nView.</p> <p>Maximum number of displays - 4 direct attached monitors</p> <p>Maximum number of monitors across all available NVIDIA® Quadro® P2000 outputs is 4.</p>
Shading Architecture	Shader Model 5.1
Supported Graphics APIs	OpenGL® 4.5 DirectX® 12
Available Graphics Drivers	<p>API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran software</p> <p>Microsoft Windows 10 Microsoft Windows 7 Professional 64bit Linux® - Full OpenGL® implementation, complete with NVIDIA® Quadro® and ARB extensions</p> <p>HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html</p>
Notes	

Radeon™ Pro WX 3100 4GB Graphics	Form Factor	Low-Profile Single Slot (6.6" Length)
	Graphics Controller	<p>Polaris12 GL GPU: 512 Stream Processors organized into 8 Compute Units Power: 50 Watts Cooling: Active</p>
	Memory	<p>4GB GDDR5 memory Memory Bandwidth: 6 Gbps / 96 GB/s Memory Width: 128 bit</p>
	Connectors	<p>2x Mini DisplayPort™ 1.4 plus 1x DisplayPort™ 1.4 – HDR ready connectors with HBR3 and MST support.</p> <p>Factory Configured: No adapters included After market option kit: One mDP-to-DP cable adapters included</p> <p>Additional Mini DisplayPort™-to-DisplayPort™, DisplayPort™-to-VGA or DisplayPort™-to-DVI adapters are available as Factory Configuration or Option Kit accessories.</p>
	Maximum Resolution	<p>5K support @ 60Hz</p> <ul style="list-style-type: none"> 1x single-cable 5K monitor, or 2x dual-cable 5K monitors <p>3x 4K support @ 60Hz</p>
Image Quality Features	Advanced support for 8-bit and 10-bit per RGB color component. High bandwidth scaler for high quality up and downscaling	

Technical Specifications - Graphics

Display Output 3 full physical DP1.3 HBR3 / DP1.4 HDR outputs
FreeSync support

GPU Architecture Polaris
Supported Graphics APIs DirectX® 12
OpenGL® 4.5
OpenCL™ 2.0
Vulkan™ 1.0

Available Graphics Drivers Windows 10 64-bit
(Windows® 7 64-bit available from AMD)
Linux® 64-bit (selected Enterprise distributions)

HP qualified drivers may be preloaded or available from the HP support Web site:

<http://welcome.hp.com/country/us/en/support.html>

Notes

1. HDR content requires that the system be configured with a fully HDR-ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support.
2. AMD PowerTune and AMD ZeroCore Power are technologies offered by certain FirePro™ and Radeon™ Pro products, which are designed to intelligently manage GPU power consumption in response to certain GPU load conditions.
3. As of September 2016, certified for DisplayPort™ 1.4 HBR3 and ready for DisplayPort™ 1.4 HDR based on independent verification by DisplayPort™ testing authority. HDR content requires that the system be configured with a fully HDR-ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support.

Radeon™ Pro WX 4100 4GB Graphics

Form Factor Low-Profile Single Slot (6.6" Length)

Graphics Controller Polaris 11 Baffin GL XT
GPU: 1024 Stream Processors organized into 16 Compute Units
Power: 50 Watts
Cooling: Active

Memory 4GB GDDR5 memory
Memory Bandwidth: 6 Gbps / 96 GB/s
Memory Width: 128 bit

Connectors 4x Mini DisplayPort™ 1.4 – HDR ready connectors with HBR3 and MST support.

Factory Configured: Four mDP-to-DP cable adapters included
After market option kit: Four mDP-to-DP cable adapters included

Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.

Technical Specifications - Graphics

Maximum Resolution	5K support @ 60Hz <ul style="list-style-type: none"> 1x single-cable 5K monitor, or 2x dual-cable 5K monitors 4x 4K support @ 60Hz
Image Quality Features	Advanced support for 8-bit and 10-bit per RGB color component. High bandwidth scaler for high quality up and downscaling
Display Output	4 full physical DP1.3 HBR3 / DP1.4 HDR outputs FreeSync support
GPU Architecture	GCN 4th Generation
Supported Graphics APIs	DirectX®12 OpenGL® 4.5 OpenCL™ 2.0 Vulkan™ 1.0
Available Graphics Drivers	Windows 10 64-bit Windows® 7 64-bit Linux® 64-bit (selected Enterprise distributions)

HP qualified drivers may be preloaded or available from the HP support Web site:

<http://welcome.hp.com/country/us/en/support.html>

Notes	<ol style="list-style-type: none"> HDR content requires that the system be configured with a fully HDR-ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support. AMD PowerTune and AMD ZeroCore Power are technologies offered by certain FirePro™ and Radeon™ Pro products, which are designed to intelligently manage GPU power consumption in response to certain GPU load conditions. As of September 2016, certified for DisplayPort™ 1.4 HBR3 and ready for DisplayPort™ 1.4 HDR based on independent verification by DisplayPort™ testing authority. HDR content requires that the system be configured with a fully HDR-ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windows mode content requires operating system support.
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NVIDIA® Quadro® P4000 1st GFX 8GB Graphics	Form Factor	Dimensions: 4.4”H x 9.5”L Single-slot, full-height Weight: 475 grams (without extender)
	Graphics Controller	NVIDIA® Quadro® P4000 Graphics Card GPU: GP104 with 1792 CUDA cores Power: 120 Watts
	Bus Type	PCI Express 3.0 x16
	Memory	Size: 8GB GDDR5 Memory Bandwidth: 243 GB/s Memory Width: 256-bit

Technical Specifications - Graphics

Connectors	<p>4 x DisplayPort 1.4 3-pin mini-DIN connector via optional bracket 1 x 6-pin auxiliary power connector 4-pin header for stereo signal SYNC connector for Quadro® Sync II 2 x SLI connectors</p> <p>Factory Configured Option: No video cable adapter included After Market Option: No video cable adapter included</p> <p>Additional DisplayPort-to-VGA, DisplayPort-to-HDMI, or DisplayPort-to-DVI adapters are available as accessories</p>
Maximum Resolution	<p>Dual-link internal TMDS (DVI 1.0): - up to 2560 x 1600 x 32 bpp @ 60 Hz</p> <p>Single-link internal TMDS (DVI 1.0): - up to 1920 x 1200 x 32 bpp @ 60 Hz</p> <p>HDMI™ 2.0b (requires DP to HDMI adapter): - up to 5120 x 2880 x 24 bpp @ 60Hz</p> <p>DisplayPort: - up to 4096 x 2160 x 30 bpp @ 60Hz - up to 2560 x 1600 x 30 bpp @ 120 Hz - supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST)</p> <p>Using two DP outputs, the P4000 can drive one dual DP input display with 5120 x 2880 x 30 bpp @ 60Hz resolution.</p>
Image Quality Features	<p>Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component. HDCP 2.2 support over DisplayPort, DVI, and HDMI connectors NVIDIA 3D Vision™ and other 3D stereo technologies NVIDIA Mosaic and nView</p>
Display Output	<p>Maximum number of displays - 4 direct attached monitors</p> <p>Maximum number of monitors across all available Quadro P4000 outputs is 4.</p>
Shading Architecture	<p>Shader Model 5.1</p>
Supported Graphics APIs	<p>OpenGL 4.5 DirectX 12 Vulkan 1.0</p> <p>API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran</p>
Available Graphics Drivers	<p>Microsoft Windows 10 Microsoft Windows 7 Linux - Full OpenGL implementation, complete with NVIDIA and ARB extensions</p> <p>HP qualified drivers may be preloaded or available from the HP support Web site:</p>

Technical Specifications - Graphics

Notes	<p>http://welcome.hp.com/country/us/en/support.html</p> <ol style="list-style-type: none"> 1. Quadro P4000 offered as Factory Configured Option does not include a video cable adapter. Video cable adapters must be ordered separately. 2. Quadro P4000 offered as an After Market Option does not include video cables. Video cable adapters must be ordered separately.
<hr/>	
NVIDIA® Quadro® P5000 1st GFX 16GB Graphics	<p>Form Factor Full-Height Dual Slot (4.4" Height x 10.5" Length) Weight: 815 grams / 1.80 lbs</p> <p>Graphics Controller NVIDIA® Quadro® P5000 graphics GPU: 2560 NVIDIA® CUDA® Parallel Processing Cores Power: 180 Watts Cooling: Active</p> <p>Memory 16GB GDDR5X memory Memory Bandwidth: Up to 288 GB/s Memory Width: 256 bit ECC Memory (disabled by default)</p> <p>Connectors DP (x4) with HDR support DL-DVI(D) 3-pin mini-DIN connector SLI connector NVIDIA® Quadro® Sync connector (compatible with NVIDIA® Quadro® II Sync) One 8-pin auxiliary power connector</p> <p>Factory configured option: No video cable adapter included with card. After market option Kit: No video cable adaptor included with card.</p> <p>DVI to VGA, DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories.</p> <p>Maximum Resolution 5K support @ 60Hz 1x single-cable 5K monitor, or 2x dual-cable 5K monitors</p> <p>Image Quality Features Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component. HDCP 2.2 support over DisplayPort™, DVI, and HDMI connectors NVIDIA® 3D Vision™ and other 3D stereo technologies NVIDIA Mosaic and nView Desktop Management</p> <p>Display Outputs¹ 4x DP1.4 HDR outputs (up to 3840x2160 UHD @ 120Hz refresh, or up to 8K at 30Hz) 1x Dual-link DVI-D output (up to 2560 x 1600 @ 60 Hz and 1920x1200 @ 120 Hz)</p>

Technical Specifications - Graphics

GPU Architecture	NVIDIA Pascal™
Supported Graphics APIs	DirectX® 12, OpenGL® 4.5, OpenCL™ 1.0, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran
Available Graphics Drivers	Windows 10 64-bit Windows® 7 64-bit Linux® 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
Notes	1- Supports up to a total of 4 displays

NVIDIA® Quadro® P6000 1st GFX 24GB Graphics

Form Factor	Full-Height Dual Slot (4.4" Height x 10.5" Length) Weight: 967 grams / 2.14 lbs
Graphics Controller	NVIDIA® Quadro® P6000 graphics GPU: 3840 NVIDIA® CUDA® Parallel Processing Cores Power: 250 Watts Cooling: Active
Memory	24GB GDDR5X memory Memory Bandwidth: Up to 432 GB/s Memory Width: 384 bit ECC Memory (disabled by default)
Connectors	DP (x4) with HDR support DL-DVI(I) 3-pin mini-DIN connector SLI connector Quadro Sync connector (compatible with Quadro II Sync) One 8-pin auxiliary power connector Factory configured option: No video cable adaptor included with card. After market option Kit: No video cable adaptor included with card. DVI to VGA, DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories.
Maximum Resolution	5K support @ 60Hz 1x single-cable 5K monitor, or 2x dual-cable 5K monitors

Technical Specifications - Graphics

Image Quality Features	Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component. HDCP 2.2 support over DisplayPort, DVI, and HDMI connectors NVIDIA 3D Vision™ and other 3D stereo technologies NVIDIA Mosaic and nView
Display Outputs¹	4x DP1.4 HDR outputs (up to 3840x2160 UHD @ 120Hz refresh, or up to 8K at 30Hz) 1x Dual-link DVI-D output (up to 2560 x 1600 @ 60 Hz and 1920x1200 @ 120 Hz)
GPU Architecture	NVIDIA Pascal™
Supported Graphics APIs	DirectX® 12, OpenGL® 4.5, OpenCL™ 1.0, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran
Available Graphics Drivers	Windows® 10 64-bit Windows® 7 64-bit Linux® 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
Notes	1- Supports up to a total of 4 displays

Radeon™ Pro WX 7100 1st GFX 8GB Graphics	Form Factor	Full-Height Single Slot (9.5" Length)
	Graphics Controller	Radeon™ Pro WX 7100 graphics GPU: 2304 Stream Processors organized into 36 Compute Units Power: 130 Watts Cooling: Active
	Memory	8GB GDDR5 memory Memory Bandwidth: 7 Gbps / 224 GB/s Memory Width: 256 bit
	Connectors	4x Display Port 1.4 – HDR ready connectors with HBR3 and MST support. Factory Configured: No video cable adapter included After market option kit: No video cable adapter included Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.
	Maximum Resolution	5K support @ 60Hz <ul style="list-style-type: none"> 1x single-cable 5K monitor, or 2x dual-cable 5K monitors
	Image Quality Features	Advanced support for 8-bit, 10-bit, and 16-bit per RGB color component. High bandwidth scaler for high quality up and downscaling

Technical Specifications - Graphics

Display Output 4 full physical DP1.3 HBR3 / DP1.4 HDR outputs
FreeSync support

GPU Architecture GCN 4th Generation

Supported Graphics APIs DirectX®12
OpenGL® 4.5
OpenCL™ 2.0
Vulkan™ 1.0

Available Graphics Drivers Windows 10 64-bit
Windows® 7 64-bit
Linux® 64-bit

HP qualified drivers may be preloaded or available from the HP support Web site:

<http://welcome.hp.com/country/us/en/support.html>

Notes

7. HDR content requires that the system be configured with a fully HDR-ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support.
8. Radeon VR Ready Creator Products are select Radeon Pro and AMD FirePro™ GPUs that meet or exceed the Oculus Rift or HTC Vive recommended specifications for video cards/GPUs. Other hardware (including CPU) and system requirements recommended by Oculus Rift or HTC Vive should also be met in order to operate the applicable HMDs as intended. As VR technology, HMDs and other VR hardware and software evolve and/or become available, these criteria may change without notice.
9. AMD PowerTune and AMD ZeroCore Power are technologies offered by certain FirePro™ and Radeon™ Pro products, which are designed to intelligently manage GPU power consumption in response to certain GPU load conditions.
10. As of September 2016, certified for DisplayPort™ 1.4 HBR3 and ready for DisplayPort™ 1.4 HDR based on independent verification by DisplayPort™ testing authority. HDR content requires that the system be configured with a fully HDR-ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support.

NVIDIA® Quadro® Sync II	Part number	1WT20AA
	Dimensions (HxD)	6.0 inches × 4.2 inches
	Devices Supported	NVIDIA® Quadro® P4000 NVIDIA® Quadro® P5000 NVIDIA® Quadro® P6000

Technical Specifications - Graphics

Bus Type	Requires one free mechanical PCIe bus slot. 6-pin PCI or SATA power connector
PCI Form Factor	Full Height, half length, single slot
Ports	2 RJ45 connectors for carrying frame lock signals over CAT5 cables. BNC Connector for external house synchronization.
Internal Connectors	6 NVIDIA SLI® style edge fingers for connection to compatible GPUs <ul style="list-style-type: none">• Included with the board are 4 12-Inch Short Sync Cables to connect to GPU's• Included with the board are 2 24-Inch Long Sync Cables to connect to GPU's
System Requirements	Requires one free mechanical PCIe bus slot. 6-pin PCI or SATA power connector Must be used with NVIDIA Quadro P4000, P5000 or P6000 graphics cards. Requires Quadro driver version R375 or later.
Temperature - Operating	0° to 55° C
Temperature - Storage	-40° to 60° C
Relative Humidity - Operating	10% to 80%
Power Requirements	Board power dissipation: <15W
Operating Systems Supported	Windows 10 64-bit Windows 7 64-bit Linux 64-bit
Kit Contents	Contains: <ul style="list-style-type: none">• Quadro Sync II Card• 4 x 12-Inch Short Sync Cables• 2 x 24-Inch Long Sync Cables (Two)• Quick Start Guide

Technical Specifications – Optical and Removable Storage

OPTICAL AND REMOVABLE STORAGE

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 Full Stroke DVD Full Stroke CD	8.5 GB DL or 4.7 GB standard < 200 ms (seek) < 200 ms (seek)
	Maximum Data Transfer Rates	CD ROM Read DVD ROM Read	CD-ROM, CD-R Up to 24X CD-RW Up to 24X 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 DC Power Requirements DC Current	SATA DC power receptacle 5 VDC ± 5%-100 mV ripple p-p 5 VDC -< 800 mA typical, <1600 mA maximum
	Operating Environmental (all conditions non-condensing)	Temperature Relative Humidity Maximum Wet Bulb Temperature	41° to 122° F (5° to 50° C) 10% to 80% 84° F (29° C)
	Operating Systems Supported	Windows 10, Windows 7 Professional 32-bit and 64-bit, Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*. Red Hat Enterprise Linux(RHEL) WS4**, 5, 6 Desktop/Workstation SUSE Linux Enterprise Desktop 10 & 11	
Kit Contents	HP SATA DVD Writer drive, installation guide.		

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

Description	9.5mm height, tray-load
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Technical Specifications – Optical and Removable Storage

HP 9.5mm Slim DVD-ROM Drive	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 – <800mA typical, < 1600 mA maximum	
	Operating Environmental (all conditions non-condensing)	Temperature	41° to 122° F (5° to 50° C)	
Relative Humidity		10% to 80%		
Maximum Wet Bulb Temperature		84° F (29° C)		
Operating Systems Supported	Windows 8.1, Windows 8 32-bit and 64-bit, Windows 7 Professional 32-bit and 64-bit, Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*.			
	Red Hat Enterprise Linux(RHEL) WS4**, 5, 6 Desktop/Workstation SUSE Linux Enterprise Desktop 10 & 11			
	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			

HP 9.5mm Slim BDXL 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 – Optical and Removable Storage

	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-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 8.1, Windows 8 32-bit and 64-bit, Windows 7 Professional 32-bit and 64-bit, Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*.	
	Red Hat Enterprise Linux(RHEL) WS4**, 5, 6 Desktop/Workstation SUSE Linux Enterprise Desktop 10 & 11	
	No driver is required for this device. Native support is provided by the operating system.	

Technical Specifications – Optical and Removable Storage

Kit Contents	<p>9.5mm Slim BDXL Blu-Ray Writer, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide</p> <p>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.</p>
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HP SD Card Reader	Description	<p>Supports hardware ECC (Error Correction Code) function</p> <p>Supports hardware CRC (Cyclic Redundancy Check) function</p> <p>Supports SD 4-bit parallel transfer mode</p>
	Interface Type	USB 3.0 High-speed interface
	Dimensions (WxHxD)	1.15 x .9 x .15 in (29.00 x 23.6 x 3.15 mm) Fits conveniently in the Front IO Bay
	Supported Media Types	<p>Secure Digital Card (SD)</p> <p>Secure Digital High Capacity (SDHC)</p> <p>SD Extended Capacity Memory Card (SDXC)</p> <p>SD Ultra High Speed II (SD UHSII)</p> <p>These additional media types are supported with a card adapter.</p> <p>Memory Stick Micro (M2)</p> <p>miniSD</p> <p>miniSD High Capacity</p> <p>Micro SD Memory Card (MicroSD)</p> <p>Micro SD High Capacity Memory Card (MicroSDHC)</p>
	Operating Systems Supported	<p>Windows 10</p> <p>No driver is required for this device. Native support is provided by the operating system.</p>
	Kit Contents	Media card reader
	Approvals	<p>USB-IF, WHQL, Compliant with USB Mass Storage Class Bulk only Transport Specification Rev. 1.0,</p> <p>Compliant Intel Front Panel I/O Connectivity Design Guide V. 1.3, FCC, CE, BSMI, C-Tick, VCCI, MIC, cUL, TUVT</p>
	Weight	0.35 lbs. (0.16 kg)

Technical Specifications - Networking and Communications

NETWORKING AND COMMUNICATIONS

Integrated Intel I219LM PCIe GbE Controller	Connector	RJ-45
	Controller	Intel I219LM GbE platform LAN connect networking controller
	Data Rates Supported	10/100/1000 Mbps
	Boot ROM Support	PXE, UEFI
	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"> • Off = 10Mbps • Amber = 100Mbps • Green = 1000Mbps

Management Capabilities Intel® Active Management Technology™ 11

Integrated Intel I210	Connector	RJ-45
	Controller	Intel® I210
	Data Rates Supported	10/100/1000 Mbps
	Boot ROM Support	PXE, UEFI
	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"> • Off = 10Mbps • Amber = 100Mbps • Green = 1000Mbps

Management Capabilities Wake-On-LAN

Intel® I210-T1	Networking Interface	RJ-45
	System Interface	PCI Express 2.1 x1
	Networking Speeds Supported	10Mbps, 100Mbps, 1Gbps
	Cabling (up to 100m)	Cat3 (or higher) for 10Mbps Cat5 (or higher) for 100Mbps Cat5e (or higher) for 1Gbps
	Power Consumption (active-typical)	0.81W
	Physical Dimensions	Length: 6.7cm (2.64 inches) (Bracket) Width: 1.8cm (0.709 inches) Full-height end bracket: 12.07cm (4.755 inches) Low-profile end bracket: 8cm (3.15 inches)

Technical Specifications - Networking and Communications

Connect Speed LED Indicators	<p>Link/Activity LED</p> <ul style="list-style-type: none"> • Off = No link • Blinking = Activity <p>Speed LED</p> <ul style="list-style-type: none"> • Off = 10Mbps • Green = 100Mbps • Amber = 1Gbps
Operating Temperature	0 °C to 55 °C (32 °F to 131 °F)
Hardware Certifications	USA: FCC B, EU: UL CE, Japan: VCCI, Taiwan: BSMI, Australia/New Zealand: CTICK, Korea: KCC, Canada: ICES-003/NMB-003

Intel® I350-T2	Networking Interface	2 x RJ-45
	System Interface	PCI Express 2.1 x4
	Networking Speeds Supported	10Mbps, 100Mbps, 1Gbps
	Cabling (up to 100m)	Cat3 (or higher) for 10Mbps Cat5 (or higher) for 100Mbps Cat5e (or higher) for 1Gbps
	Power Consumption (active-typical)	4.4W
	Physical Dimensions	Length: 13.54cm (5.33 inches) Width: 6.89 (2.71 inches) Full-height end bracket: 12.0cm (4.725 inches) Low-profile end bracket: 7.92cm (3.117 inches)
	Connect Speed LED Indicators	<p>Link/Activity LED</p> <ul style="list-style-type: none"> • Off = No link • Blinking = Activity <p>Speed LED</p> <ul style="list-style-type: none"> • Off = 10Mbps • Green = 100Mbps • Amber = 1Gbps
	Operating Temperature	0 °C to 55 °C (32 °F to 131 °F)
	Hardware Certifications	USA: FCC B, EU: UL CE, Japan: VCCI, Taiwan: BSMI, Australia/New Zealand: CTICK, Korea: KCC, Canada: ICES-003/NMB-003

Intel® I350-T4	Networking Interface	4 x RJ-45
	System Interface	PCI Express 2.1 x4

Technical Specifications - Networking and Communications

Networking Speeds Supported	10Mbps, 100Mbps, 1Gbps
Cabling (up to 100m)	Cat3 (or higher) for 10Mbps Cat5 (or higher) for 100Mbps Cat5e (or higher) for 1Gbps
Power Consumption (active-typical)	5W
Physical Dimensions	Length: 13.54cm (5.33 inches) Width: 6.89 (2.71 inches) Full-height end bracket: 12.0cm (4.725 inches) Low-profile end bracket: 7.92cm (3.117 inches)
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"> • Off = 10Mbps • Green = 100Mbps • Amber = 1Gbps
Operating Temperature	0 °C to 55 °C (32 °F to 131 °F)
Hardware Certifications	USA: FCC B, EU: UL CE, Japan: VCCI, Taiwan: BSMI, Australia/New Zealand: CTICK, Korea: KCC, Canada: ICES-003/NMB-003

Intel® X550-T2	Networking Interface	2 x RJ-45
	System Interface	PCI Express 3 x4
	Networking Speeds Supported	100Mbps, 1Gbps, 2.5Gbps, 5Gbps, 10Gbps
	Cabling (up to 100m)	Cat5 (or higher) for 100Mbps Cat5e (or higher) for 1Gbps, 2.5Gbps, or 5Gbps Cat6a (or higher) for 10Gbps
	Power Consumption (active-typical)	3.9W at 100Mbps 5.5W at 1Gbps 11.2W at 10Gbps
	Physical Dimensions	5.2 in x 2.7 in (without bracket)
	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"> • Off = No link • Amber = <10Gbps • Green = 10Gbps
	Operating Temperature	0 °C to 55 °C (32 °F to 131 °F)

Technical Specifications - Networking and Communications

Hardware Certifications	USA: FCC B, EU: UL CE, Japan: VCCI, Taiwan: BSMI, Australia/New Zealand: CTICK, Korea: KCC, Canada: ICES-003/NMB-003
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Intel® X710-DA2 10GBASE-SR Converged Network Adapter	Networking Interface	2 SFP+ Ports for LC SFP+ Transceivers	
	System Interface	PCI Express 3.0 x8	
	Networking Speeds Supported	1Gbps, 10Gbps	
	Cabling	LC fiber optic cabling with LC SFP+ Transceivers	
	Power Consumption (active-typical)	4.3W	
	Physical Dimensions	6.578 in x 2.703 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"> Off = 10Mbps Green = 100Mbps Amber = 1Gbps
		Operating Temperature	0 °C to 55 °C (32 °F to 131 °F)
	Hardware Certifications	USA: FCC B, EU: UL CE, Japan: VCCI, Taiwan: BSMI, Australia/New Zealand: CTICK, Korea: KCC, Canada: ICES-003/NMB-003	

10GbE SFP+ SR Transceiver	Connector Type	LC
	Cable Type	62.5/125um or 50/125um (core/cladding), graded-index, low metal content, multimode fiber optic, complying with ITU-T G.651 and ISO/IEC 793-2 Type A1b or A1a, respectively.
	Cable Length	2-300m
	Wavelength	850nm
	Form Factor	SFP+
	Physical Dimensions	0.47(h) x 0.54(w) x 2.19(d) inches (1.19 x 1.38 x 5.57 cm)
	Operating Temperature	0C to 45C (32F to 113F)
	Operating Humidity	0% to 85%, noncondensing

Technical Specifications - Networking and Communications

Intel® 8265 WLAN	Networking Speeds	802.11ac MU-MIMO (up to 867 Mbps) Bluetooth 4.2
	IEEE WLAN Standard	IEEE 802.11a/b/g/n/ac, 802.11d, 802.11e, 802.11h, 802.11i, 802.11w; 802.11r, 802.11k, 802.11v pending
	Bluetooth	4.2
	System Interface	PCI Express 2.1 x1
	Antenna	2x2

Summary of Changes

SUMMARY OF CHANGES

Date of change:	Version History:		Description of change:
November 1, 2017	From v1 to v2	Added	HP DisplayPort to HDMI Adapter, NVIDIA SLI 2-slot Graphics Connector and NVIDIA Quadro Sync II to Graphics section
		Changed	Graphics, Storage / Hard Drives and Memory sections, changed Front and internal view info on the Overview section, changed Operating Systems section, changed System Board section, changed System Configuration, DECLARED NOISE EMISSIONS and Physical Security and Serviceability sections
November 29, 2017	From v2 to v3	Added	Processors, hard drives and graphics to offerings, added Intel Xeon W-2195 to Processors section
		Changed	Wattage links on power supply section updated and Voltage links on efficiency section updated

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