Overview

## HP Z6 G4 Workstation



## Front view

1. Integrated Front Handle
2. Front I/O module options
3. $2 \times 5.25$ " external bays
4. 1 Slim ODD bay

- Premium (optional, shown here): power button, 2 USB 3.1 G1 Type-A, 2 USB 3.1 G2 Type-C™ (Left-most Type A port has charging capability), Headset/Mic, Media Card Reader (optional).
- Standard: power button, 4 USB 3.1 G1 Type-A (left-most Type A port has charging capability), Headset/Mic, Media Card Reader (optional).



## Internal view

5. Power supply: $1000 \mathrm{~W} 90 \%$ efficient with 2 graphics power adapters
6. 6 DIMM slots: DDR4-2666 Registered RAM
7. Inte ${ }^{\oplus}$ Xeon ${ }^{\circledR}$ processor Scalable family
8. $2^{\text {nd }}$ CPU \& memory riser connector: adds $2^{\text {nd }}$ CPU socket and (6) DIMM slots
9. PCle slots: 2 PCle $\mathrm{G} 3 \times 16,3$ PCle G3 $\times 4,1$ PCle G3 $\times 8$
10. $6 \times 6 \mathrm{~Gb} / \mathrm{s}$ SATA ports
11. 2 PCle G3 $\times 4 \mathrm{M} .2$ for SSDs
12. $2 \times 2.5^{\prime \prime} / 3.5^{\prime \prime}$ internal drive bays
13. $2 \times 5.25^{\prime \prime}$ external drive bays

Overview

14. Rear handle
15. Padlock loop
16. Rear power button
17. Rear I/O (top to bottom): audio in/out, keyboard/mouse PS/2, 6 USB 3.1 G1 Type-A,
$2 \times 1 \mathrm{GbE}$ LAN ports

## Rear view

18. HP Dual Port 10GBase-T NIC module slot (optional)
19. Side panel barrel keylock (optional)
20. Kensington lock slot

## Overview

## Overview

Form Factor Operating Systems

## Available Processors

Tower
Preinstalled:

- Windows 11 Pro for Workstations ${ }^{2}$
- Windows 10 Pro for Workstations ${ }^{1,2}$
- Ubuntu 20.04 LTS $^{3}$
- HP Linux-ready (minimal OS ready for customer OS installation)
- Red Hat ${ }^{\circledR}$ Enterprise Linux ${ }^{\circledR}$ Desktop Workstation (Paper license with 1 year support; no preinstalled OS)


## Supported:

- Red Hat Enterprise Linux Workstation 6, 7, $8^{4}$
- SUSE Linux Enterprise Desktop 12, 154
- Ubuntu 16.04, 18.04, 20.04 LTS $^{3}$
${ }^{1}$ Device comes with Windows 10 and a free Windows 11 upgrade or may be preloaded with Windows 11. Upgrade timing may vary by device. Features and app availability may vary by region. Certain features require specific hardware (see Windows 11 Specifications).
${ }^{2}$ Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. Windows is automatically updated and enabled. High speed internet and Microsoft account required. ISP fees may apply and additional requirements may apply over time for updates. See http://www.windows.com.
${ }^{3}$ Not all features are available in all editions or versions of Ubuntu. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS to take full advantage of Ubuntu functionality. Ubuntu may be automatically updated. ISP fees may apply, and additional requirements may apply over time for updates.
${ }^{4}$ Notes: For detailed Linux ${ }^{\circledR}$ OS/hardware support information, see:
http://www.hp.com/support/linux_hardware_matrix

Note: In accordance with Microsoft's support policy, HP does not support the Windows ${ }^{\circledR} 7$ operating system on products configured with Inte ${ }^{\circledR} 7$ th Generation and forward processors.

| Name | Cores | Clock Speed (GHz) | Cache <br> (MB) | Memory Speed (MT/s) | HyperThreading | Intel ${ }^{\circledR}$ Turbo Boost <br> Technology ${ }^{1}$ | Supports Intel ${ }^{\circledR}$ DCPMM Technology $^{2}$ | TDP <br> (W) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\oplus}$ W Processors |  |  |  |  |  |  |  |  |
| ```Intel` Xeon® W-3275 processor``` | 28 | 2.5 GHz | 38.5 | 2933 | Yes | 4.4, 4.6 | NO | 205 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ W-3265 processor | 24 | 2.7 GHz | 33 | 2933 | Yes | 4.4, 4.6 | NO | 205 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ W-3245 processor | 16 | 3.2 GHz | 22 | 2933 | YES | 4.4, 4.6 | NO | 205 |
| $\text { Intel }{ }^{\circledR} \text { Xeon }{ }^{\circledR} \text { W-3235 }$ processor | 12 | 3.3 GHz | 19.25 | 2933 | YES | 4.4, 4.5 | NO | 180 |
| $\begin{aligned} & \text { Intel }{ }^{\circledR} \text { Xeon }{ }^{\oplus} \text { W-3225 } \\ & \text { processor } \end{aligned}$ | 8 | 3.7 GHz | 16.5 | 2666 | YES | 4.3, 4.4 | NO | 160 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ W-3223 processor | 8 | 3.5 GHz | 16.5 | 2666 | YES | 4,4.2 | NO | 160 |

Overview

| Intel ${ }^{\oplus}$ Xeon ${ }^{\otimes}$ Scalable Processors |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Gold 6258R processor | 28 | 2.7 GHz | 38.50 | 2933 | YES | 4.0, 3.4 | YES | 205 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Gold 6248R processor | 24 | 3.0 GHz | 35.75 | 2933 | YES | 4.0, 3.9 | YES | 205 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Gold 6246R processor | 16 | 3.4 GHz | 35.75 | 2933 | YES | 4.1, 4.0 | YES | 205 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Gold 6244 processor | 8 | 3.6 GHz | 24.75 | 2933 | YES | 4.3, 4.4 | YES | 150 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Gold 6242R processor | 20 | 3.1 GHz | 35.75 | 2933 | YES | 4.1, 3.8 | YES | 205 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Gold 6242 processor | 16 | 2.6 GHz | 22 | 2933 | YES | 3.5, 3.9 | YES | 150 |
| Intel ${ }^{\circledR}$ Keon ${ }^{\circledR}$ Gold 6240R processor | 24 | 2.4 GHz | 35.75 | 2933 | YES | 4.0, 3.2 | YES | 165 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Gold 6240 processor | 18 | 2.6 GHz | 24.75 | 2933 | YES | 3.3, 3.9 | YES | 150 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Gold 6238R processor | 28 | 2.2 GHz | 38.5 | 2933 | YES | 4.0, 3.0 | YES | 165 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Gold 6234 processor | 8 | 3.3 GHz | 24.75 | 2933 | YES | 4.0, 4.0 | YES | 130 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Gold 6230R processor | 26 | 2.1 GHz | 35.75 | 2933 | YES | 4.0, 3.0 | YES | 150 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Gold 6226R processor | 16 | 2.9 GHz | 22 | 2933 | YES | 3.9, 3.6 | YES | 150 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Gold 6226 processor | 12 | 2.7 GHz | 19.25 | 2933 | YES | 3.5, 3.7 | YES | 125 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Gold 6136 processor | 12 | 3.0 GHz | 24.75 | 2666 | YES | 3.6, 3.7 | NO | 150 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Gold 6128 processor | 6 | 3.4 GHz | 19.25 | 2666 | YES | 3.7, 3.7 | NO | 115 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Gold 5222 processor | 4 | 3.8 GHz | 16.5 | 2666 | YES | 3.9, 3.9 | YES | 105 |
| Intel ${ }^{\circledR}$ Keon ${ }^{\circledR}$ Gold 5220R processor | 24 | 2.2 GHz | 35.75 | 2666 | YES | 4.0, 2.9 | YES | 150 |
| Intel ${ }^{\oplus}$ Xeon ${ }^{\circledR}$ Gold 5218R processor | 20 | 2.1GHz | 27.5 | 2666 | YES | 4.0, 2.9 | YES | 125 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Gold 5218 processor | 16 | 2.3 GHz | 22 | 2666 | YES | 2.8, 3.9 | YES | 125 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Gold 5215 processor | 10 | 2.5 GHz | 13.75 | 2666 | YES | 3.0, 3.4 | YES | 85 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Gold 5118 processor | 12 | 2.3 GHz | 16.50 | 2400 | YES | 2.7, 3.2 | NO | 105 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Silver 4216 processor | 16 | 2.1 GHz | 22 | 2400 | YES | 2.7, 3.2 | NO | 100 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Silver 4215R processor | 8 | 3.2 GHz | 11 | 2400 | YES | 4.0, 3.6 | YES | 130 |
| Inte ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Silver 4214R processor | 12 | 2.4 GHz | 16.5 | 2400 | YES | 3.0, 3.5 | NO | 100 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Silver 4214 processor | 12 | 2.2 GHz | 16.5 | 2400 | YES | 2.7, 3.2 | NO | 85 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Silver 4210R processor | 10 | 2.4 GHz | 13.75 | 2400 | YES | 2.9, 3.2 | NO | 100 |
| Intel ${ }^{\circledR}$ Xeon ${ }^{『}$ Silver 4210 processor | 10 | 2.2 GHz | 13.75 | 2400 | YES | 2.7, 3.2 | NO | 85 |

Overview


## Available Processors

Disclaimers

## Color

Convertibility No
Expansion Slots (see system board section for more details)

Black

When ordering two processors, the second processor must be the same as the first. Intel processor numbers are not a measurement of higher performance. Processor numbers differentiate features within each processor family, not across different processor families.

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.

Slot 0:
Mechanical-only, for use with devices that require only rear bulkhead mounting or when $2^{\text {nd }} \mathrm{CPU}$ riser is installed

Slot 1:
PCI Express Gen3 x4 - CPU with open-ended connector*
Slot 2:
PCI Express Gen3 x16-CPU

## Slot 3:

PCI Express Gen3 x4-PCH with open-ended connector*
Slot 4:
PCI Express Gen3 x8-CPU with open-ended connector (slot converts to $\times 4$ electrical when SSD is installed in 2nd M. 2 slot)*

Slot 5:
PCI Express Gen3 x16-CPU

## Slot 6:

## Overview

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

## M. 2 Slot 1:

M. 2 PCle Gen 3 x4-CPU up to 80mm storage devices

## M. 2 Slot 2:

M. 2 PCle Gen 3 x4-CPU up to 80mm storage devices

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

| Expansion Bays (see storage section for more details) | 2 internal 3.5" bays (with acoustic dampening rail assemblies pre-installed) 2 external 5.25" bays <br> - 3rd and 4th 3.5" HDD each occupy one external bay <br> - 3rd and 4th 2.5" HDD/SSD occupy a single external bay within a 2:1 carrier) |
| :---: | :---: |
|  | 1 dedicated 9.5mm slim optical disk drive bay |
| Front l/0 | - Base: Power button, 1 Headset audio port, 4 USB 3.1 G1 Type A (1 charging) <br> - Premium (optional): Power button, 1 Headset audio port, 2 USB 3.1 G2 Type CTM, 2 USB 3.1 G1 Type A (1 charging) <br> - 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, 21 Gbe LAN ports ( 1 x supporting Intel ${ }^{\circledR}$ AMT), Audio: 1 Line out, 1 Line in (Line in can be retasked as microphone), $1 \mathrm{PS} / 2$ mouse port, $1 \mathrm{PS} / 2$ keyboard port, 1 Rear power button Optional: 1 serial port (cable up to rear bulkhead) |
| Interfaces Supported | SD card reader (optional) <br> 6-channel SATA interface ( 6 @ $6.0 \mathrm{~Gb} / \mathrm{s}$ ) <br> 6 channels are eSATA configurable for use with eSATA CTO/AMO Kit (No hot plug / hot swap supported) <br> 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 SATA RAID 1 Mirrored Array SATA RAID 5 Striped/Parity SATA RAID 10 Striped/Mirrored |
| Chassis Dimensions ( Hx WxD) | H: $17.5^{\prime \prime}(445 \mathrm{~mm})$ <br> W: 6.65" (169mm) <br> D: $18.3^{\prime \prime}(465 \mathrm{~mm})$ |
| Packaged Dimensions | H: 24" ( 610 mm ) W: 12.3" (313mm) D: 23.3" (593mm) |
| Palletization Profile | 6 units $\times 3$ layers $=18$ units per pallet $1200 \times 1000 \times 1836 \mathrm{~mm}$ (pallet included) |
| Rack Dimensions | 4 U |
| Weight | Exact weights depend upon configuration (System weight only). <br> Minimum: 13.1 kg ( 29 lbs.$)$ <br> Standard: 13.6 kg (30.1 lbs.) |

Overview

|  | Maximum: 23.9 kg (52.7 lbs.) |
| :---: | :---: |
| Temperature | Operating: $5^{\circ}$ to $35^{\circ} \mathrm{C}\left(40^{\circ}\right.$ to $\left.95^{\circ} \mathrm{F}\right)$ <br> Non-operating: $-40^{\circ}$ to $60^{\circ} \mathrm{C}\left(-40^{\circ}\right.$ to $\left.140^{\circ} \mathrm{F}\right)$ |
|  | Note: Above 1524 m (5,000 feet) altitude, maximum operating temperature is reduced by $1^{\circ} \mathrm{C}\left(1.8^{\circ} \mathrm{F}\right)$ per 305 m (1,000 feet) elevation increase |
| Humidity | Operating: $10 \%$ to $85 \%$ relative humidity, non-condensing, $35^{\circ} \mathrm{C}$ maximum wet bulb Non-operating: $10 \%$ to $90 \%$ relative humidity, non-condensing, $35^{\circ} \mathrm{C}$ maximum wet bulb |
| Maximum Altitude (nonpressurized) | 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 $1^{\circ} \mathrm{C}\left(1.8^{\circ} \mathrm{F}\right)$ per 305 m ( 1,000 feet) elevation increase |
| Power Supply | 1000 watts wide-ranging, active Power Factor Correction, 90\% Efficient, with 2X 6-pin graphics power cables (graphics power cables are 6/8-pin convertible) |
|  | The Z6 G4 1000W power supply efficiency report can be found at this link: https://plugloadsolutions.com/psu_reports/HP_D15-1KOP1A_1000W_ECOS\%204838_Report.pdf |
| Workstation ISV Certifications | See the latest list of certifications at http://www8.hp.com/us/en/campaigns/workstations/industries-and-partners.html |

Processors

|  |  |  | Option Kit |
| :--- | :---: | :---: | :---: | :---: |
| Part |  |  |  | Support

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Note 1: Intel ${ }^{\circledR}$ DCPMM ${ }^{\circledR}$ (Data Center Persistent Memory) Supported.

| 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 | 1 JS08AA |  |
|  | HP Z Display Z24n G2 |  | Y | 1JS09AA |  |
|  | HP Z Display Z24nf G2 |  | Y | $1 \mathrm{JS07AA}$ |  |
|  | 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 | SAS Hard Drives for HP Workstations <br> HP 300GB 15k SAS SFF <br> NOTE: SAS controller add-in card required | Factory Configured Y | Option Kit Y | Option Kit Part Number L5B74AA | Support Notes |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 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 | W0R10AA |  |
|  | 2TB SATA 7200RPM HDD | Y | $Y$ | QB576AA |  |
|  | 2TB 7200RPM SATA 3.5in Enterprise | Y | Y | 2Z274AA |  |
|  | 4TB SATA 7200RPM Ent 3.5" HDD | Y | Y | K4T76AA |  |
|  | 6TB SATA 7200RPM Ent 3.5" HDD | Y | Y | 3DH90AA |  |
|  | 8TB 7200RPM SATA 3.5in Enterprise | $Y$ | $Y$ | 2Z273AA |  |
|  | NOTES: |  |  |  |  |

## Supported Components

Up to (4) 3.5 -inch 7200 rpm SATA drives: $500 \mathrm{~GB}, 1.0,2.0,4.0 \mathrm{~TB}$; maximum system HDD storage: 16.0TB

Supported Components

SATA Solid State Drives

HP Solid State Drives (SSDs) for Workstations
HP 256GB SATA SSD

| Factory | Option | Option <br> Kit Part | Support <br> Configured |
| :---: | :---: | :---: | :---: |
| Kit | Number | Notes |  |

HP 512GB SATA SSD
HP 1 TB SATA SSD
HP 2TB SATA SSD
HP 256GB SATA SED OPAL2 SSD
HP 512GB SATA SED OPAL2 SSD
HP 240GB SATA Enterprise SSD
HP 480GB SATA Enterprise SSD
HP 960GB 2.5in Enterprise SATA-3 SSD
1920GB 2.5in Enterprise SATA-3 SSD

PCle Solid State Drives

PCle SSDs for HP Workstations
HP Z Turbo Drive 256GB MLC Z4/Z6 G4 SSD Kit
HP Z Turbo Drive 512GB MLC Z4/Z6 G4 SSD Kit
HP Z Turbo Drive 1TB MLC Z4/Z6 G4 SSD Kit
HP Z Turbo Drive 256GB TLC Z4/Z6 G4 SSD Kit
HP Z Turbo Drive 512GB TLC Z4/Z6 G4 SSD Kit
HP Z Turbo Drive 1TB TLC Z4/Z6 G4 SSD Kit
HP Z Turbo Drive 2TB TLC Z4/Z6 G4 SSD Kit
HP Z Turbo Drive 256GB Z4/Z6 G4 SED Kit
HP Z Turbo Drive 512GB Z4/Z6 G4 SED Kit
HP Z Turbo Drive 1TB TLC Z4/Z6 G4 SED Kit
HP Z Turbo Drive 1TB TLC Z4/Z6 G4 SED Module
HP Z Turbo 2TB SED OPAL2 TLC M. 2 Z4/Z6 SSD
HP 256GB M. 22280 PCle NVMe TLC SSD Z2/Z4/Z6 Kit
HP 512GB M. 22280 PCle NVMe TLC SSD Z2/Z4/Z6 Kit
HP 1TB M. 22280 PCle NVMe TLC SSD Z2/Z4/Z6 Kit
HP 256GB M. 22280 PCle NVMe TLC SSD Module
HP 512GB M. 22280 PCle NVMe TLC SSD Module
HP 1TB M. 22280 PCle NVMe TLC SSD Z2 Module
HP 2TB PCle NVME TLC M. 2 Z4/6 G4 SSD
HP Z Turbo Drive Dual Pro
HP Z Turbo Drive Dual Pro 256GB TLC SSD
HP Z Turbo Drive Dual Pro 512GB TLC SSD
HP Z Turbo Drive Dual Pro 1TB TLC SSD

| Factory <br> Configured | Option <br> Kit | Option <br> Kit Part <br> Number | Support <br> Notes |
| :---: | :---: | :---: | :---: |
| Y | Y | 1PD56AA | 4 |
| Y | Y | 1PD557AA/AT | 4 |
| Y | Y | 1PD58AA | 4 |
| Y | Y | 1PD59AA/AT |  |
| Y | Y | 1PD60AA |  |
| Y | Y | 1PD61AA |  |
| Y | Y | 3KP39AA |  |
| N | N | EOL | 4 |
| N | N | EOL | 4 |
| Y | Y | 6YT76AA |  |
| Y | Y | 6YT79AA |  |
| Y | Y | 2Y7W6AA |  |
| Y | Y | 8PE68AA | 3 |
| Y | Y | 8PE69AA | 3 |
| Y | Y | 8PE70AA | 3 |
| N | Y | 8PE62AA | 2 |
| N | Y | 8PE63AA | 2 |
| N | Y | 8PE64AA | 2 |
| Y | Y | 35F74AA |  |
|  |  |  |  |
| Y | Y | 4YF60AA | 3 |
| Y | Y | 4YF61AA | 3 |
| Y | Y | 4YF62AA | 3 |

## Supported Components

| HP Z Turbo Drive Dual Pro 2TB TLC SSD | Y | Y | 4YF63AA | 3 |
| :---: | :---: | :---: | :---: | :---: |
| HP 256GB M. 22280 PCle NVMe TLC SSD Dual Pro Kit | Y | Y | 8PE74AA | 3 |
| HP 512GB M. 22280 PCle NVMe TLC SSD Dual Pro Kit | Y | Y | 8PE75AA | 3 |
| HP 1TB M. 22280 PCle NVMe TLC SSD Dual Pro Kit | Y | Y | 8PE76AA | 3 |
| HP Z Turbo Drive Quad Pro |  |  |  |  |
| HP Z Turbo Drive Quad Pro 2x256GB PCle TLC SSD | Y | Y | 4YZ38AA | 1 |
| HP Z Turbo Drive Quad Pro 2x512GB PCle TLC SSD | Y | Y | 4YZ39AA | 1 |
| HP Z Turbo Drive Quad Pro 2x1TB PCle TLC SSD | Y | Y | 4YZ40AA | 1 |
| HP Z Turbo Drive Quad Pro 2x2TB PCle TLC SSD | Y | Y | 3KP42AA |  |
| HP Z Turbo Drive Quad Pro 256GB SSD module | N | Y | N2NOOAA | 2 |
| HP Z Turbo Drive Quad Pro 512GB SSD module | N | $Y$ | N2N01AA | 2 |
| HP Z Turbo Drive Quad Pro 1TB SSD module | N | $Y$ | T9J00AA | 2 |
| HP Z Turbo Drive Quad Pro 2TB SSD module | N | Y | 3KP43AA |  |
| Intel ${ }^{\text {® 905p Series SSD (Optane SSD) }}$ |  |  |  |  |
| Intel ${ }^{\circledR}$ Optane SSD 905p 280GB AiC** | Y | Y | 2SC47AA |  |
| Intel ${ }^{\circledR}$ Optane SSD 905p 480GB AiC** | Y | $Y$ | 2SC48AA |  |
| Intel ${ }^{\circledR}$ Optane SSD 905p 380GB M. 2 SSD Module | Y | Y | 6LA66AA |  |

Note 1: Dual M. 2 SSD modules plus carrier and heat sink Note 2: M. 2 SSD module only, for Quad Pro or Dual Pro carrier Note 3: Single M. 2 SSD module plus dual carrier and heat sink Note 4: These M. 2 SSD kits and module are End of Life and no longer available. ** PCle card installed in standard PCle x4 slot

| Hard Drive Controllers |  | Factory <br> Configured | Option <br> Option <br> Kit |
| :--- | :--- | :--- | :--- |
|  | Kit Part |  |  |
| Number |  |  |  | Support | Notes |
| :---: |

## Graphics

|  | Factory <br> Configured | Option <br> Kit | Option Kit Part <br> Number | Support <br> Notes |
| :--- | :---: | :---: | :---: | :---: |
| Supported <br> \# of cards |  |  |  |  |
| Graphics Cable Adapters | Y | Y | AS615AA |  |
| HP DisplayPort to VGA Adapter | Y | Y | K2K92AA |  |
| HP DisplayPort to HDMI Adapter | Y | Y | NR078AA |  |
| HP DisplayPort to Dual Link DVI Adapter | Y | Y | FH973AA | 1 |
| HP DisplayPort to DVI-D Adapter | Y | N |  | 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 | Y | 2YY85AA | 1 |
| NVIDIA® SLI 3-slot Graphics Connector |  |  | 1 |  |

## Supported Components

| Quadro RTX NVLink High-Bandwidth 3-slotBridge (RTX 8000, RTX 6000) | N | Y | 6FY13AA | 2 |
| :---: | :---: | :---: | :---: | :---: |
| Quadro RTX NVLink 3-slotBridge (RTX 5000) | Y | Y | 6FY14AA | 2 |
| NVIDIA NVLink 3 Slot Bridge (RTX A6000, RTX A5000) | Y | Y | 340L3AA | 2 |
| Entry 3D |  |  |  |  |
| NVIDIA ${ }^{\circledR}$ Quadro ${ }^{\text {® }}$ P400 2GB Graphics | Y | Y | 1ME43AA | 2 |
| NVIDIA ${ }^{\circledR}$ Quadro ${ }^{\text {® }}$ P620 2GB Graphics | Y | Y | 3ME25AA | 2 |
| NVIDIA ${ }^{\circledR}$ T400 2 GB Graphics | Y | $Y$ | 340K8AA | 2 |
| NVIDIA ${ }^{\circledR}$ T600 4 GB Graphics | Y | Y | 340K9AA | 2 |
| Mid-range 3D |  |  |  |  |
| NVIDIA ${ }^{\circledR}$ Quadro ${ }^{\text {® P1000 4GB Graphics }}$ | Y | Y | 1ME01AA | 3 |
| NVIDIA ${ }^{\circledR}$ Quadro ${ }^{\text {® }}$ P2000 5GB Graphics | Y | Y | 1ME41AA | 2 |
| NVIDIA ${ }^{\circledR}$ Quadro ${ }^{\text {® }}$ P2200 5GB Graphics | Y | Y | 6YT67AA | 2 |
| AMD Radeon ${ }^{\text {TM }}$ Pro WX 3200 4GB Graphics | Y | Y | 6YT68AA | 2 |
| NVIDIA ${ }^{\circledR}$ T1000 4 GB 4mDP Graphics | Y | Y | 20X22AA/AT | 2 |
| NVIDIA RTX A2000 6 GB 4mDP Graphics | Y | Y | 340LOAA | 3 |
| High End 3D |  |  |  |  |
| NVIDIA ${ }^{\circledR}$ Quadro RTX 4000 8GB Graphics | Y | Y | 5JV89AA | 2 |
| NVIDIA ${ }^{\circledR}$ RTX A4000 16 GB 4DP Graphics | Y | Y | 20X24AA/AT | 2 |
| NVIDIA ${ }^{\circledR}$ RTX A4500 20 GB GDDR6 4DP Graphics | Y | $Y$ | 5S458AA/AT | 2 |
| AMD Radeon ${ }^{\text {TM }}$ Pro W5500 8GB Graphics | $Y$ | Y | 9GC16AA/AT | 2 |
| AMD Radeon ${ }^{\text {TM }}$ Pro W5700 8GB Graphics | Y | Y | 9GC15AA/AT | 1 |
| Ultra High-End 3D |  |  |  |  |
| NVIDIA ${ }^{\circledR}$ Quadro RTX 5000 16GB Graphics | $Y$ | Y | 5JH81AA | 1 |
| NVIDIA ${ }^{\circledR}$ Quadro RTX 6000 24GB Graphics | $Y$ | Y | 5JH80AA | 1 |
| NVIDIA ${ }^{\circledR}$ Quadro RTX 8000 48GB Graphics | Y | Y | 6NB51AA | 1 |
| NVIDIA ${ }^{\circledR}$ RTX A5000 24 GB Graphics | Y | Y | 20X23AA | 2 |
| NVIDIA ${ }^{\oplus}$ RTX A6000 48 GB 4DP Graphics | Y | Y | 2S6U3AA | 1 |
| AMD Radeon Pro W6800 32 GB Graphics | Y | Y | 340K7AA | 1 |
| NVIDIA ${ }^{\circledR}$ Quadro ${ }^{\circledR}$ Sync II | Y | Y | 1WT20AA |  |


| Memory | SL | CL <br> Processor | Factory <br> Configured | Option <br> Kit | Option Kit Part Support <br> Number |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| DDR4-2666 ECC Registered DIMMs |  |  |  |  |  |

## Supported Components

SL Processor: Are processors formerly known as Intel ${ }^{\circledR}$ Skylake that are sold under the model name Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ SP: Platinum 8100, Gold 6100, Gold 5100, Silver 4100 and Bronze 3100 Family

CL Processor: Are processors formerly known as Intel ${ }^{\circledR}$ Cascade Lake that are sold under the model name Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ SP: Platinum 8200, Gold 6200, Gold 5200, Silver 4200 and Bronze 3200 Family

NOTES:
1: For details on the supported memory configurations on the HP Z6 G4 Workstation, please refer to the System Technical Specifications - System Board section of this document.

Each processor supports up to 6 channels of DDR4 memory. To realize full performance at least 1 DIMM must be inserted into each channel.

With single-processor configurations, 6 DIMM slots are available. 6 additional DIMM slots are available with the 2nd CPU \& Memory Module.

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

The Z6 G4 is designed to work ONLY with DDR4 memory. The system will not work with DDR3 memory.
2: Z6 G4 configurations that includea $2^{\text {nd }}$ CPUrequire the HP Z6 Memory Cooling Solution, which is available both CTO (2JA81AV) and AMO (2HW44AA). Z6 G4 configurations that include greater than 32GB total system memory require the HP Z6 Memory Cooling Solution, which is available both CTO (2JA81AV) and AMO (2HW44AA).

NOTE: Factory-configured CTO (xxxxxAV) and aftermarket AMO (xxxxxAA, xxxxxAT) HP memory part numbers designated as "2666" may ship with " 2933 " or " 3200 " speed memory components. Similarly, HP Memory part numbers designated as "2933" may ship with "3200" speed memory. This does not affect HP part number availability, nor does it affect system performance or operation. All hardware configurations currently supporting HP memory part numbers designated as " 2666 " or 2933 have been fully qualified to work with fast speed memory and are fully supported by HP under standard support terms.

## NVDIMM Memory

Intel ${ }^{\circledR}$ Optane ${ }^{\text {TM }}$ DC Persistent Memory (DCPMM)
128GB (1x128GB) DC Persistent Memory Module

| Factory | Option | Option Kit Part | Support <br> Configured <br> Kit |
| :---: | :---: | :---: | :---: |
| Number |  |  |  |

256GB ( $2 \times 128 G B$ ) DC Persistent Memory Configuration
512GB (4x128GB) DC Persistent Memory Configuration

| $Y$ | $Y$ | 9NH78AA | 1 |
| :---: | :---: | :---: | :---: |
| $Y$ | $N$ |  | 1 |
| $Y$ | $N$ |  | 1,2 |

NOTE 1: Supported only with Xeon 82xx, 62xx, 52xx and 4215/4215R processors.
a. Available as factory configured in Memory Mode or Storage Mode.
b. Systems configured with DCPMM memory will operate the memory subsystem at 2666 MT/s.
c. Operating System Support:
i. Windows 11 Pro for Workstations with all updates applied
ii. Windows 10 Pro for Workstations v1903 or later with all updates applied.
iii. Linux OS support may be found in the Linux Hardware Support Matrix.
d. Detailed setup, security and support information may be found in the Intel ${ }^{\circledR}$ Optane ${ }^{\text {TM }}$ DC Persistent Memory: Configuration and Setup on HP Z6 G4 and Z8 G4 Workstation_white paper.
e. DCPMM solutions require additional DRAM memory to be included in the solution:
i. Systems configured with DCPMM in Memory Mode will include DRAM memory to be used as cache. The amount of included DRAM memory is based on an 8:1 DCPMM to DRAM capacity ratio.
ii. Systems configured with DCPMM in Storage Mode will require DRAM System Memory to be ordered separately.
iii. DCPMM Memory will report approximately $2 \%$ less than advertised capacity .

## Supported Components

f. Total Memory (DCPMM + DRAM) per processor must be <= 1TB or 2 TB per dual processor system.
i. When configured in memory mode, additional DRAM does not count against maximum processor memory.
g. Maximum number of DCPMM modules in a Z6G4 is 4 per processor.
h. Customer is responsible for additional required DRAM when adding DCPMM modules in Memory Mode.
i. HP Z6G4 configured with some AMD Graphics are limited to 1 TB of total DCPMM and DRAM memory. See AMD Graphics specifications for details.

NOTE 2: Requires $2^{\text {nd }}$ processor option.
Multimedia and Audio Devices

## Supported Components

Multimedia and Audio Devices

|  |  | Option Kit |  |
| :---: | :---: | :---: | :---: |
|  | Factory | Part | Support |
| Configured | Option Kit | Number | Notes |

## Optical and Removable Storage

$\left.\begin{array}{lcccc} & \begin{array}{c}\text { Factory } \\ \text { Configured }\end{array} & \text { Option Kit } & \begin{array}{c}\text { Option Kit Part } \\ \text { Number }\end{array} & \begin{array}{c}\text { Support } \\ \text { Notes }\end{array} \\ \text { HP SlimTray Optical Drives } & \text { Y } & \text { Y } & \text { K3R65AA } & \\ \begin{array}{l}\text { HP 9.5mm Slim Blu Ray Disc Writer } \\ \text { HP 9.5mm Slim DVD ROM }\end{array} & \text { Y } & \text { Y } & \text { K3R63AA } & \\ \begin{array}{l}\text { HP 9.5mm Slim DVD Writer }\end{array} & \text { Y } & \text { Y } & \text { K3R64AA }\end{array}\right]$

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 PCle Dual Port Gigabit NIC | Y | $Y$ | V4A91AA |  |
| Intel ${ }^{\text {® }}$ 1350-T4 PCle 4-Port Gigabit NIC | $N$ | Y | W8X25AA |  |
| Intel ${ }^{\text {® }}$ Ethernet $1210-\mathrm{T} 1$ PCle $\times 1 \mathrm{~Gb}$ NIC | Y | $Y$ | E0X95AA |  |
| Aquantia ${ }^{\text {® }}$ NBASE-T 5GbE PCle NIC | N | Y | 1PM63AA |  |
| HP Dual Port 10GBase-T NIC Module | Y | $Y$ | 1QL49AA |  |
| Intel ${ }^{\circledR} 8265802.11 \mathrm{a} / \mathrm{b} / \mathrm{g} / \mathrm{n} / \mathrm{ac}+\mathrm{BT}$ PCle WLAN | N | Y | 1QL48AA |  |

## Supported Components

| Intel ${ }^{\text {® }}$ X550-T2 10Gbe Dual Port NIC | Y | Y | 1QL46AA |
| :---: | :---: | :---: | :---: |
| Intel ${ }^{\text {® }}$ X710-DA2 10 GbE SFP+ Dual Port NIC | Y | Y | 1QL47AA |
| HP 10GbE SFP+ SR Transceiver | Y | Y | C3N53AA |
| Intel ${ }^{\text {® }}$ Wi-Fi 6 AX200 \& BT PCle | N | Y | 7CE01AA |
| Intel AX210 Wi-Fi 6e non-vPro +Bluetooth 5.2 <br> External Antenna WLAN | N | Y | 340L7AA |
| Allied Telesis AT-2914SX/LC-901 1GB LC Fiber NIC Note 1: Windows 7 is NOT supported | Y | Y | 1C7Q2AA |

## 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 Z2 Mini/Z2 TWR/Z4/Z6 Dept Adj Fixed Rail Rack Kit |  | Y | 2A8Y5AA |  |
| HP Keyed Cable Lock 10mm | $N$ | Y | T1A62AA |  |

## Input Devices

|  | Factory Configured | Option Kit | $\begin{aligned} & \text { Option Kit } \\ & \text { Part } \\ & \text { Number } \end{aligned}$ | 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 |  |
| HP Optical USB Mouse | Y | $Y$ | QY777AA |  |
| HP PS/2 Mouse | Y | Y | QY775AA |  |
| HP USB Hardened Mouse | Y | Y | P1N77AA |  |
| HP Creator 935 Black Wireless Mouse | N | Y | 1D0K8AA |  |

## Other Hardware

|  | Factory Configured | Option Kit | Option Kit Part Number | Support Notes |
| :---: | :---: | :---: | :---: | :---: |
| HP ENERGY STAR ${ }^{\circledR}$ Certified Configuration | Y |  |  |  |
| HP Z Premium Front I/O 2xUSB-A 2xUSB-C | $Y$ | Y | 1XM32AA |  |
| HP Z6 G4 Memory Cooling Solution | Y | Y | 2HW44AA | Note 1 |
| HP Internal USB Port Kit | N | Y | EM165AA | Note 2 |
| HP eSATA 2 port PCI Bulkhead Kit | Y | Y | GM110AA |  |
| HP Serial Port Adapter | $Y$ | Y | PA716A |  |
| HP Workstation Mouse Pad | Y |  |  |  |

Note 1: Z6 G4 configurations that include a 2nd CPU require the HP Z6 Memory Cooling Solution, which is available both CTO (2JA81AV) and AMO (2HW44AA). Z6 G4 configurations that include greater than 32GB total system memory require the HP Z6 Memory Cooling Solution, which is available both CTO (2JA81AV) and AMO (2HW44AA).

Note 2: The HP Internal USB Port kit has a single USB 2.0 type A connector.

Supported Components

## Application <br> Software

|  | Factory <br> Configured |  |  | Option Kit <br> Part |
| :--- | :---: | :---: | :---: | :---: |
| Number |  |  |  |  |$\quad$ Support Notes

*Not all Application Software for Z Desktop Workstations is included with purchase.
Note 1: Only available with NVIDIA graphics cards selections.
Note 2: Only available with Ubuntu 20.04 LTS preinstall.
Note 3: Only available with Windows 10 Pro for Workstations or Windows 11 Pro for Workstations.

## Supported Components

Operating Systems
Support Notes
Windows 11 Pro for Workstations ..... Note 4,1
Windows 10 Pro for Workstations ..... Note 3,4,1
Ubuntu 20.04 LTS ..... Note 2
HP Linux ${ }^{\circledR}$ Installer Kit ..... Note 2
Red Hat ${ }^{\oplus}$ Enterprise Linux ${ }^{\oplus}$ (RHEL) Workstation - Paper License (1yr) ..... Note 2,5
NOTE 1: Available with Windows Subsystem for Linux ${ }^{\circledR}$ (WSL2).
NOTE 2: For detailed Linux ${ }^{\circledR}$ OS/hardware support information, see: http://www.hp.com/support/linux_hardware_matrix
NOTE 3: Device comes with Windows 10 and a free Windows 11 upgrade or may be preloaded with Windows 11 . Upgrade timing may vary by device. Features and app availability may vary by region. Certain features require specific hardware (see Windows 11 Specifications).
NOTE 4: Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. Windows is automatically updated and enabled. High speed internet and Microsoft account required. ISP fees may apply and additional requirements may apply over time for updates. See http://www.windows.com.
NOTE 5: This second OS must be ordered with the HP Linux ${ }^{\circledR}$ Installer Kit as the first OS.

## System Technical Specifications

## System Board

System Board Form Factor

Main System Board:
$24 \times 31 \mathrm{~cm}$
$9.6 \times 12.2$ inches

2nd CPU/Memory Board (optional):
$14.9 \times 29.2 \mathrm{~cm}$
$5.85 \times 11.50$ inches

Processor Socket

CPU Bus Speed
Chipset
Super I/O Controller Nuvoton SI015
Memory Expansion Slots 6 on system board (CPU0) +6 on optional 2nd CPU/Memory Module (CPU1)
Memory Type Supported DDR4 R-DIMM (Registered), ECC: 8GB, 16GB, 32GB, and 64GB
Memory Modes NUMA (Non-Uniform Memory Architecture), Memory Node Interleave
Memory Speed Supported

FCLGA3647 (Socket P)
1st CPU on system board 2nd CPU on optional 2nd CPU/Memory Module
UPI: Up to 10.4GT/second, depending on processor
Intel ${ }^{\circledR}$ C622 Chipset

## Available Memory Configurations:

|  | Single Processor |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | CPU 0 |  |  |  |  |  |  |
|  | Top Slots |  |  | Bottom Slots |  |  |  |
| Capacity | DIMM1 | DIMM2 | DIMM3 | DIMM4 | DIMM5 | DIMM6 | Perf Rating |
| 8 GB | 8 GB |  |  |  |  |  | Fair |
| 16 GB | 8 GB |  |  |  |  | 8 GB | Good |
| 24 GB | 8 GB | 8 GB | 8 GB |  |  |  | Better |
| 32 GB | 8 GB |  | 8 GB | 8 GB |  | 8 GB | Better |
| 32 GB | 16 GB |  |  |  |  | 16 GB | Good |
| 48 GB | 8 GB | 8 GB | 8 GB | 8 GB | 8 GB | 8 GB | Best |
| 48 GB | 16 GB | 16 GB | 16 GB |  |  |  | Better |
| 64 GB | 16 GB |  | 16 GB | 16 GB |  | 16 GB | Better |
| 64 GB | 32 GB |  |  |  |  | 32 GB | Good |
| 96 GB | 16 GB | 16 GB | 16 GB | 16 GB | 16 GB | 16 GB | Best |
| 96 GB | 32 GB | 32 GB | 32 GB |  |  |  | Better |
| 128 GB | 32 GB |  | 32 GB | 32 GB |  | 32 GB | Better |
| 192 GB | 32 GB | 32 GB | 32 GB | 32 GB | 32 GB | 32 GB | Best |
| 256 GB | 64 GB |  | 64 GB | 64 GB |  | 64 GB | Better |
| 384 GB | 64 GB | 64 GB | 64 GB | 64 GB | 64 GB | 64 GB | Best |

System Technical Specifications

|  | CPU 0 |  |  |  |  |  | CPU 1 |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Top Slots |  |  | Bottom Slots |  |  | Top Slots |  |  | Bottom Slots |  |  |  |
| Capacity | $\begin{gathered} \text { DIMM } \\ 1 \\ \hline \end{gathered}$ | $\begin{gathered} \text { DIMM } \\ 2 \end{gathered}$ | $\begin{gathered} \text { DIMM } \\ 3 \\ \hline \end{gathered}$ | $\begin{gathered} \text { DIMM } \\ 4 \\ \hline \end{gathered}$ | $\begin{gathered} \text { DIMM } \\ 5 \end{gathered}$ | $\begin{gathered} \text { DIMM } \\ 6 \end{gathered}$ | $\begin{gathered} \hline \text { DIMM } \\ \hline \end{gathered}$ | $\begin{gathered} \text { DIMM } \\ 2 \end{gathered}$ | $\begin{gathered} \text { DIMM } \\ 3 \end{gathered}$ | $\begin{gathered} \text { DIMM } \\ 4 \end{gathered}$ | $\begin{gathered} \text { DIMM } \\ 5 \\ \hline \end{gathered}$ | $\begin{gathered} \text { DIMM } \\ 6 \\ \hline \end{gathered}$ | Rating |
| 16 GB | 8 GB |  |  |  |  |  | 8 GB |  |  |  |  |  | Fair |
| 32 GB | 8 GB |  |  |  |  | 8 GB | 8 GB |  |  |  |  | 8 GB | Good |
| 48 GB | 8 GB | 8 GB | 8 GB |  |  |  | 8 GB | 8 GB | 8 GB |  |  |  | Better |
| 64 GB | 8 GB |  | 8 GB | 8 GB |  | 8 GB | 8 GB |  | 8 GB | 8 GB |  | 8 GB | Better |
|  | 16 GB |  |  |  |  | 16 GB | 16 GB |  |  |  |  | 16 GB | Good |
| 96 GB | 8 GB | 8 GB | 8 GB | 8 GB | 8 GB | 8 GB | 8 GB | 8 GB | 8 GB | 8 GB | 8 GB | 8 GB | Best |
|  | 16 GB | 16 GB | 16 GB |  |  |  | 16 GB | 16 GB | 16 GB |  |  |  | Better |
| 128 GB | 16 GB |  | 16 GB | 16 GB |  | 16 GB | 16 GB |  | 16 GB | 16 GB |  | 16 GB | Better |
|  | 32 GB |  |  |  |  | 32 GB | 32 GB |  |  |  |  | 32 GB | Good |
| 192 GB | 16 GB | 16 GB | 16 GB | 16 GB | 16 GB | 16 GB | 16 GB | 16 GB | 16 GB | 16 GB | 16 GB | 16 GB | Best |
|  | 32 GB | 32 GB | 32 GB |  |  |  | 32 GB | 32 GB | 32 GB |  |  |  | Better |
| 256 GB | 32 GB |  | 32 GB | 32 GB |  | 32 GB | 32 GB |  | 32 GB | 32 GB |  | 32 GB | Better |
|  | 64 GB |  |  |  |  | 64 GB | 64 GB |  |  |  |  | 64 GB | Best |
| 384 GB | 32 GB | 32 GB | 32 GB | 32 GB | 32 GB | 32 GB | 32 GB | 32 GB | 32 GB | 32 GB | 32 GB | 32 GB | Better |
|  | 64 GB | 64 GB | 64 GB |  |  |  | 64 GB | 64 GB | 64 GB |  |  |  | Best |
| 512 GB | 64 GB |  | 64 GB | 64 GB |  | 64 GB | 64 GB |  | 64 GB | 64 GB |  | 64 GB | Fair |
| 768 GB | 64 GB | 64 GB | 64 GB | 64 GB | 64 GB | 64 GB | 64 GB | 64 GB | 64 GB | 64 GB | 64 GB | 64 GB | Good |

## System Technical Specifications

## Memory Loading Order:

## Load Order for Single and Dual Processor Configuration




Memory Load Order
\# Single CPU
(\#) Dual CPU

## Maximum Memory

Memory Configuration
(Supported)
Supports up to 768 GB DDR4-2933 ECC RAM* (transfer rates up to 2933MT/s) and 384 GB DDR4-2666 ECC RAM (transfer rates up to 2666MT/s).

Notes For systems installed with Microsoft Windows 7 (Ultimate, Enterprise or Pro), the maximum accessible system memory is 192GB
*768 GB configuration requires 2 CPUs configuration.
NVDIMM Memory Intel ${ }^{\circledR}$ Optane ${ }^{\text {TM }}$ DC Persistent Memory is available factory configured in the following capacities:

- 128GB ( $1 \times 128 G B$ ) Single Processor Configuration
- 256GB ( $2 \times 128 G B$ ) Single Processor Configuration
- $512 \mathrm{~GB}(4 \times 128 G B)$ Dual Processor Configuration

NOTES:
a. Supported only with Xeon 82xx, 62xx, 52xx and 4215/4215R processors.
b. Available as factory configured in Memory Mode or Storage Mode.
c. Systems configured with DCPMM memory will operate the memory subsystem at $2666 \mathrm{MT} / \mathrm{s}$.
d. Operating System Support:
i. Windows 11 Pro for Workstations with all updates applied.
ii. Windows 10 Pro for Workstations v1903 or later with all updates applied.
iii. Linux OS support may be found in the Linux Hardware Support Matrix.
e. Detailed setup, security and support information may be found in the Intel ${ }^{\circledR}$ Optane ${ }^{\text {TM }}$ DC Persistent Memory: Configuration and Setup on HP Z6 G4 and Z8 G4 Workstation_white paper.
f. DCPMM solutions require additional DRAM memory to be included in the solution:

## System Technical Specifications

i. Systems configured with DCPMM in Memory Mode will include DRAM memory to be used as cache. The amount of included DRAM memory is based on an 8:1 DCPMM to DRAM capacity ratio.
ii. Systems configured with DCPMM in Storage Mode will require DRAM System Memory to be ordered separately.
iii. DCPMM Memory will report approximately $2 \%$ less than advertised capacity .
g. Total Memory (DCPMM + DRAM) per processor must be <=1 1 TB or $2 T B$ per dual processor system.
i. When Configured in Memory Mode, additional DRAM does not count against maximum processor memory.
ii. Maximum number of DCPMM modules in a Z6G4 is 4 per processor.
h. Customer is responsible for additional required DRAM when adding DCPMM modules in Memory Mode.
i. HP Z6G4 configured with some AMD Graphics are limited to 1 TB of total DCPMM and DRAM memory. See AMD Graphics specifications for details.

## PCI Express Connectors Slot 0:

Mechanical-only, for use with devices that require only rear bulkhead mounting or when $2^{\text {nd }} \mathrm{CPU}$ riser is installed

## Slot 1:

PCI Express Gen3 x4-CPU with open-ended connector*
Slot 2:
PCI Express Gen3 x16-CPU
Slot 3:
PCI Express Gen3 x4 - PCH with open-ended connector*
Slot 4:
PCI Express Gen3 x8 - CPU with open-ended connector (slot converts to $x 4$ electrical when SSD is installed in 2nd M. 2 slot)*

Slot 5:
PCI Express Gen3 x16-CPU

## Slot 6:

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

## M. 2 Slot 1:

M. 2 PCle Gen 3 x4-CPU up to 80mm storage devices

## M. 2 Slot 2:

M. 2 PCle Gen $3 \times 4$ - CPU up to 80 mm storage devices

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

| Supported Drive <br> Interfaces | SATA | 6 SATA @6Gb/s, supports RAID 0, 1, 5, \& 10 |
| :--- | :--- | :--- |
|  | Serial Attached SCSI | Requires Optional PCle card |
|  | Factory Configured | SATA RAID 0 Striped Array <br> RAID |
|  | SATA RAID 1 Mirrored Array |  |
|  |  | SATA RAID 10 Striped/Mirrored |



## System Technical Specifications

| 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 per CPU |
| AUX IN (audio) | No |

Z6 Required Power Supply Info

## Power Supply

Operating Voltage Range

## Rated Voltage Range

Rated Line Frequency
Operating Line Frequency Range

## Rated Input Current

Heat Dissipation
(Configuration and software dependent)
Power Supply Fan
ENERGY STAR ${ }^{\circledR}$ Qualified
(Configuration dependent)

## 80 PLUS ${ }^{\circledR}$ Compliant

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

Sensor Header
Integrated Gigabit Ethernet
Clear CMOS Button

1000W 90\% Efficient, Custom PSU
(Wide Ranging, Active PFC)
90-269 VAC

| $100-127$ VAC |  |
| :---: | :---: |
| $200-240$ VAC | 118 VAC |
| $50-60 \mathrm{~Hz}$ | 400 Hz |
| $47-66 \mathrm{~Hz}$ | $393-407 \mathrm{~Hz}$ |
| 12 A @ 100-127 VAC |  |
| 6.3 A @ 200-240 VAC | $12 \mathrm{~A} @ 118$ VAC |

Typical = 2467 btu/hr
Maximum = 4112 btu/hr
$80 \times 25 \mathrm{~mm}$ variable speed
Yes
Yes, 90\% Efficient
The Z6 G4 1000W power supply efficiency report can be found at this link:
https://plugloadsolutions.com/psu_reports/HP_D151K0P1A_1000W_ECOS\ 4838_Report.pdf

Yes
Yes
Yes; Configuration dependent
<= 20W

Yes
Yes

Integrated in Front User Interface (Power Switch, Power LED, HDD LED, Speaker) Cable
Integrated Intel ${ }^{\circledR}$ I219LM GbE LAN
Yes

## System Technical Specifications

## System Configuration

| Example Z6 G4 Configuration \#1 | Processor | 1x Intel Xeon 3104 (Six-core) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Memory | 1x 8GB DDR4-2666 (Registered DIMM) |  |  |  |  |  |
|  | Graphics | 1x NVIDIA Quadro P400 |  |  |  |  |  |
|  | Disks / Optical | 1x 500GB SATA 7200; $1 \times$ Slim DVD-ROM SATA |  |  |  |  |  |
|  | Power Supply | 1000W 90\% custom PSU |  |  |  |  |  |
|  | Other | NA |  |  |  |  |  |
| Energy Consumption |  | 115 VAC |  | 230 VAC |  | 100 VAC |  |
|  |  | LAN Enabled | LAN Disabled | LAN Enabled | LAN Disabled | LAN Enabled | LAN Enabled |
|  | Windows Idle (SO) | 54.109 |  | 54.586 |  | 54.906 |  |
|  | Windows Busy Typ(S0) | 94.256 |  | 94.275 |  | 94.043 |  |
|  | Windows Busy Max (S0) | 95.992 |  | 95.268 |  | 95.643 |  |
|  | Sleep (S3) | 6.219 | 6.205 | 6.319 | 6.306 | 6.334 | 6.239 |
|  | Off (S5) | 3.354 | 3.343 | 3.521 | 3.341 | 3.350 | 3.342 |
|  | Zero Power Mode (ErP) | 0.209 |  | 0.388 |  | 0.195 |  |
|  |  |  |  |  |  |  |  |
| Heat Dissipation (Btu/hr) |  | 115 VAC |  | 230 VAC |  | 100 VAC |  |
|  |  | LAN Enabled | LAN Disabled | LAN Enabled | LAN Enabled | LAN Disabled | LAN Enabled |
|  | Windows Idle (SO) | 184.619 |  | 186.247 |  | 187.339 |  |
|  | Windows Busy Typ(S0) | 321.601 |  | 321.666 |  | 320.875 |  |
|  | Windows Busy Max (S0) | 327.524 |  | 325.054 |  | 326.334 |  |
|  | Sleep (S3) | 21.219 | 21.171 | 21.561 | 21.516 | 21.611 | 21.287 |
|  | Off (S5) | 11.444 | 11.406 | 12.014 | 11.399 | 11.430 | 11.403 |
|  | Zero Power Mode (ErP) | 0.713 |  | 1.323 |  | 0.665 |  |


| Example Z6 G4 <br> Configuration \#2 | Processor | 1x Intel Xeon 4108 (Eight-core) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Memory | 4x 8GB DDR4-2666 (Registered DIMM) |  |  |  |  |  |
|  | Graphics | 1x NVIDIA Quadro P2000 |  |  |  |  |  |
|  | Disks / Optical | 2x 1TB SATA 7200 ; $1 \times$ Slim DVDRW SATA |  |  |  |  |  |
|  | Power Supply | 1000W 90\% custom PSU |  |  |  |  |  |
|  | Other | NA |  |  |  |  |  |
| Energy Consumption (Watts) |  | 115 VAC |  | 230 VAC |  | 100 VAC |  |
|  |  | LAN Enabled | LAN Disabled | LAN Enabled | LAN Disabled | LAN Enabled | LAN Enabled |
|  | Windows Idle (S0) | 61.661 |  | 61.531 |  | 61.354 |  |
|  | Windows Busy Typ(S0) | 168.665 |  | 167.375 |  | 166.535 |  |
|  | Windows Busy Max (SO) | 166.097 |  | 163.682 |  | 169.674 |  |
|  | Sleep (S3) | 7.231 | 7.177 | 7.229 | 7.217 | 7.324 | 7.248 |
|  | Off (S5) | 3.376 | 3.366 | 3.527 | 3.512 | 3.354 | 3.350 |
|  | Zero Power Mode (ErP) | 0.211 |  | 0.386 |  | 0.195 |  |
|  |  |  |  |  |  |  |  |
| 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) | 210.387 |  | 209.944 |  | 209.340 |  |

System Technical Specifications

|  | Windows Busy Typ(SO) <br> Windows Busy Max (SO) <br> Sleep (S3) | $\begin{aligned} & 575.485 \\ & \hline 576.959 \end{aligned}$ |  | $\begin{array}{\|l\|} \hline 571.084 \\ \hline 575.543 \\ \hline \end{array}$ |  | $\begin{aligned} & 568.217 \\ & \hline 578.928 \end{aligned}$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  |
|  |  | 24.672 | 24.488 | 24.665 | 24.624 | 24.989 | 24.730 |
|  | Off (S5) | 11.519 | 11.484 | 12.034 | 11.983 | 11.443 | 11.430 |
|  | Zero Power Mode (ErP) | 0.720 |  | 1.317 |  | 0.665 |  |
| Example Z6 G4 <br> Configuration \#3 <br> ENERGY STAR <br> QUALIFIED | Processor | 1x Intel Xeon 6136 (Twelve-core) |  |  |  |  |  |
|  | Memory | 6x 8GB DDR4-2666 (Registered DIMM) |  |  |  |  |  |
|  | Graphics | 1x NVIDIA QuadroP4000 |  |  |  |  |  |
|  | Disks/Optical | 2x 1TB SATA 7200 ; $1 \times$ Slim DVDRW SATA |  |  |  |  |  |
|  | Power Supply | 1000W 90\% custom PSU |  |  |  |  |  |
|  | Other | NA |  |  |  |  |  |
| Energy Consumption (Watts) |  | 115 VAC |  | 230 VAC |  | 100 VAC |  |
|  |  | LAN Enabled | LAN Disabled | LAN Enabled | LAN Disabled | LAN Enabled | LAN Enabled |
|  | Windows Idle (SO) | 79.074 |  | 79.109 |  | 79.938 |  |
|  | Windows Busy Typ(S0) | 324.975 |  | 317.991 |  | 327.451 |  |
|  | Windows Busy Max (S0) | 328.268 |  | 320.296 |  | 329.668 |  |
|  | Sleep (S3) | 7.847 | 7.756 | 7.878 | 7.826 | 7.931 | 7.852 |
|  | Off (S5) | 3.353 | 3.348 | 3.535 | 3.489 | 3.373 | 3.355 |
|  | Zero Power Mode (ErP) | 0.206 |  | 0.386 |  | 0.196 |  |
|  |  |  |  |  |  |  |  |
| Heat Dissipation (Btu/hr) |  | 115 VAC |  | 230 VAC |  | 100 VAC |  |
|  |  | LAN Enabled | LAN Disabled | LAN Enabled | LAN Enabled | LAN Disabled | LAN Enabled |
|  | Windows Idle (SO) | 269.801 |  | 269.920 |  | 272.748 |  |
|  | Windows Busy Typ(S0) | 1108.815 |  | 1084.985 |  | 1117.262 |  |
|  | Windows Busy Max (S0) | 1120.051 |  | 1092.850 |  | 1124.827 |  |
|  | Sleep (S3) | 26.774 | 26.463 | 26.880 | 26.702 | 27.061 | 26.791 |
|  | Off (S5) | 11.441 | 11.426 | 12.061 | 11.904 | 11.509 | 11.447 |
|  | Zero Power Mode (ErP) | 0.703 |  | 1.317 |  | 0.669 |  |


| Example Z6 G4 | Processor | $2 \times$ Intel Xeo | 160 (Dual | re) |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Configuration \#4 | Memory | 12x 32GB DD | -2666 (Re | ered DIMM |  |  |  |
|  | Graphics | $2 \times$ NVIDIA Q | ro P5000 |  |  |  |  |
|  | Disks / Optical | 4x 2TB SATA | 00; 1x Slim | DRW SATA |  |  |  |
|  | Power Supply | 1000W 90\% | stom PSU |  |  |  |  |
|  | Other | NA |  |  |  |  |  |
| Energy Consumption |  |  |  |  |  |  |  |
| (Watts) |  | LAN Enabled | LAN Disabled | LAN Enabled | LAN Disabled | LAN Enabled | LAN Enabled |
|  | Windows Idle (SO) |  |  |  |  |  |  |
|  | Windows Busy Typ(S0) |  |  |  |  |  |  |
|  | Windows Busy Max (SO) |  |  |  |  |  |  |
|  | Sleep (S3) | 14.208 | 13.833 | 14.698 | 14.487 | 15.176 | 13.886 |

System Technical Specifications

|  | Off (S5) | 3.511 | 3.418 | 3.575 | 3.570 | 3.509 | 3.412 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Zero Power Mode (ErP) | 0.287 |  | 0.387 |  | 0.272 |  |
| Heat Dissipation (Btu/hr) |  | 115 VAC |  | 230 VAC |  | 100 VAC |  |
|  |  | LAN Enabled | LAN Disabled | LANEnabled | LAN Enabled | LAN Disabled | LAN Enabled |
|  | Windows Idle (S0) | 383.469 |  | 394.547 |  | 382.492 |  |
|  | Windows Busy Typ(S0) | 1748.120 |  | 1672.443 |  | 1797.800 |  |
|  | Windows Busy Max (S0) | 2383.446 |  | 2297.863 |  | 2410.445 |  |
|  | Sleep (S3) | 48.478 | 47.198 | 50.150 | 49.430 | 51.781 | 47.379 |
|  | Off (S5) | 11.980 | 11.662 | 12.198 | 12.181 | 11.973 | 11.642 |
|  | Zero Power Mode (ErP) | 0.979 |  | 1.321 |  | 0.928 |  |

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

| System Configuration <br> (Entry level) | Processor Info | Inte ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Gold 6130 processor 2.1GHz 12C CPU |
| :--- | :--- | :---: |
|  | Memory Info | 24GB (3x8GB) DDR4-2666 ECC Memory RDIMMs |
|  | Graphics Info | 1-NVIDIA ${ }^{\circledR}$ Quadro ${ }^{\circledR}$ P400 2GB |
|  | Disks/Optical | $1-500 G B$ SATA 7200RPM 3.5" HDD / 1-HP 9.5mm Slim Blu Ray Disc Writer |
|  | Power Supply | 1000 W |


| Declared Noise Emissions <br> (in accordance with ISO <br> 7779 and ISO 9296) | Sound Power <br> (LWAd, bels) | Deskside Sound Pressure <br> (LpAm, decibels) |  |
| :--- | :--- | :---: | :---: |
|  | Idle | 3.3 | 15 |
|  | Hard drive Operating <br> (random reads) | 3.5 | 18 |


| System Configuration (Mid-range) | Processor Info | Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Platinum 8168 processor 2.7GHz 24C CPU |  |
| :---: | :---: | :---: | :---: |
|  | Memory Info | 96GB (6x16GB) DDR4-2666 ECC Memory RDIMMs |  |
|  | Graphics Info | 1-NVIDIA ${ }^{\circledR}$ Quadro ${ }^{\circledR} \mathrm{P6000}$ 24GB |  |
|  | Disks/Optical | 2-4TB 6Gb/s 7200RPM SATA HDD / 1-HP 9.5mm Slim Blu Ray Disc Writer |  |
|  | Power Supply | 1000 W |  |
| Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296) |  | Sound Power (LWAd, bels) | Deskside Sound Pressure (LpAm, decibels) |
|  | Idle | 3.8 | 23 |
|  | Hard drive Operating (random reads) | 3.9 | 23 |

System Technical Specifications

| System Configuration (High end) | Processor Info | 2-Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Gold 6136 processor 3.0GHz 12C CPU |  |
| :---: | :---: | :---: | :---: |
|  | Memory Info | 192GB (12x16GB) DDR4-2666 ECC Memory RDIMMs |  |
|  | Graphics Info | 1-NVIDIA ${ }^{\circledR}$ Quadro ${ }^{\circledR} \mathrm{P6000}$ 24GB |  |
|  | Disks/Optical | 2-4TB 6Gb/s 7200RPM SATA HDD / 1-HP 9.5mm Slim Blu Ray Disc Writer |  |
|  | Power Supply | 1000 W |  |
| Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296) |  | Sound Power (LWAd, bels) | Deskside Sound Pressure (LpAm, decibels) |
|  | Idle | 3.8 | 23 |
|  | Hard drive Operating (random reads) | 3.9 | 24 |

## ENVIRONMENTAL DATA

Environmental Requirements
Temperature
Humidity
Maximum Altitude
Shock (non-repetitive)

Shock (non-repetitive) Operating: $1 / 2-$ sine: $40 \mathrm{~g}, 2-3 \mathrm{~ms}(\sim 62 \mathrm{~cm} / \mathrm{sec})$
Non-operating: $1 / 2-$ sine: $160 \mathrm{~cm} / \mathrm{s}, 2-3 \mathrm{~ms}$ ( $\sim 105 \mathrm{~g}$ )
square: $422 \mathrm{~cm} / \mathrm{s}, 20 \mathrm{~g}$

## Vibration

Operating random: 0.5 g (rms), $5-300 \mathrm{~Hz}$, up to $0.0025 \mathrm{~g}^{2} / \mathrm{Hz}$
Non-operating random: 2.0 g (rms), 5-500 Hz, up to $0.0150 \mathrm{~g}^{2} / \mathrm{Hz}$

## Physical Security and Serviceability

| Access Panel | Tool-less <br> Includes system board and memory information. |
| :--- | :--- |
| Optical Drive | Tool-less, no carrier or rails required |
| Hard Drives | Tool-less |
|  | Optional 5.25" external bay carriers |
| Expansion Cards | Tool-less |
| Processor Socket | 1st socket on main system board. 2nd socket on optional 2nd CPU/Memory Module. |
| Blue User Touch Points Yes, on primary serviceable components. <br> Color-coordinated Cables Yes <br> and Connectors  |  |

## System Technical Specifications

| Memory | Tool-less |
| :---: | :---: |
| System Board | Torx T15 screws 2nd CPU/Memory Module: Tool-less |
| Front of Computer LEDs | Dual Color Power/Failure LED = Yes HDD Activity LED = Yes |
| Configuration Record SW | Yes |
| Over-Temp Warning on Screen | Yes, at POST screen on reboot |
| Restore CD/DVD Set | Yes, restores the computer to its original factory shipping image; can be obtained via HP Support. |
| Dual Function Front Powe Switch | Yes, also acts as a reset switch when held for 4 seconds. |
| Padlock Support | Yes |
| Cable Lock Support | Kensington Cable Lock (optional): Prevents entire system theft and system access. $3 \mathrm{~mm} \times 7 \mathrm{~mm}$ slot at rear of system |
| Universal Chassis Clamp Lock Support | No |
| Solenoid Lock and Hood | Access Panel Solenoid Lock: Yes (optional). Activated remotely to prevent system entry. |
| Sensor | Access Panel Intrusion Sensor: Yes (optional). |
| Removable Media Write/Boot Control | Yes, user can prevent the workstation from writing to or booting from removable media. |
| Power-On Password | Yes, prevents an unauthorized person from booting up the workstation |
| Setup Password | Yes, prevents an unauthorized person from changing the workstation configuration |
| 3.3V Aux Power LED on System PCA | Yes |
| NIC LEDs (integrated) (Green \& Amber) | Yes |
| CPUs and Heatsinks | CPU heatsink removal requires a T-30 Torx screwdriver. |
| Power Supply Diagnostic LED | Yes |
| Front Power Button | Yes |
| 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 |
| Power Supply Fans | 1-80 mm x $80 \mathrm{~mm} \times 25 \mathrm{~mm}$ (non-serviceable) |
| CPU Heatsink Fan | 1st CPU: $1-80 \mathrm{~mm}$ <br> Optional 2nd CPU: 1-60mm x 25mm |
| Memory Fan | Front memory fan: $1-80 \mathrm{~mm} \times 25 \mathrm{~mm}$ Memory duct blower: $1-90 \mathrm{~mm} \times 25 \mathrm{~mm}$ 2nd CPU/Memory Module: 1 - $60 \mathrm{~mm} \times 25 \mathrm{~mm}$ |

## System Technical Specifications

| Chassis Fans | Front chassis fan : 1-120mm x 25mm Rear chassis fan: 1-120mm x 25mm |
| :---: | :---: |
| HP Vision Diagnostics Offline Edition | 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) |
| ACPI-Ready Hardware | Advanced Configuration and Power Management Interface (ACPI). |
|  | - Allows the system to wake from a low-power mode. <br> - 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 | Integrated Infineon TPM 2.0. TCG and FIPS 140-2 Certified |
| Integrated Chassis Handles | Yes, Front handle and dedicated rear recess |
| Power Supply | Requires T15 Torx or flat blade screwdriver |
| PCle Card Retention | Yes, tool-less <br> Rear (all) <br> Middle (full-height cards) <br> Front (full-length cards with extender) |
| Flash ROM | Yes |
| Diagnostic Power Switch LED on board | Yes |
| Clear Password Jumper | Yes |
| Clear CMOS Button | Yes |
| CMOS Battery Holder | Yes |
| DIMM Connectors | Yes |
| 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). BiosConfigurationUtility.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: |

System Technical Specifications

## Remote ROM Flash ACPI (Advanced Configuration and Power Management Interface) <br> Ownership Tag <br> Remote Wakeup/Remote Shutdown <br> Instantly Available PC <br> (Suspend to RAM - ACPI <br> sleep state S3) <br> Remote System Installation via F12 (PXE 2.1) (Remote Boot from Server) <br> ROM revision levels

System board revision
level
Start-up Diagnostics
(Power-on Self-Test)
Auto Setup when new hardware installed
Keyboard-less Operation
Localized ROM Setup
Asset Tag
Per-slot Control
Adaptive Cooling
Pre-boot Diagnostics
Industry Standard Specification Support
Industry Standard

- 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.
Provides secure, fail-safe ROM image management from a central network console.
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.
A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen.
System administrators can power on, restart, and power off a client computer from a remote location.
Allows for very low power consumption with quick resume time.

Allows a new or existing system to boot over the network and download software, including the operating system.

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.
Allows management SW to read revision level of the system board.
Revision level is digitally encoded into the HW and cannot be modified.
Assesses system health at boot time with selectable levels of testing.
System automatically detects addition of new hardware.
The system can be booted without a keyboard.
Common BIOS image supports System Configuration Utility (F10 Setup) menus in 14 languages with local keyboard mappings.
The user or MIS to set a unique tag string in non-volatile memory.
Allows I/O slot parameters (option ROM enable/disable, bus latency) to be configured individually. Control parameters are set according to detected hardware configuration for optimal acoustics. (Pre-video) critical errors are reported via beeps and blinks on the power LED.

## UEFI Specification Revision 2.6

ACPI
ATA (IDE)
CD Boot
EDD
AT Attachment 6 with Packet Interface (ATA/ATAPI-6), Revision 3b
"El Torito" Bootable CD-ROM Format Specification Version 1.0

- 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

## System Technical Specifications

| 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 |
| SPD | Serial ATA 6 Gb/s: Serial ATA Specification, Revision 3.0 |
| TPM | PC SDRAM Serial Presence Detect (SPD) Specification, Revision 1.2B |
|  | Trusted Platform Module (TPM) 2.0 (Infineon SLB 9670) <br> Common Criteria EAL4+ Certified |
|  | FIPS 140-2 Certification <br> TCG TPM Certified products list: <br> http://www.trustedcomputinggroup.org/certification/tpm-certified-products/ |
| UHCI | Universal Host Controller Interface Design Guide, Revision 1.1 |
| USB | Universal Serial Bus Revision 1.1 Specification <br> Universal Serial Bus Revision 2.0 Specification |
| SMBIOS | Universal Serial Bus Revision 3.1 Specification <br>  |
|  | System Management BIOS Reference Specification, Version 2.8 |

## Social and Environmental Responsibility

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

- ENERGY STAR ${ }^{\circledR}$ (energy-saving features available on selected configurations-Windows only)
- US Federal Energy Management Program (FEMP)
- China Energy Conservation Program
- The ECO declaration (TED)
- TCO Certified configurations available*
*TCO Certified configurations available when ENERGY STAR configurations are selected with a USB Type-C® connector. ENERGY STAR available with a combination of high-performance CPU's, highperformance GPU's and select memory configurations.

The Z6 G4 is registered EPEAT ${ }^{\circledR}$ Silver in the US and Canada. EPEAT ${ }^{\circledR}$ registration varies by country. See http://www.epeat.net for registration status by country. Search keyword generator on HP's $3^{\text {rd }}$ 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 40 ppm 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

## System Technical Specifications

| Low Halogen Statement | This product is low-halogen except for power cords, external cables and peripherals. Service parts <br> obtained after purchase may not be low-halogen. |
| :--- | :--- |
| End-of-Life Management | HP Inc. offers end-of-life HP product return and recycling programs in many geographic areas. To <br> recycle your product, please go to: http://www.hp.com/recycle or contact your nearest HP sales office. <br> and Recycling |
| Products returned to HP will be recycled, recovered or disposed of in a responsible manner. This <br> product is greater than 90\% recyclable by weight when properly disposed of at end of life. |  |
| HP Inc. Corporate | For more information about HP's commitment to the environment: |
| Environmental Information Sustainability Report |  |

## Eco-label certifications:

http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html

## ISO 14001 certificate:

http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html

## Additional Information

## Packaging

- 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 IS01043.
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
- A multi-unit eco packaging option is available to institutional customers that uses less packaging material or has a lower volume footprint than conventional single-unit packaging. Please contact your sales representative for additional details.


## Packaging Materials <br> Internal <br> External

Cushions and plastic bags made of low density polyethylene (LDPE).
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 ${ }^{\circledR}$ LAN on motherboard)

Intel ${ }^{\circledR}$ Active Management Intel ${ }^{\circledR}$ Active Management Technology (AMT) 11.2x
Technology (AMT)

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 11.2x includes the following advanced management functions:

- Power Management (on, off, reset, graceful shutdown, sleep and hibernate)

System Technical Specifications


- Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ processor Scalable Family
- Intel ${ }^{\circledR}$ C622 chipset
- Intel ${ }^{\circledR}$ I219LM GbE LAN

Remote Manageability Software Solutions

The HP Z6 G4 Workstation is supported on the following remote manageability software consoles:

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

For questions or support for manageability needs, please visit
http://www.hp.com/go/clientmanagement
System Software Manager For questions or support for SSM, please visit: http://www.hp.com/go/ssm Warranty

Service, Support, and On-site Warranty and Service (Note 1): Three-years, limited warranty and service offering delivers onsite, 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 $24 \times 7$ 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

## System Technical Specifications

Product Change<br>Notification

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.

- 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

| Global Series SKUs | As part of its commitment to hardware, software, and solution innovation, HP is proud to introduce this breakthrough platform configuration stability to HP Workstation customers. HP Stable \& Consistent Offerings are built on the foundation of a carefully chosen set of hardware and software designed and tested to work with all HP Z Workstation platforms through their end of life. These components and their corresponding HP Workstation platform compatibility are outlined in this section. |  |
| :---: | :---: | :---: |
| Stable \& Consistent Offerings | HP Stable \& Consistent Offerings are available worldwide to all HP Workstation customers-no special programs, no additional cost-no kidding. Simply select your hardware and software components when you customize your HP Workstation and be assured that you'll be able to buy that same configuration throughout the lifecycle of the product. |  |
| Processors | Product \# | Offering |
|  | 2DL32AV | Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Gold 6128 processor |
|  | 2DL32AV, 1XM44AA | Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Gold $61282^{\text {nd }}$ processor |
|  | 2DL22AV | Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Silver 4114 processor |
|  | 2DL22AV, 1XM49AA | Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Silver 4114 2nd processor |
|  | 2DL18AV | Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Silver 4108 processor |
|  | 2DL18AV, 1XM51AA | Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Silver $41082^{\text {nd }}$ processor |

Hard Drives

Product \#
Z5H22AV, LQ037AA

Offering
1TB SATA 7200 RPM 3.5" HDD

Graphics
Product \#
2TF08AA

Offering
AMD Radeon ${ }^{\text {T }}$ Pro WX 3100 4GB Graphics

| Memory | Product \# <br> TBD | Offering <br> TBD |
| :--- | :--- | :--- |
|  |  |  |
| Optical and Removable <br> Storage | Product \# | Offering |
|  | TBD | TBD |

## Technical Specifications - Processors

Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ W-3200 Series CPU<br>Intel ${ }^{\oplus}$ Xeon ${ }^{\oplus}$ W-3275 2.52933 28C processor<br>Intel ${ }^{\oplus}$ Xeon ${ }^{\oplus}$ W-3265 2.72933 24C processor<br>Intel ${ }^{\oplus}$ Xeon ${ }^{\oplus}$ W-3245 3.22933 16C processor<br>Intel ${ }^{\oplus}$ Xeon ${ }^{\oplus}$ W-3235 3.32933 12C processor<br>Inte ${ }^{\oplus}$ Xeon ${ }^{\oplus}$ W-3225 3.72666 8C processor<br>Inte ${ }^{\oplus}$ Xeon ${ }^{\oplus}$ W-3223 3.52666 8C processor<br>Inte ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Scalable CPU<br>Inte ${ }^{\oplus}$ Xeon ${ }^{\oplus}$ Gold 6258R processor<br>Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Gold 6248R processor<br>Inte ${ }^{\ominus}$ Xeon ${ }^{\circledR}$ Gold 6246R processor Intel ${ }^{\oplus}$ Xeon ${ }^{\circledR}$ Gold 6244 processor Inte ${ }^{\oplus}$ Xeon ${ }^{\oplus}$ Gold 6242 R processor Intel ${ }^{\oplus}$ Xeon ${ }^{\circledR}$ Gold 6242 processor Intel ${ }^{\otimes}$ Xeon ${ }^{\oplus}$ Gold 6240R processor Intel ${ }^{\oplus}$ Xeon ${ }^{\circledR}$ Gold 6240 processor Intel ${ }^{\ominus}$ Xeon ${ }^{\ominus}$ Gold 6238R processor Intel ${ }^{\oplus}$ Xeon ${ }^{\circledR}$ Gold 6234 processor Inte ${ }^{\ominus}$ Xeon ${ }^{\oplus}$ Gold 6230R processor Intel ${ }^{\ominus}$ Xeon ${ }^{\oplus}$ Gold 6226R processor Intel ${ }^{\ominus}$ Xeon ${ }^{\ominus}$ Gold 6226 processor Intel ${ }^{\ominus}$ Xeon ${ }^{\circledR}$ Gold 6136 processor Intel ${ }^{\oplus}$ Xeon ${ }^{\circledR}$ Gold 6128 processor Intel ${ }^{\ominus}$ Xeon ${ }^{\otimes}$ Gold 5222 processor Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Gold 5220R processor Intel ${ }^{\ominus}$ Xeon ${ }^{\oplus}$ Gold 5218R processor Intel ${ }^{\oplus}$ Xeon ${ }^{\otimes}$ Gold 5218 processor Intel ${ }^{\oplus}$ Xeon ${ }^{\circledR}$ Gold 5215 processor Intel ${ }^{\oplus}$ Xeon ${ }^{\circledR}$ Gold 5118 processor Inte ${ }^{\ominus}$ Xeon ${ }^{\circledR}$ Silver 4216 processor Intel ${ }^{\oplus}$ Xeon ${ }^{\circledR}$ Silver 4215R processor Intel ${ }^{\oplus}$ Xeon ${ }^{\oplus}$ Silver 4214R processor Intel ${ }^{\ominus}$ Xeon ${ }^{\circledR}$ Silver 4214 processor Intel ${ }^{\oplus}$ Xeon ${ }^{\oplus}$ Silver 4210R processor Intel ${ }^{\ominus}$ Xeon ${ }^{\circledR}$ Silver 4210 processor Intel ${ }^{\ominus}$ Xeon ${ }^{\circledR}$ Silver 4208 processor Intel ${ }^{\circledR}$ Xeon ${ }^{\circledR}$ Silver 4114 processor Inte ${ }^{\otimes}$ Xeon ${ }^{\otimes}$ Silver 4108 processor Intel ${ }^{\oplus}$ Xeon ${ }^{\circledR}$ Bronze 3206R processor Intel ${ }^{\oplus}$ Xeon ${ }^{\oplus}$ Bronze 3204 processor

Technical Specifications - Hard Drives

## STORAGE/HARD DRIVES



## Technical Specifications - Hard Drives

SATA (Serial ATA) Hard Drives for HP Workstations

| 500GB SATA 7200 rpm 6Gb/s 3.5" HDD | Capacity Height Width | 500GB |  |
| :---: | :---: | :---: | :---: |
|  |  | $1 \mathrm{in} ; 2.54 \mathrm{~cm}$ |  |
|  |  | Media Diameter | $3.5 \mathrm{in} ; 8.9 \mathrm{~cm}$ |
|  |  | Physical Size | $4 \mathrm{in} ; 10.17 \mathrm{~cm}$ |
|  | 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 | $2 \mathrm{ms*}$ |
|  |  | Average | 11 ms* |
|  |  | Full Stroke | 21 ms* |
|  | Rotational Speed | 7,200 rpm |  |
|  | Logical Blocks | 976,773,168 |  |
|  | Operating Temperature | $41^{\circ}$ to $131^{\circ} \mathrm{F}\left(5^{\circ}\right.$ to $\left.55^{\circ} \mathrm{C}\right)$ |  |
|  | *Actual performance may vary. |  |  |
| 1TB SATA 7200 rpm 6Gb/s 3.5" HDD | Capacity | 17B |  |
|  | Height | $1 \mathrm{in} ; 2.54 \mathrm{~cm}$ |  |
|  | Width | Media Diameter | $3.5 \mathrm{in} ; 8.9 \mathrm{~cm}$ |
|  |  | Physical Size | $4 \mathrm{in} ; 10.17 \mathrm{~cm}$ |
|  | Interface | Serial ATA (6.0Gb/s), NCQ enabled |  |
|  | Synchronous Transfer Rate (Maximum) | Up to $600 \mathrm{MB} / \mathrm{s}^{*}$ |  |
|  | Buffer | 64MB |  |
|  | Cache | Adaptive |  |
|  | Seek Time (typical reads, | Single Track | $2 \mathrm{ms*}$ |
|  | includes controller | Average | 11 ms* |
|  | overhead, including settling) | Full Stroke | 21 ms* |
|  | Rotational Speed | 7,200 rpm |  |
|  | Operating Temperature | $41^{\circ}$ to $131^{\circ} \mathrm{F}\left(5^{\circ}\right.$ to $\left.55^{\circ} \mathrm{C}\right)$ |  |
|  | *Actual performance may vary. |  |  |


| 2.0TB SATA 7200 rpm 6Gb/s 3.5" HDD CMR | Capacity | 2.0TB |  |
| :---: | :---: | :---: | :---: |
|  | Height | $1 \mathrm{in} ; 2.54 \mathrm{~cm}$ |  |
|  | Width | Media Diameter | $3.5 \mathrm{in} ; 8.9 \mathrm{~cm}$ |
|  |  | Physical Size | $4 \mathrm{in} ; 10.17 \mathrm{~cm}$ |
|  | Interface | Serial ATA ( $6.0 \mathrm{~Gb} / \mathrm{s}$ ), NCQ Enabled |  |
|  | Synchronous Transfer Rate (Maximum) | Up to $600 \mathrm{MB} / \mathrm{s}^{*}$ |  |
|  | Buffer | 64MB |  |
|  | Seek Time (typical reads, | Single Track | $1.0 \mathrm{~ms}^{*}$ |
|  | includes controller | Average | 11 ms* |
|  | overhead, including settling) | Full Stroke | $18 \mathrm{~ms}^{*}$ |
|  | Rotational Speed | 7,200 rpm |  |


|  | Logical Blocks Operating Temperature | 3,907,029,168 |  |
| :---: | :---: | :---: | :---: |
|  |  | $41^{\circ}$ to $131^{\circ} \mathrm{F}\left(5^{\circ}\right.$ |  |
|  | *Actual performance may vary. |  |  |
| 2.0TB SATA 7200 rpm 6Gb/s 3.5" HDD SMR | Capacity | 2.0TB |  |
|  | Height | $1 \mathrm{in} ; 2.54 \mathrm{~cm}$ |  |
|  | Width | Media Diameter | $3.5 \mathrm{in} ; 8.9 \mathrm{~cm}$ |
|  |  | Physical Size | $4 \mathrm{in} ; 10.17 \mathrm{~cm}$ |
|  | Interface | Serial ATA ( $6.0 \mathrm{~Gb} / \mathrm{s}$ ), NCQ Enabled |  |
|  | Synchronous Transfer Rate (Maximum) | Up to $600 \mathrm{MB} / \mathrm{s}^{*}$ |  |
|  | Buffer | 64MB |  |
|  | Seek Time (typical reads, includes controller overhead, including settling) | Single Track | 1.2 ms* |
|  |  | Average | $12 \mathrm{~ms} *$ |
|  |  | Full Stroke | 21 ms* |
|  | Rotational Speed | 7,200 rpm |  |
|  | Logical Blocks | 3,907,029,168 |  |
|  | Operating Temperature | $41^{\circ}$ to $140^{\circ} \mathrm{F}\left(5^{\circ}\right.$ to $\left.60^{\circ} \mathrm{C}\right)$ |  |
|  | *Actual performance may vary. |  |  |
| 3.0TB SATA 7200 rpm 6Gb/s 3.5" HDD | Capacity | 3.0тB |  |
|  | Height | $1 \mathrm{in} ; 2.54 \mathrm{~cm}$ |  |
|  | Width | Media Diameter | $3.5 \mathrm{in} ; 8.9 \mathrm{~cm}$ |
|  |  | Physical Size | $4.0 \mathrm{in} ; 10.17 \mathrm{~cm}$ |
|  | Interface | Serial ATA (6.0Gb/s), NCQ enabled |  |
|  | Synchronous Transfer Rate (Maximum) | Up to $6.0 \mathrm{~Gb} / \mathrm{s}^{*}$ |  |
|  | Buffer | 64MB |  |
|  | Seek Time (typical reads, includes controller overhead, including settling) | Single Track | 0.6 ms* |
|  |  | Average | 11 ms* |
|  |  | Full Stroke | Not Specified* |
|  | Rotational Speed | 7,200 rpm |  |
|  | Operating Temperature | $41^{\circ}$ to $140^{\circ} \mathrm{F}\left(5^{\circ}\right.$ to $\left.60^{\circ} \mathrm{C}\right)$ |  |
|  | *Actual performance may vary. |  |  |


| 1TB SATA 7200 rpm <br> 6Gb/s 3.5" HDD <br> (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) | $1 \mathrm{in} ; 2.54 \mathrm{~cm}$ |  |
|  | Physical Size (Width) | $4 \mathrm{in} ; 10.17 \mathrm{~cm}$ |  |
|  | Media Diameter | $3.5 \mathrm{in} ; 8.9 \mathrm{~cm}$ |  |
|  | Interface | Serial ATA (6Gb/s), NCQ enabled |  |
|  | Synchronous Transfer <br> Rate (Maximum) | Up to $600 \mathrm{MB} / \mathrm{s}^{*}$ |  |
|  | Buffer | 128MB |  |
|  | Seek Time (typical reads, | Single Track | 0.32 ms * |
|  | includes controller | Average | 7.45ms* |
|  | overhead, including settling) | Full Stroke | 14.2ms* |
|  | Operating Temperature | $41^{\circ}$ to $140^{\circ} \mathrm{F}\left(5^{\circ}\right.$ to $\left.60^{\circ} \mathrm{C}\right)$ |  |
|  | Performance | Sequential Read | up to $226 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  | Sequential Write | up to 226MB/s* |
|  | Enterprise Class Features | High Reliability |  |
|  | *Actual performance may |  |  |

## Technical Specifications - Hard Drives

| 4TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class) | Capacity <br> Height <br> Width | 4TB |  |
| :---: | :---: | :---: | :---: |
|  |  | 0.275 in; 0.7 cm |  |
|  |  | Media Diameter | $2.5 \mathrm{in} ; 6.36 \mathrm{~cm}$ |
|  |  | Physical Size | $2.75 \mathrm{in} ; 6.99 \mathrm{~cm}$ |
|  | Interface | Serial ATA (6Gb/s), NCQ enabled |  |
|  | Synchronous Transfer Rate (Maximum) | Up to 600MB/s* |  |
|  | Buffer | 128MB |  |
|  | Seek Time (typical reads, | Single Track | 0.7ms* |
|  | includes controller | Average | 8.5ms* |
|  | overhead, including settling) | Full Stroke | 15.7ms* |
|  | Rotational Speed | 7,200 rpm |  |
|  | Operating Temperature | $32^{\circ}$ to $140^{\circ} \mathrm{F}\left(0^{\circ}\right.$ |  |
|  | *Actual performance may | vary. |  |


| 500GB SATA 7.2K SED SFF HDD | Capacity | 500GB |  |
| :---: | :---: | :---: | :---: |
|  | Height | $0.275 \mathrm{in} ; 0.7 \mathrm{~cm}$ |  |
|  | Width | Media Diameter | $2.5 \mathrm{in} ; 6.36 \mathrm{~cm}$ |
|  |  | Physical Size | $2.75 \mathrm{in} ; 6.99 \mathrm{~cm}$ |
|  | 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 | $32^{\circ}$ to $140^{\circ} \mathrm{F}\left(0^{\circ}\right.$ to $\left.60^{\circ} \mathrm{C}\right)$ |  |
|  | *Actual performance may | vary. |  |

Technical Specifications - Hard Drives

## SATA SSDs for HP

 WorkstationsHP 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) | $0.28 \mathrm{in} ; 0.7 \mathrm{~cm}$ |  |
| Physical Size (Width) | $2.5 \mathrm{in} ; 6.36 \mathrm{~cm}$ |  |
| Interface | SATA 6Gb/s |  |
| Synchronous Transfer Rate (Maximum) | Up to 600MB/s* |  |
| Operating Temperature | $32^{\circ}$ to $158^{\circ} \mathrm{F}\left(0^{\circ}\right.$ to $\left.70^{\circ} \mathrm{C}\right)$ |  |
| Performance | Sequential Read | $530 \mathrm{MB} / \mathrm{s}$ (max)* |
|  | Sequential Write | $500 \mathrm{MB} / \mathrm{s}$ (max)* |
|  | Random Read | 95K IOPS (max)* |
|  | Random Write | 83K IOPS (max)* |

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

HP 512GB 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) | $0.28 \mathrm{in} ; 0.7 \mathrm{~cm}$ |  |
| Physical Size (Width) | $2.5 \mathrm{in} ; 6.36 \mathrm{~cm}$ |  |
| Interface | 6Gb/s SATA |  |
| Synchronous Transfer Rate (Maximum) | Up to 550MB/s (Sequential Read)* |  |
| Operating Temperature | $32^{\circ}$ to $158^{\circ} \mathrm{F}\left(0^{\circ}\right.$ to $70^{\circ} \mathrm{C}$ ) |  |
| Performance | Sequential Read | 530MB/s* |
|  | Sequential Write | $500 \mathrm{MB} / \mathrm{s}^{*}$ |
|  | Random Read | 95K IOPS* |
|  | Random Write | 83K IOPS* |
| Self-Encrypting Drive Support | OPAL 2 |  |
| *Actual performance may vary. |  |  |
| 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 550MB/s ( | ial Read)* |
|  | Operating Temperature | $32^{\circ}$ to $158^{\circ} \mathrm{F}\left(0^{\circ}\right.$ |  |
|  | Performance | Sequential Read | $530 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  | Sequential Write | $500 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  | Random Read | 95K IOPS* |
|  |  | Random Write | 83K IOPS* |
|  | *Actual performance may vary. |  |  |
| 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) | $0.28 \mathrm{in} ; 0.7 \mathrm{~cm}$ |  |
|  | Physical Size (Width) | $2.5 \mathrm{in} ; 6.36 \mathrm{~cm}$ |  |
|  | Interface | SATA 6Gb/s |  |
|  | Synchronous Transfer Rate (Maximum) | Up to 600MB/s* |  |
|  | Operating Temperature | $32^{\circ}$ to $158^{\circ} \mathrm{F}\left(0^{\circ}\right.$ to $\left.70^{\circ} \mathrm{C}\right)$ |  |
|  | Performance | Sequential Read | $530 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  | Sequential Write | $500 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  | Random Read | 95K IOPS* |
|  |  | Random Write | 83K IOPS* |
|  | Self-Encrypting Drive Support | OPAL 1 and 2 |  |
|  | *Actual performance may vary. |  |  |
| HP 1TB SATA 6Gb/s SSD | Capacity | 17B |  |
|  | 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) | $2.5 \mathrm{in} ; 6.36 \mathrm{~cm}$ |  |
|  | Interface | SATA 6Gb/s |  |
|  | Synchronous Transfer Rate (Maximum) | Up to 550MB/s (Sequential Read)* |  |
|  | Operating Temperature | $32^{\circ}$ to $158^{\circ} \mathrm{F}\left(0^{\circ}\right.$ to $\left.70^{\circ} \mathrm{C}\right)$ |  |


|  | Performance | Sequential Read | $530 \mathrm{MB} / \mathrm{s}^{*}$ |
| :---: | :---: | :---: | :---: |
|  |  | Sequential Write | $500 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  | Random Read | 95K IOPS* |
|  |  | Random Write | 83K IOPS* |
|  | *Actual performance may vary. |  |  |
| HP 2TB SATA 6Gb/s SSD | Capacity | 2TB |  |
|  | Protocol | SATA |  |
|  | Form Factor | 2.5 " |  |
|  | Controller | AHCI |  |
|  | NAND Type | 3D TLC |  |
|  | Endurance | 400TBW (TB Writ |  |
|  | Reliability (MTTF) | 1.5M hours |  |
|  | Physical Size (Height) | $0.28 \mathrm{in} ; 0.7 \mathrm{~cm}$ |  |
|  | Physical Size (Width) | $2.5 \mathrm{in} ; 6.36 \mathrm{~cm}$ |  |
|  | Interface | SATA 6Gb/s |  |
|  | Synchronous Transfer Rate (Maximum) | Up to 550MB/s (Sequential Read)* |  |
|  | Operating Temperature | $32^{\circ}$ to $158^{\circ} \mathrm{F}\left(0^{\circ}\right.$ to $\left.70^{\circ} \mathrm{C}\right)$ |  |
|  | Performance | Sequential Read | $530 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  | Sequential Write | $500 \mathrm{MB} / \mathrm{s}$ * |
|  |  | Random Read | 95K IOPS* |
|  |  | Random Write | 83K IOPS* |
|  | *Actual performance may vary. |  |  |
| 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) | $0.28 \mathrm{in} ; 0.7 \mathrm{~cm}$ |  |
|  | Physical Size (Width) | $2.5 \mathrm{in} ; 6.36 \mathrm{~cm}$ |  |
|  | Interface | 6Gb/s SATA |  |
|  | Synchronous Transfer Rate (Maximum) | Up to 600MB/s* |  |
|  | Operating Temperature | $32^{\circ}$ to $158^{\circ} \mathrm{F}\left(0^{\circ}\right.$ to $\left.70^{\circ} \mathrm{C}\right)$ |  |
|  | Performance | Sequential Read | $540 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  | Sequential Write | $310 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  | Random Read | 93K IOPS* |
|  |  | Random Write | 48K IOPS* |
|  | Enterprise Class Features | High Endurance NAND <br> Power Loss Protection <br> End-to-End Data Protection |  |
|  | *Actual performance may | vary. |  |

## Technical Specifications - Hard Drives

| 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) | $0.28 \mathrm{in} ; 0.7 \mathrm{~cm}$ |  |
|  | Physical Size (Width) | 2.5 in ; 6.36 cm |  |
|  | Interface | 6Gb/s SATA |  |
|  | Synchronous Transfer Rate (Maximum) | Up to 600MB/s* |  |
|  | Operating Temperature | $32^{\circ}$ to $158^{\circ} \mathrm{F}\left(0^{\circ}\right.$ to $\left.70^{\circ} \mathrm{C}\right)$ |  |
|  | Performance | Sequential Read | $540 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  | Sequential Write | $460 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  | Random Read | 93K IOPS* |
|  |  | Random Write | 74K IOPS* |
|  | Enterprise Class Features | High Endurance Power Loss Prot <br> End-to-End Data | tion |

Performance PCle SSDs for HP Workstations

| HP Z Turbo Drive 256GB M. 22280 TLC SSD | Capacity | 256GB |
| :---: | :---: | :---: |
|  | Protocol | PCle |
|  | Form Factor | M. 2 |
|  | Controller | NVMe |
|  | NAND Type | 3D TLC |
|  | SED Support | Opal 2 |
|  | Endurance | 200TB |
|  | Reliability (MTBF) | 1.5M hou |
|  | Interface | PCI Expre |
|  | Operating Temperature | $32^{\circ}$ to 15 |
|  | Performance | Sequentia |
|  |  | Sequentia |
|  |  | Random |
|  |  | Random |
|  | *Actual performance may vary. |  |
| HP ZTurbo Drive 512GB M. 22280 TLC SSD | Capacity | 512GB |
|  | Protocol | PCle |
|  | Form Factor | M. 2 |
|  | Controller | NVMe |
|  | NAND Type | 3D TLC |
|  | SED Support | Opal 2 |
|  | Endurance | 300TB |

## Technical Specifications - Hard Drives

|  | Reliability (MTBF) <br> Interface <br> Operating Temperature <br> Performance | 1.5M hours |  |
| :---: | :---: | :---: | :---: |
|  |  | PCI Express $3.0 \times 4$ electrical $\times 4$ physical |  |
|  |  | $32^{\circ}$ to $158^{\circ} \mathrm{F}\left(0^{\circ}\right.$ to $\left.70^{\circ} \mathrm{C}\right)$ |  |
|  |  | Sequential Read | $3500 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  | Sequential Write | $2900 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  | Random Read | 460 K IOPS* |
|  |  | Random Write | 500K IOPS* |
|  | *Actual performance may vary. |  |  |
| HP ZTurbo Drive 1TB M. 2 2280 TLC SSD | Capacity | 1 TB |  |
|  | Protocol | PCle |  |
|  | Form Factor | M. 2 |  |
|  | Controller | NVMe |  |
|  | NAND Type | 3D TLC |  |
|  | SED Support | Opal 2 |  |
|  | Endurance | 400тB |  |
|  | Reliability (MTBF) | 1.5M hours |  |
|  | Interface | PCI Express $3.0 \times 4$ | rical $\times 4$ physical |
|  | Operating Temperature | $32^{\circ}$ to $158^{\circ} \mathrm{F}\left(0^{\circ} \mathrm{t}\right.$ |  |
|  | Performance | Sequential Read | $3500 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  | Sequential Write | $3000 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  | Random Read | 580K IOPS* |
|  |  | Random Write | 500K IOPS* |
|  | *Actual performance may vary. |  |  |
| HP ZTurbo Drive 2TB M. 2 <br> 2280 TLC SSD | Capacity | 2TB |  |
|  | Protocol | PCle |  |
|  | Form Factor | M. 2 |  |
|  | Controller | NVMe |  |
|  | NAND Type | 3D TLC |  |
|  | SED Support | Opal 2 |  |
|  | Endurance | 5007B |  |
|  | Reliability (MTTF) | 1.5M hours |  |
|  | Interface | PCI Express $3.0 \times 4$ | rical $\times 4$ physical |
|  | Operating Temperature | $32^{\circ}$ to $158^{\circ} \mathrm{F}\left(0^{\circ} \mathrm{t}\right.$ |  |
|  | Performance | Sequential Read | $3300 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  | Sequential Write | $2400 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  | Random Read | 500K IOPS* |
|  |  | Random Write | 440K IOPS* |
|  | *Actual performance may vary. |  |  |
| HP Z Turbo Drive Quad Pro 2x256GB PCle TLC SSD | Capacity | 512GB |  |
|  | Protocol | PCle |  |
|  | Form Factor | PCle Card, Full Height PCle Slot |  |

## Technical Specifications - Hard Drives

| Controller | NVMe |  |
| :---: | :---: | :---: |
| NAND Type | 3D TLC |  |
| SED Support | Opal 2 |  |
| Endurance | 200TB |  |
| Reliability (MTBF) | 1.5M hours |  |
| Interface | PCle Gen3 $\times 4$ architecture |  |
| Operating Temperature | $32^{\circ}$ to $158^{\circ} \mathrm{F}\left(0^{\circ}\right.$ to $\left.70^{\circ} \mathrm{C}\right)$ |  |
| Performance | Sequential Read | 3500 MB/s* |
|  | Sequential Write | 2200 MB/s* |
|  | Random Read | 240K IOPS* |
|  | Random Write | 480K IOPS* |
| *Actual performance may |  |  |

HP Z Turbo Drive Quad

| Capacity | 17B |  |
| :---: | :---: | :---: |
| Protocol | PCle |  |
| Form Factor | PCle Card, Full Height PCle Slot |  |
| Controller | NVMe |  |
| NAND Type | 3D TLC |  |
| SED Support | Opal 2 |  |
| Endurance | 300TB |  |
| Reliability (MTBF) | 1.5M hours |  |
| Interface | PCle Gen3 x 4 architecture |  |
| Operating Temperature | $32^{\circ}$ to $158^{\circ} \mathrm{F}\left(0^{\circ}\right.$ to $\left.70^{\circ} \mathrm{C}\right)$ |  |
| Performance | Sequential Read | 3500 MB/s* |
|  | Sequential Write | 2900 MB/s* |
|  | Random Read | 460 K IOPS* |
|  | Random Write | 500K IOPS* |


| HP Z Turbo Drive Quad Pro 2x1TB PCle TLC SSD | Capacity <br> Protocol | 2TB |  |
| :---: | :---: | :---: | :---: |
|  |  | PCle |  |
|  | Form Factor | PCle Card, Full Height PCle Slot |  |
|  | Controller | NVMe |  |
|  | NAND Type | 3D TLC |  |
|  | SED Support | Opal 2 |  |
|  | Endurance | 400TB |  |
|  | Interface | PCI Express $3.0 \times 4$ electrical $\times 4$ physical |  |
|  | Operating Temperature | $32^{\circ}$ to $158^{\circ} \mathrm{F}\left(0^{\circ}\right.$ to $70^{\circ} \mathrm{C}$ ) |  |
|  | Performance | Sequential Read | $3500 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  | Sequential Write | 3000 MB/s* |
|  |  | Random Read | 580K IOPS* |
|  |  | Random Write | 500K IOPS* |

*Actual performance may vary.

## Technical Specifications - Hard Drives

| HP Z Turbo Drive Dual Pro 256GB SSD | Capacity | 256GB |  |
| :---: | :---: | :---: | :---: |
|  | Protocol | PCle |  |
|  | Form Factor | M. 2 in Half-height, half-length card |  |
|  | Controller | NVMe |  |
|  | NAND Type | 3D TLC |  |
|  | Endurance | 200TBW (TB Written) |  |
|  | Reliability (MTBF) | 1.5M hours |  |
|  | Interface | PCI Express $3.0 \times 4$ electrical $\times 4$ physical |  |
|  | Operating Temperature | $32^{\circ}$ to $158^{\circ} \mathrm{F}\left(0^{\circ}\right.$ to $\left.70^{\circ} \mathrm{C}\right)$ |  |
|  | Performance | Sequential Read | $3500 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  | Sequential Write | $2200 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  | Random Read | 240K IOPS* |
|  |  | Random Write | 480K IOPS* |

*Actual performance may vary.

| HP Z Turbo Drive Dual Pro | Capacity | 512 GB |
| :--- | :--- | :--- |
| 512GB SSD | Protocol | PCle |
|  | Form Factor | M. 2 in Half-height, half-length card |
|  | Controller | NVMe |
|  | NAND Type | $3 D$ TLC |
|  | Endurance | 300 TBW (TB Written) |
|  | Reliability (MTBF) | 1.5 M hours |
|  | Interface | PCI Express $3.0 \times 4$ electrical $\times 4$ physical |
|  | Operating Temperature | $32^{\circ}$ to $158^{\circ} \mathrm{F}\left(0^{\circ}\right.$ to $\left.70^{\circ} \mathrm{C}\right)$ |
|  | Performance | Sequential Read |
|  |  | Sequential Write |
|  |  | Random Read |
|  |  | Random Write |
|  |  |  |
|  |  |  |

*Actual performance may vary.

| HP Z Turbo Drive Dual Pro 1TB SSD | Capacity | 1TB |  |
| :---: | :---: | :---: | :---: |
|  | Protocol | PCle |  |
|  | Form Factor | M. 2 in Half-height, half-length card |  |
|  | Controller | NVMe |  |
|  | NAND Type | 3D TLC |  |
|  | Endurance | 400TBW (TB Written) |  |
|  | Reliability (MTBF) | 1.5M hours |  |
|  | Interface | PCI Express $3.0 \times 4$ electrical $\times 4$ physical |  |
|  | Operating Temperature | $32^{\circ}$ to $158^{\circ} \mathrm{F}\left(0^{\circ}\right.$ to $\left.70^{\circ} \mathrm{C}\right)$ |  |
|  | Performance | Sequential Read | $3500 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  | Sequential Write | $3000 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  | Random Read | 580K IOPS* |
|  |  | Random Write | 500K IOPS* |
|  | *Actual performance may |  |  |

## Technical Specifications - Hard Drives

|  | HP Z Turbo Drive Dual Pro 2TB SSD | Capacity | 2TB |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | Protocol |  |  |
|  |  | Form Factor | M. 2 in Half-height, half-length card |  |
|  |  | Controller | NVMe |  |
|  |  | NAND Type | 3D TLC |  |
|  |  | Endurance | 500TBW (TB Written) |  |
|  |  | Reliability (MTBF) | 1.5M hours |  |
|  |  | Interface | PCI Express $3.0 \times 4$ electrical $\times 4$ physical |  |
|  |  | Operating Temperature | $32^{\circ}$ to $158^{\circ} \mathrm{F}\left(0^{\circ}\right.$ to $70^{\circ} \mathrm{C}$ ) |  |
|  |  | Performance | Sequential Read | $3500 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  |  | Sequential Write | $3000 \mathrm{MB} / \mathrm{s}$ * |
|  |  |  | Random Read | 600K IOPS* |
|  |  |  | Random Write | 500K IOPS* |
|  |  | *Actual performance may | vary. |  |
| Mainstream PCle SSDs for HP Workstations | HP 256GB M. 22280 TLC SSD | Capacity | 256GB |  |
|  |  | Protocol | PCle |  |
|  |  | Form Factor | M. 2 |  |
|  |  | Controller | NVMe |  |
|  |  | NAND Type | 3D TLC |  |
|  |  | Endurance | 200TB |  |
|  |  | Reliability (MTBF) | 1.5M hours |  |
|  |  | Interface | PCI Express $3.0 \times 4$ electrical $\times 4$ physical |  |
|  |  | Operating Temperature | $32^{\circ}$ to $158^{\circ} \mathrm{F}\left(0^{\circ}\right.$ to $\left.70^{\circ} \mathrm{C}\right)$ |  |
|  |  | Performance | Sequential Read | $3100 \mathrm{MB} / \mathrm{s}$ * |
|  |  |  | Sequential Write | $1400 \mathrm{MB} / \mathrm{s}$ * |
|  |  |  | Random Read | 200 K IOPS * |
|  |  |  | Random Write | 320 K IOPS * |
|  |  | *Actual performance may vary. |  |  |
|  | HP 512GB M. 22280 TLC SSD | Capacity | 512GB |  |
|  |  | Protocol | PCle |  |
|  |  | Form Factor | M. 2 |  |
|  |  | Controller | NVMe |  |
|  |  | NAND Type | 3D TLC |  |
|  |  | Endurance | 300тB |  |
|  |  | Reliability (MTBF) | 1.5M hours |  |
|  |  | Interface | PCI Express $3.0 \times 4$ electrical $\times 4$ physical |  |
|  |  | Operating Temperature | $32^{\circ}$ to $158^{\circ} \mathrm{F}\left(0^{\circ}\right.$ to $\left.70^{\circ} \mathrm{C}\right)$ |  |
|  |  | Performance | Sequential Read | $3300 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  |  | Sequential Write | $2500 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  |  | Random Read | 225 K IOPS* |
|  |  |  | Random Write | 430 K IOPS* |
|  |  | *Actual performance may | vary. |  |

## Technical Specifications - Hard Drives

| HP 1TB M. 22280 TLC SSD | Capacity | 1TB |  |
| :---: | :---: | :---: | :---: |
|  | Protocol | PCle |  |
|  | Form Factor | M. 2 |  |
|  | Controller | NVMe |  |
|  | NAND Type | 3D TLC |  |
|  | Endurance | 400тB |  |
|  | Reliability (MTBF) | 1.5M hours |  |
|  | Interface | PCI Express $3.0 \times 4$ electrical $\times 4$ physical |  |
|  | Operating Temperature | $32^{\circ}$ to $158^{\circ} \mathrm{F}\left(0^{\circ}\right.$ to $\left.70^{\circ} \mathrm{C}\right)$ |  |
|  | Performance | Sequential Read | $3300 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  | Sequential Write | $2500 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  | Random Read | 400 K IOPS* |
|  |  | Random Write | 440 K IOPS* |

*Actual performance may vary.

Intel ${ }^{\circledR}$ 905p Series AIC PCle Intel ${ }^{\circledR}$ 905p Series AIC SSD 280GB PCle SSD
$\begin{array}{rr}\text { HP 2TB M. } 22280 \text { TLC SSD Capacity } & \text { 2TB } \\ \text { Protocol } & \text { PCle }\end{array}$
Form Factor M. 2
Controller NVMe
NAND Type 3D TLC
Endurance 500TB
Reliability (MTBF) 1.5M hours
Interface $\quad \mathrm{PCI}$ Express $3.0 \times 4$ electrical $\times 4$ physical
Operating Temperature $32^{\circ}$ to $158^{\circ} \mathrm{F}\left(0^{\circ}\right.$ to $\left.70^{\circ} \mathrm{C}\right)$

Performance
Sequential Read $3300 \mathrm{MB} / \mathrm{s}^{*}$
Sequential Write 2700 MB/s*
Random Read 430 K IOPS*
Random Write 500 K IOPS*
*Actual performance may vary.

| Capacity | 280GB |  |
| :--- | :--- | :--- |
| Protocol | PCle |  |
| Form Factor | PCle Card, Half Height |  |
| Controller | NVMe |  |
| NVM Type | 3 DXPoint |  |
| Endurance | 5.11 PBW (PB Written) |  |
| Reliability (MTBF) | 1.6 M hours |  |
| Operating Temperature | $32^{\circ}$ to $185^{\circ} \mathrm{F}\left(0^{\circ}\right.$ to $\left.85^{\circ} \mathrm{C}\right)$ |  |
| Performance | Sequential Read | $2730 \mathrm{MB} / \mathrm{s}^{*}$ |
|  | Sequential Write | $2280 \mathrm{MB} / \mathrm{s}^{*}$ |
|  | Random Read | $587 \mathrm{KIOPS*}$ |
|  | Random Write | $559 \mathrm{KIOPS*}$ |

*Actual performance may vary.
Capacity 480GB

## Technical Specifications - Hard Drives

|  | Protocol | PCle |  |
| :---: | :---: | :---: | :---: |
|  | Form Factor | PCle Card, Half He |  |
|  | Controller | NVMe |  |
|  | NVM Type | 3DXPoint |  |
|  | Endurance | 8.76 PBW (PB Wr |  |
| Intel ${ }^{\circledR}$ 905p Series AIC | Reliability (MTBF) | 1.6M hours |  |
|  | Operating Temperature | $32^{\circ}$ to $185^{\circ} \mathrm{F}\left(0^{\circ}\right.$ to |  |
|  | Performance | Sequential Read | 2710 MB/s* |
|  |  | Sequential Write | 2280 MB/s* |
|  |  | Random Read | 582K IOPS* |
|  |  | Random Write | 561K IOPS* |

*Actual performance may vary.

| Intel ${ }^{\circledR}$ Optane $^{\text {TM }}$ DC Persistent Memory | Intel ${ }^{\circledR}$ Optane ${ }^{\text {m }}$ DC <br> Persistent Memory 128GB <br> Module | Capacity | 128GB |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | Protocol | DDR-T |  |
|  |  | Form Factor | DDR4 |  |
|  |  | Controller | NVMe |  |
|  |  | NVM Type | 3DXPoint |  |
|  |  | Endurance | 292 PBW (256B Sequential Write) <br> 91 PBW (64B Sequential Write) |  |
|  |  | Reliability (MTBF) | 2M hours |  |
|  |  | Operating Temperature | $32^{\circ}$ to $185^{\circ} \mathrm{F}\left(0^{\circ}\right.$ |  |
|  |  | Performance | Sequential Read | $6800 \mathrm{MB} / \mathrm{s}^{*}$ |
|  |  |  | Sequential Write | 1850 MB/s* |
|  |  | *Actual performance | vary. |  |

## Technical Specifications - Hard Drive Controllers

## HARD DRIVE CONTROLLERS

| Microsemi | PCI Bus | 8 lanes, PCI Express 3.0 |
| :--- | :--- | :--- |
| SmartHBA2100-4i4e SAS |  |  |
| Card | RAID Levels | Offers Integrated RAID (0, 1, and 10) |
|  | PCI Data Burst Transfer | Half Duplex x8, PCle, 8000 MB/s |
|  | Rate |  |
|  | SAS Bandwidth | Half Duplex |
|  | PCI Card Type | 3.3 V Add-in Card |
|  | PCI Voltage | $12 \mathrm{~V} \pm 10 \%$ |
|  | PCI Power | 9.8 W typical, Airflow min 200 LFM lane |
|  | Bracket | Full height and low profile |
|  | Certification Level | PCI Express 3.0 compliant |
|  | SAS Processor | Microsemi SmartIOC 2100 SAS IO Controller |
|  | Internal Connectors | One x4 internal mini-SASHD (SFF-8643) |
|  | External Connectors | One x4 external mini-SASHD (SFF-8644) |
|  | Maximum Number of SCSI | 256 Non-RAID SAS/SATA devices |
|  | Devices |  |
|  | LED Indicators | Connector for Drive Activity Light |
|  |  | NOTE: RAID 5 is not supported on MicroSemi 2100-4i4e 8-port SAS 12Gb/s |
|  |  | RAID Card |

## Technical Specifications - Graphics

## GRAPHICS

NVIDIA® Quadro ${ }^{\circledR}$ P400

| Form Factor | Dimensions: 2.713" H x 5.7" L <br> Single Slot, Low Profile <br> Cooling: Active <br> Weight: 129 grams |
| :---: | :---: |
| Graphics Controller | NVIDIA ${ }^{\circledR}$ Quadro ${ }^{\circledR}$ P400 Graphics Card GPU: 256 NVIDIA ${ }^{\circledR}$ CUDA ${ }^{\circledR}$ cores Max Power: 30 Watts |
| Bus Type | PCI Express $3.0 \times 16$ |
| Memory | Size: 2 GB GDDR5, 2000 MHz Memory Interface: 64-bit Memory Bandwidth: 32 GB/s |
| Connectors | 3mDP Outputs |
| Maximum Resolution | DisplayPort ${ }^{\text {TM }} 1.4$ : <br> - up to $3 \times 5120 \times 2880 \times 24$ bpp @ 60Hz <br> - 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 ${ }^{\circledR} 12$ Shader Model 5.1 |
| Supported Graphics APIs | OpenGL® 4.5 <br> Direct X $^{\circledR} 12$ <br> Vulkan ${ }^{\text {TM }} 1.0$ <br> API support includes: <br> CUDA C, CUDA C++, DirectCompute, OpenCL™ |
| Available Graphics Drivers | Windows 11 <br> Windows 10 <br> Windows 7 Professional 64-bit Linux ${ }^{\circledR}$ |

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 ${ }^{\circledR}$ Quadro ${ }^{\circledR}$ P620 2GB Graphics

| Form Factor | Dimensions: 2.713" H x 5.7" L <br> Single Slot, Low Profile <br> Cooling: Active <br> Weight: 129 grams |
| :---: | :---: |
| Graphics Controller | NVIDIA ${ }^{\circledR}$ Quadro ${ }^{\circledR}$ P620 Graphics Card GPU: 512 CUDA cores Max Power: 40 Watts |
| Bus Type | PCI Express $3.0 \times 16$ |
| Memory | Size: 2 GB GDDR5, 2000 MHz Memory Interface: 128-bit |

## Technical Specifications - Graphics

|  | Memory Bandwidth: $64 \mathrm{~GB} / \mathrm{s}$ |
| :--- | :--- |
| Connectors | 4mDP Outputs * |
| Maximum Resolution | DisplayPort ${ }^{\text {TM }} 1.4:$ <br> - up to $4 \times 5120 \times 2880 \times 24 \mathrm{bpp} @ 60 \mathrm{~Hz}$ <br>  <br> - supports Multi-Stream Transport (MST) <br> Image Quality Features <br>  <br> 10-bit internal display processing pipeline <br> $10-$ 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 Windows 11
Windows 10
Windows 7 Professional
Linux ${ }^{\circledR}$
HP qualified drivers may be preloaded or available from the HP support Web site:
http://welcome.hp.com/country/us/en/support.html
Notes *P620 only have mini-DisplayPort ${ }^{\text {TM }}(\mathrm{mDP})$ video ports.
Factory Configured (Z4 G4/ Z6 G4/ Z8 G4 Workstations): No adapters included
After market option kit:Two mDP-to-DP Adapters included
Additional mDP-to-DP Adapters are available as Factory Configuration or Option Kit accessories:

- 2MY05AA - HP miniDP-to-DP Adapter Cables
- 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables

| NVIDIA ${ }^{\oplus}$ T400 2GB Graphics | Form Factor | Dimensions: 2.713" H x 6.137" L Single Slot, Low Profile Weight: 124g |
| :---: | :---: | :---: |
|  | Graphics Controller | NVIDIA ${ }^{\oplus}$ T400 Graphics Card GPU: 384 CUDA cores <br> Power: 30 Watts <br> Cooling: Active |
|  | Bus Type | PCI Express $3.0 \times 16$ |
|  | Memory | Size: 2 GB GDDR6 <br> Memory Interface: 64-bit Memory Bandwidth: 80 GB/s |
|  | Connectors | 3 mmP |
|  | Maximum Resolution | $3 \times 5120 \times 2880 \times 24 \mathrm{bpp}$ @ 60Hz |

## Technical Specifications - Graphics

| Supported Graphics APIsOpenGL 4.5 <br>  <br> DirectX 12 <br>  <br> Vulkan 1.0 <br>  <br> API support includes: <br>  <br> CUDA, OpenCL 1.x |  |
| :--- | :--- |
| Available Graphics DriversWindows 11 <br>  <br> Windows 10 <br>  <br> Linux |  |
|  | HP qualified drivers may be preloaded or available from the HP support |
|  | Web site: |
|  | http://welcome.hp.com/country/us/en/support.html |


| NVIDIA ${ }^{\oplus}$ T600 4GB Graphics | Form Factor | Dimensions: 2.713" H x 6.137" L <br> Single Slot, Low Profile <br> Weight: 130g |
| :---: | :---: | :---: |
|  | Graphics Controller | NVIDIA ${ }^{\circledR}$ T600 Graphics Card GPU: 640 CUDA cores <br> Power: 40 Watts Cooling: Active |
|  | Bus Type | PCI Express $3.0 \times 16$ |
|  | Memory | Size: 4 GB GDDR6 <br> Memory Interface: 128-bit Memory Bandwidth: 160 GB/s |
|  | Connectors | 4x mDP |
|  | Maximum Resolution | $4 \times 5120 \times 2880 \times 24 \mathrm{bpp}$ @ 60Hz |
|  | Supported Graphics APIs | OpenGL 4.5 <br> DirectX 12 <br> Vulkan 1.0 <br> API support includes: <br> CUDA C, CUDA C++, DirectCompute , OpenCL |
|  | Available Graphics Drivers | Windows 11 <br> Windows 10 Linux |

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

| NVIDIA ${ }^{\oplus}$ Quadro ${ }^{\oplus}$ P1000 4GB Graphics | Form Factor | Dimensions:2.713" H x 5.7" L <br> Single Slot, Low Profile <br> Cooling: Active <br> Weight: 129 grams |
| :---: | :---: | :---: |
|  | Graphics Controller | NVIDIA ${ }^{\circledR}$ Quadro ${ }^{\circledR}$ P1000 Graphics Card GPU: 640 NVIDIA ${ }^{\circledR}$ CUDA ${ }^{\circledR}$ cores Max Power: 47 Watts |
|  | Bus Type | PCI Express $3.0 \times 16$ |
|  | Memory | Size: 4 GB GDDR5, 2500 MHz |

## Technical Specifications - Graphics

|  | Memory Interface: 128-bit memory interface Memory Bandwidth: $80 \mathrm{~GB} / \mathrm{s}$ memory bandwidth |
| :---: | :---: |
| Connectors | 4mDP Outputs |
| Maximum Resolution | DisplayPort ${ }^{\text {TM }} 1.4$ : <br> - up to $4 \times 5120 \times 2880 \times 24 \mathrm{bpp}$ @ 60Hz <br> - 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 Direct ${ }^{\text {® }} 12$ Shader Model 5.1 |
| Supported Graphics APIs | OpenGL® 4.5 <br> Direct ${ }^{\circledR}{ }^{\text {® }} 12$ <br> Vulkan ${ }^{\text {TM }} 1.0$ <br> API support includes: <br> CUDA C, CUDA C++, DirectCompute , OpenCL™ |
| Available Graphics Drivers | Windows 11 <br> Windows 10 <br> Windows 7 Professional Linux ${ }^{\text {® }}$ |

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 ${ }^{\circledR}$ Quadro ${ }^{\oplus}$ P2000 5GB Graphics

| Form Factor | Dimensions: 4.4"Hx7.9"L <br> Single Slot <br> Cooling: Active <br> Weight: 260 grams |
| :---: | :---: |
| Graphics Controller | NVIDIA® Quadro ${ }^{\circledR}$ P2000 Graphics Card Power: 75 Watts |
| Bus Type | PCI Express $3.0 \times 16$ |
| Memory | Size: 5GB GDDR5 <br> Memory Bandwidth: 140 GB/s Memory Width: 160-bit |
| Connectors | 4x DisplayPort ${ }^{\text {TM }} 1.4$ |
|  | Factory Configured Option: No adapter included with card After Market Option: No video cable adapter included |
|  | Additional DVI to VGA, DisplayPort ${ }^{\text {TM }}$ to VGA, DisplayPort ${ }^{\text {TM }}$ to DVI, and DisplayPort ${ }^{\text {TM }}$ to Dual-Link DVI adapters available as accessories. |
| Maximum Resolution | DisplayPort ${ }^{\text {TM }}$ : <br> - up to $5120 \times 2880 \times 24$ bpp @ 60Hz <br> - supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST) DP 1.3 \& 1.4 ready. |
|  | DL-DVI(I) output: <br> - up to $2560 \times 1600 \times 32 \mathrm{bpp}$ @ 60 Hz |
|  | Single Link-DVI(I) output: |

## Technical Specifications - Graphics

- up to $1920 \times 1200 \times 32$ bpp @ 60Hz

HDMI 2.0 (requires DP to HDMI adapter): $5120 \times 2880 \times 24$ bpp @ 60Hz
Image Quality Features 12-bit internal display pipeline (hardware support for 12-bit scanout on supported panels, applications and connection)

Stereoscopic 3D display support including NVIDIA ${ }^{\circledR}$ 3D Vision ${ }^{\text {TM }}$ technology, NVIDIA ${ }^{\circledR}$ Mosaic and nView.
Display Output Maximum number of displays

- 4 direct attached monitors

Maximum number of monitors across all available Quadro P2000 outputs is 4 .

Shading Architecture Shader Model 5.1
Supported Graphics APIs OpenGL 4.5
Direct ${ }^{\circ} 12$

API support includes:
CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™ ${ }^{\text {™ }}$, Java, Python, and Fortran software
Available Graphics Drivers Windows 11
Windows 10
Windows 7 Professional
Linux ${ }^{\circledR}$ - Full OpenGL ${ }^{\circledR}$ implementation, complete with NVIDIA ${ }^{\circledR}$ and ARB extensions

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 ${ }^{\circledR}$ Quadro ${ }^{\circledR}$ P2200 5GB Graphics

| Form Factor | Dimensions: 4.4"H x 7.9"L <br> Single Slot, Full Height <br> Weight: 260 grams |
| :---: | :---: |
| Graphics Controller | NVIDIA ${ }^{\circledR}$ Quadro ${ }^{\circledR}$ P2200 Graphics Card GPU: 1280 CUDA cores <br> Power: 75 Watts <br> Cooling: Active |
| Bus Type | PCI Express $3.0 \times 16$ |
| Memory | Size: 5GB GDDR5X <br> Memory Bandwidth: 200 GB/s Memory Width: 160-bit |
| Connectors | 4x DisplayPort ${ }^{\text {TM }} 1.4$ |
|  | Factory Configured Option: No adapter included with card After Market Option: No video cable adapter included |

## Technical Specifications - Graphics

|  | Additional DVI to VGA, DisplayPort ${ }^{\text {TM }}$ to VGA, DisplayPort ${ }^{\text {TM }}$ to DVI, and DisplayPort ${ }^{\text {TM }}$ to Dual-Link DVI adapters available as accessories. |
| :---: | :---: |
| Maximum Resolution | DisplayPort ${ }^{\mathrm{TM}}$ : <br> - up to $5120 \times 2880 \times 24$ bpp @ 60Hz <br> - supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST) DP 1.3 <br> \& 1.4 ready. |
|  | DL-DVI(I) output: <br> - up to $2560 \times 1600 \times 32$ bpp @ 60 Hz |
|  | Single Link-DVI(I) output: <br> - up to $1920 \times 1200 \times 32 \mathrm{bpp}$ @ 60Hz |
|  | HDMI 2.0 (requires DP to HDMI adapter): $5120 \times 2880 \times 24$ bpp @ 60Hz |
| Image Quality Features | 12-bit internal display pipeline (hardware support for 12-bit scanout on supported panels, applications and connection) |
|  | Stereoscopic 3D display support including NVIDIA ${ }^{\oplus}$ 3D Vision ${ }^{\text {TM }}$ technology, NVIDIA ${ }^{\oplus}$ Mosaic and nView. |
| Display Output | Maximum number of displays - 4 direct attached monitors |
|  | Maximum number of monitors across all available NVIDIA ${ }^{\oplus}$ Quadro ${ }^{\oplus}$ P2200 outputs is 4 . |
| Shading Architecture | Shader Model 5.1 |
| Supported Graphics APIs | $\begin{aligned} & \text { OpenGL }^{\bullet} 4.5 \\ & \text { DirectX } 12 \end{aligned}$ |
|  | API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran software |
| Available Graphics Drivers | Windows 11 <br> Windows 10 <br> Windows 7 Professional <br> Linux ${ }^{\circledR}$ - Full OpenGL ${ }^{\circledR}$ implementation, complete with NVIDIA ${ }^{\circledR}$ Quadro ${ }^{\circledR}$ and ARB extensions |
|  | HP qualified drivers may be preloaded or available from the HP support Web site: <br> http://welcome.hp.com/country/us/en/support.html |
| Notes | 1. Quadro P2200 offered as Factory Configured Option does not include a video cable adapter. Video cable adapters must be ordered separately. <br> 2. Quadro P2200 offered as an After Market Option does not include video cables. Video cable adapters must be ordered separately. |

## AMD Radeon ${ }^{\text {TM }}$ Pro WX 3200 4GB Graphics

## Form Factor <br> Graphics Controller

Low-Profile Single Slot (2.75 "H x 6.6" L)
Radeon ${ }^{\text {TM }}$ Pro WX 3200 Graphics Card
GPU: 640 Stream Processors organized into 8 Compute Units
Power: 56 Watts
Cooling: Active

Technical Specifications - Graphics

| Memory | 4GB GDDR5 memory <br> Memory Bandwidth: 96 GB/s <br> Memory Width: 128 bit |
| :---: | :---: |
| Connectors | 4x Mini DisplayPort ${ }^{\text {TM }} 1.4$ - HDR ready connectors with HBR3 and MST support. |
|  | Factory Configured: No adapters included After market option kit: One mDP-to-DP cable adapters included |
|  | Additional Mini DisplayPort ${ }^{\text {TM }}$-to-DisplayPort ${ }^{\text {TM }}$, DisplayPort ${ }^{\text {TM }}$-to-VGA or DisplayPort ${ }^{\text {TM }}$-to-DVI adapters are available as Factory Configuration or Option Kit accessories. |
| Maximum Resolution | 5K support @ 60Hz <br> - $1 \times$ single-cable 5K monitor, or $2 x$ 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 | Polaris |
| Supported Graphics APIs | Direct ${ }^{\circ} 12$ <br> OpenGL® 4.6 <br> OpenCLTM 2.0 <br> Vulkan ${ }^{\text {TM }} 1.0$ |
| Available Graphics Drivers | Windows 11 <br> Windows 10 <br> Linux ${ }^{\circledR}$ 64-bit (selected Enterprise distributions) |
|  | HP qualified drivers may be preloaded or available from the HP support Web site: <br> http://welcome.hp.com/country/us/en/support.html |
| 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. <br> 2. AMD PowerTune and AMD ZeroCore Power are technologies offered by certain FirePro ${ }^{\text {TM }}$ and Radeon ${ }^{\text {TM }}$ Pro products, which are designed to intelligently manage GPU power consumption in response to certain GPU load conditions. <br> 3. As of September 2016, certified for DisplayPort ${ }^{\text {TM }} 1.4$ HBR3 and ready for DisplayPort ${ }^{\text {TM }} 1.4$ HDR based on independent verification by DisplayPort ${ }^{\text {TM }}$ testing authority. HDR content requires that the system be configured with a fully HDRready 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. |

## Technical Specifications - Graphics

| NVIDIA ${ }^{\oplus}$ T1000 4GB Graphics | Form Factor | Dimensions: 2.713" H x 6.137" L Single Slot <br> Weight: xx |
| :---: | :---: | :---: |
|  | Graphics Controller | NVIDIA ${ }^{\oplus}$ T1000 Graphics Card <br> Power: 50W <br> Cooling: Active |
|  | Bus Type | PCI Express $3.0 \times 16$ |
|  | Memory | Size: 4GB GDDR6 <br> Memory Bandwidth: Up to 160 GB/s Memory Width: 128-bit |
|  | Connectors | 4x mini DisplayPort ${ }^{\text {TM }} 1.4 \mathrm{a}$ |
|  | Maximum Resolution | $7680 \times 4320$ @ 120Hz |
|  | Display Output | Maximum number of displays: 4 displays |
|  | Architecture | NVIDIA ${ }^{\circledR}$ Turing ${ }^{\text {TM }}$ |
|  | Supported Graphics APIs | xx |
|  | Available Graphics Drivers | Windows 11 |
|  |  | Windows 10 |
|  |  | Windows 8.1 |
|  |  | Windows 7 Professional |
|  |  | Linux ${ }^{\circledR}$ - Full OpenGL ${ }^{\circledR}$ implementation, complete with NVIDIA ${ }^{\circledR}$ Quadro ${ }^{\circledR}$ and |
|  |  | ARB extensions |
|  |  | HP qualified drivers may be preloaded or available from the HP support Web site: |
|  |  | http://welcome.hp.com/country/us/en/support.html |

NVIDIA ${ }^{\circledR}$ RTX A2000 6GB Graphics

## Form Factor

Graphics Controller

Bus Type
Memory

Connectors
Maximum Resolution
Architecture
Supported Graphics APIs
Available Graphics Drivers

## Notes

Windows 10
Linux ${ }^{\oplus}$ 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
Dimensions: 2.713" H x 6.6" L
Dual slot, half-height
Weight: 295 grams (without extender)
NVIDIA ${ }^{\circledR}$ RTX A2000 Graphics Card
Power: 70W
Cooling: Active
PCI Express $4.0 \times 16$
Size: 6GB GDDR6
Memory Bandwidth: Up to 288 GB/s
Memory Width: 192-bit
4x mini-DisplayPort ${ }^{\text {TM }} 1.4$ a
Up to 4x $5120 \times 2880 \times 24 \mathrm{bpp}$ @ 60Hz
NVIDIA ${ }^{\circledR}$ Ampere ${ }^{\text {TM }}$
CUDA, OpenCL ${ }^{\text {TM }} 1 . x$

1. RTX A2000 offered as Factory Configured Option does not include a video cable adapter. Video cable adapters must be ordered separately as AMO:
a. 2MY05AA - HP Single miniDP-to-DP Adapter Cable
b. 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables
2. Two mDP-to-DP adapters are included with the RTX A2000 when it is ordered as an AMO kit.

NVIDIA ${ }^{\circledR}$ Quadro ${ }^{\oplus}$ RTX 4000 8GB Graphics

| Form Factor | Full-Height Single Slot (4.4" Height x 9.5" Length) Weight: 550 grams / 1.21 lbs |
| :---: | :---: |
| Graphics Controller | NVIDIA ${ }^{\circledR}$ Quadro ${ }^{\circledR}$ RTX 4000 Graphics <br> GPU: 2304 NVIDIA ${ }^{\circledR}$ CUDA ${ }^{\circledR}$ Parallel Processing Cores <br> Power: 160 Watts <br> Cooling: Active |
| Memory | 8GB GDDR6 memory Memory Bandwidth: Up to 416 GB/s Memory Width: 384 bit |
| Connectors | 3x DP 1.4a and VirtualLink <br> Quadro Sync connector (compatible with Quadro II Sync) One 8-pin auxiliary power connector <br> Factory configured option: No video cable adapter included with card. <br> After market option Kit: No video cable adaptor included with card. <br> DVI to VGA, DisplayPort ${ }^{\text {TM }}$ to VGA, DisplayPort ${ }^{\text {TM }}$ to DVI, and DisplayPort ${ }^{\text {M }}$ to Dual-Link DVI adapters available as accessories. |
| Maximum Resolution | $7680 \times 4320$ @ 60Hz |
| Image Quality Features | Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component. <br> HDCP 2.2 support over DisplayPort ${ }^{\text {TM }}$, DVI, and HDMI connectors <br> NVIDIA ${ }^{\oplus}$ 3D Vision ${ }^{\text {TM }}$ and other 3D stereo technologies NVIDIA ${ }^{\oplus}$ Mosaic and nView |
| Display Outputs ${ }^{1}$ | $3 \times$ DP 1.4a and VirtualLink ( $7680 \times 4320$ @ 60Hz) |
| Supported Graphics APIs | DirectX ${ }^{\circ} 12$, OpenGL ${ }^{\circ} 4.5$, OpenCL ${ }^{\text {TM }} 1.0$, Vulkan $^{\text {TM }} 1.0$ Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL ${ }^{\text {TM }}$, Java, Python, and Fortran |
| Available Graphics Drivers | Windows 11 <br> Windows 10 <br> Windows 7 |

## Technical Specifications - Graphics

NVIDIA® Quadro ${ }^{\oplus}$ RTX 5000 16GB Graphics

## Form Factor

Graphics Controller

Memory

$\begin{array}{ll}\text { Connectors } & 4 x \text { DP 1.4a and VirtualLink } \\ & \text { Quadro Sync connector (compatible with Quadro II Sync) }\end{array}$
One 8-pin + 6-pin auxiliary power connector
Factory configured option: No video cable adapter included with card.
After market option Kit: No video cable adaptor included with card.
DVI to VGA, DisplayPort ${ }^{\text {TM }}$ to VGA, DisplayPort ${ }^{\text {TM }}$ to DVI, and DisplayPort ${ }^{\text {TM }}$ to Dual-Link DVI adapters available as accessories.

Maximum Resolution $7680 \times 4320$ @ 60Hz

Image Quality Features Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component.
HDCP 2.2 support over DisplayPort ${ }^{\text {TM }}$, DVI, and HDMI connectors
NVIDIA ${ }^{\oplus}$ 3D Vision ${ }^{\text {M }}$ and other 3D stereo technologies NVIDIA ${ }^{\oplus}$ Mosaic and nView
Display Outputs ${ }^{1}$ 4x DP 1.4a and VirtualLink (7680x4320 @ 60Hz)
Supported Graphics $\quad$ DirectX ${ }^{\circ} 12$, OpenGL ${ }^{\circ} 4.5$, OpenCL ${ }^{\text {TM }} 1.0$, Vulkan $^{\text {TM }} 1.0$
Full-Height Dual Slot (4.4" Height x 10.5" Length)
Weight: 1050 grams / 2.31 lbs
NVIDIA ${ }^{\oplus}$ Quadro ${ }^{\circledR}$ RTX 5000 Graphics GPU: 3072 NVIDIA ${ }^{\oplus}$ CUDA ${ }^{\oplus}$ Parallel Processing Cores
Power: 265 Watts
Cooling: Active

16GB GDDR6 memory
Memory Bandwidth: Up to 448 GB/s
Memory Width: 384 bit

Maximum Resolution 7680x4320@60Hz

## APIs

Developer API support includes: CUDA C, CUDA C++, DirectCompute

Linux ${ }^{\circledR}$ 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 <br> 1- Supports up to a total of 4 displays

 5.0, OpenCL ${ }^{\text {TM }}$, Java, Python, and Fortran
## Technical Specifications - Graphics

| Available Graphics | Windows 11 |
| :--- | :--- |
| Drivers | Windows 10 |
|  | Windows 7 |
|  | Linux ${ }^{\circledR}$ 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 ${ }^{\circledR}$ Quadro ${ }^{\oplus}$ RTX

 6000 24GB GraphicsFull-Height Dual Slot (4.4" Height x 10.5" Length)
Weight: 1070 grams / 2.35 lbs
Graphics Controller
$\begin{array}{ll}\text { Memory } & \begin{array}{l}\text { 24GB GDDR6 memory } \\ \text { Memory Bandwidth: Up to } 672 \mathrm{~GB} / \mathrm{s} \\ \text { Memory Width: } 384 \text { bit }\end{array} \\ \text { Connectors } & \begin{array}{l}\text { 4x DP 1.4a and VirtualLink } \\ \text { Quadro Sync connector (compatible with Quadro II Sync) } \\ \text { One 8-pin + 6-pin auxiliary power connector }\end{array}\end{array}$
Factory configured option: No video cable adapter included with card.
After market option Kit: No video cable adaptor included with card.
DVI to VGA, DisplayPort ${ }^{\text {TM }}$ to VGA, DisplayPort ${ }^{\text {TM }}$ to DVI, and DisplayPort ${ }^{T M}$ to Dual-Link DVI adapters available as accessories.

Maximum Resolution 7680x4320 @ 60Hz

Image Quality Features Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component.
HDCP 2.2 support over DisplayPort ${ }^{\text {TM }}$, DVI, and HDMI connectors
NVIDIA ${ }^{\oplus}$ 3D Vision ${ }^{\text {TM }}$ and other 3D stereo technologies NVIDIA ${ }^{\oplus}$ Mosaic and nView
Display Outputs ${ }^{1}$ 4x DP 1.4a and VirtualLink ( $7680 \times 4320$ @ 60Hz)

## Technical Specifications - Graphics

|  | Supported Graphics APIs | Direct ${ }^{\circ} 12$, OpenGL ${ }^{\circ} 4.5$, OpenCL ${ }^{\text {TM }} 1.0$, Vulkan $^{\text {TM }} 1.0$ Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL ${ }^{\text {TM }}$, Java, Python, and Fortran |
| :---: | :---: | :---: |
|  | Available Graphics | Windows 11 |
|  | Drivers | Windows 10 |
|  |  | Windows 7 |
|  |  | Linux ${ }^{\text {6 }}$ 6-bit |
|  |  | HP qualified drivers may be preloaded or available from the HP support Web site: <br> http://welcome.hp.com/country/us/en/support.html |
|  | Notes | 1- Supports up to a total of 4 displays |
| NVIDIA ${ }^{\oplus}$ RTX A4000 | Form Factor | Full-Height Single Slot (4.4" Height x 9.5" Length) |
|  | Graphics Controller | NVIDIA ${ }^{\text {® }}$ RTX A4000 Graphics |
|  |  | GPU: 6144 NVIDIA® ${ }^{\text {CUDA }}{ }^{\oplus}$ Parallel Processing Cores |
|  |  | Power: 140 Watts |
|  |  | Cooling: Active |
|  | Memory | 16GB GDDR6 memory |
|  |  | Memory Bandwidth: Up to $448 \mathrm{~GB} / \mathrm{s}$ |
|  |  | Memory Width: 256 bit |
|  | Connectors | 4x DP |
|  |  | One 6-pin auxiliary power connector |
|  |  | Factory configured option: No video cable adapter included with card. |
|  |  | After market option Kit: No video cable adaptor included with card. |
|  |  | DVI to VGA, DisplayPort ${ }^{\text {TM }}$ to VGA, DisplayPort ${ }^{\text {TM }}$ to DVI, and |
|  |  | DisplayPort ${ }^{\text {TM }}$ to Dual-Link DVI adapters available as accessories. |
|  | Maximum Resolution | 7680x4320 @ 60Hz |
|  | Display Outputs ${ }^{1}$ | 4x DP |
|  | Supported Graphics | Direct ${ }^{\text {® }} 12$, OpenGL ${ }^{\circ} 4.5$, OpenCL ${ }^{\text {TM }} 1.0$, Vulkan ${ }^{\text {TM }} 1.0$ |
|  | APIs | Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL ${ }^{\text {TM }}$, Java, Python, and Fortran |
|  | Available Graphics | Windows 11 |
|  | Drivers | Windows 10 |
|  |  | Linux ${ }^{\text {® }}$ 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

NVIDIA ${ }^{\oplus}$ RTX A4500
Form Factor
Graphics Controller

Memory
Memory Bandwidth: Up to 640 GB/s
Memory Width: 320 bit

Connectors 4x DP
One 8-pin auxiliary power connector
Factory configured option: No video cable adapter included with card.
After market option Kit: No video cable adaptor included with card.
DVI to VGA, DisplayPort ${ }^{\text {TM }}$ to VGA, DisplayPort ${ }^{\text {TM }}$ to DVI, and DisplayPort ${ }^{\text {TM }}$ to Dual-Link DVI adapters available as accessories.

Maximum Resolution $7680 \times 4320$ @ 60Hz
Display Outputs ${ }^{1} \quad 4 \times$ DP
Supported Graphics $\quad$ Direct $X^{\circ} 12$, OpenGL ${ }^{\circ} 4.5$, OpenCL ${ }^{\text {TM }} 1.0$, Vulkan $^{\text {TM }} 1.0$
APIs

Available Graphics
Drivers
Full-Height Dual Slot (4.4" Height x 10.5" Length)

NVIDIA ${ }^{\circledR}$ RTX A4500 Graphics GPU: 7168 NVIDIA ${ }^{\circledR}$ CUDA ${ }^{\circledR}$ Parallel Processing Cores Power: 200 Watts Cooling: Active
20GB GDDR6 memory

Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL ${ }^{\text {TM }}$, Java, Python, and Fortran

Windows 11
Windows 10
Linux ${ }^{\circledR}$ 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

NVIDIA ${ }^{\oplus}$ RTX A5000 Form Factor
24GB Graphics

Form Factor
Graphics Controller

Full-Height Dual Slot (4.4" Height $\times 10.5$ " Length)
Weight: 1049 grams + 80 grams extender
NVIDIA ${ }^{\oplus}$ RTX A5000
GPU: 8192 CUDA Cores

## Technical Specifications - Graphics

\(\left.$$
\begin{array}{ll} & \begin{array}{l}\text { Power: 230W } \\
\text { Cooling: Active }\end{array}
$$ <br>
Memory \& 24GB GDDR6 <br>
Memory Bandwidth: Up to 768GB/s <br>

ECC Memory (disabled by default)\end{array}\right]\)|  |  |
| :--- | :--- |
| Connectors | DP (x4) with HDR support |
| One 8-pin auxiliary power connector |  |

NVIDIA ${ }^{\oplus}$ RTX ${ }^{T M}$ A6000 48GB Graphics

| Form Factor | Full-Height Dual Slot (4.4" Height x 10.5" Length) <br> Weight: 1230 grams / 2.71 lbs (with extender) |
| :--- | :--- |
|  |  |
| Graphics Controller | NVIDIA® RTXTM A6000 Graphics |
|  | GPU: 10752 NVIDIA ${ }^{\text {® }}$ CUDA ${ }^{\oplus}$ Parallel Processing Cores |
|  | Power: 300 Watts |
| Cooling: Active |  |
|  | 48GB GDDR6 memory |
|  | ECC optional |
|  | Memory Bandwidth: Up to $768 \mathrm{~GB} / \mathrm{s}$ |
|  | Memory Width: 384 bit |

## Technical Specifications - Graphics

| Connectors | 4x DP 1.4a |
| :---: | :---: |
|  | Quadro Sync II connector |
|  | Ampere NVLink ${ }^{\circledR}$ |
|  | Stereo Sync |
|  | Requires 8-pin CPU auxiliary power |
| Maximum Resolution | $5120 \times 2880$ @ 60Hz (up to 4 displays) |
| Display Outputs | 4x DP 1.4 (7680x4320 @ 60Hz) |
| Supported Graphics APIs | Direct ${ }^{\oplus} 12$, OpenGL ${ }^{\oplus} 4.6$, OpenCL ${ }^{\text {™ }} 1.0$, Vulkan $^{\text {™ }} 1.0$ |
|  | Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, |
| Available Graphics Drivers | Windows 11 |
|  | Windows 10 |
|  | Linux ${ }^{\text {® }}$ 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 |
| Form Factor | Full-Height Dual Slot (4.4" Height x 10.5" Length) |
|  | Weight: 1070 grams / 2.35 lbs |
| Graphics Controller | NVIDIA ${ }^{\circledR}$ Quadro ${ }^{\text {® }}$ RTX 8000 Graphics |
|  | GPU: 4608 NVIDIA ${ }^{\circledR}$ CUDA ${ }^{\circledR}$ Parallel Processing Cores |
|  | Power: 295 Watts |
|  | Cooling: Active |
| Memory | 48GB GDDR6 memory |
|  | Memory Bandwidth: Up to 672 GB/s |
|  | Memory Width: 384 bit |
| Connectors | 4x DP 1.4a and VirtualLink |
|  | Quadro Sync connector (compatible with Quadro II Sync) |
|  | One 8-pin + 6-pin auxiliary power connector |
|  | Factory configured option: No video cable adapter included with card. |
|  | After market option Kit: No video cable adaptor included with card. |
|  | DVI to VGA, DisplayPort ${ }^{\text {TM }}$ to VGA, DisplayPort ${ }^{\text {TM }}$ to DVI, and DisplayPort ${ }^{\text {TM }}$ to |
|  | Dual-Link DVI adapters available as accessories. |
| Maximum Resolution | 7680x4320 @ 60Hz |

## Technical Specifications - Graphics

| Image Quality Features | Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component. <br> HDCP 2.2 support over DisplayPort ${ }^{\text {TM }}$, DVI, and HDMI connectors <br> NVIDIA ${ }^{\circledR}$ 3D Vision ${ }^{\text {TM }}$ and other 3D stereo technologies NVIDIA ${ }^{\circledR}$ Mosaic and nView |
| :---: | :---: |
| Display Outputs ${ }^{1}$ | 4x DP 1.4a and VirtualLink (7680x4320 @ 60Hz) |
| Supported Graphics APIs | DirectX ${ }^{\circ} 12$, OpenGL ${ }^{\circ} 4.5$, OpenCL $^{\text {TM }} 1.0$, Vulkan $^{\text {TM }} 1.0$ <br> Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran |
| Available Graphics Drivers | Windows 11 <br> Windows 10 <br> Linux ${ }^{\circledR}$ 64-bit |
|  | HP qualified drivers may be preloaded or available from the HP support Web site: <br> http://welcome.hp.com/country/us/en/support.html |
| Notes | 1- Supports up to a total of 4 displays <br> 2- VirtualLink's USB-C™ (data) cannot be disabled at a hardware level |

## AMD Radeon ${ }^{\text {TM }}$ Pro W5500 8GB

Form Factor
Graphics Controller
Memory
Display Output

Max Displays: 4
Video Outputs: 4x DisplayPort ${ }^{\text {TM }} 1.4$
Factory Configured: No video cable adapter included After market option kit: No video cable adapter included

Additional DisplayPort ${ }^{\text {TM }}$-to-VGA or DisplayPort ${ }^{\text {TM }}$-to-DVI adapters are available as Factory Configuration or Option Kit accessories.

Maximum Resolution $7690 \times 4320$ resolution @ 60Hz

Software API Support DirectX ${ }^{\circ}$ : 12
OpenGL: 4.6,
OpenCL ${ }^{\text {TM }}: 2.0$

## Technical Specifications - Graphics

|  | Vulkan ${ }^{\text {TM }} 1.1$ |
| :--- | :--- |
| Available Graphics | HP qualified drivers may be preloaded or available from the HP <br> support Web site: <br> http://welcome.hp.com/country/us/en/support.html |
| Drivers |  |


| AMD Radeon ${ }^{\text {TM }}$ Pro | Form Factor | Full-Height Double Slot |
| :---: | :---: | :---: |
|  | Graphics Controller | Architecture: RDNA |
|  |  | GPU: 2304 Stream Processors organized into 36 Compute Units |
|  |  | Power: 205W |
|  |  | Cooling: Active |
|  | Memory | 8GB GDDR6 memory |
|  |  | Memory Bandwidth: up to $448 \mathrm{~GB} / \mathrm{s}$ |
|  |  | Memory Interface: 256-bit |
|  | Display Output | Max Displays: 6 |
|  |  | Video Outputs: 5x Mini-DisplayPort ${ }^{\text {TM }} 1.4$ and 1x USB-C |
|  |  | Factory Configured: No video cable adapter included |
|  |  | After market option kit: No video cable adapter included |
|  |  | Additional DisplayPort ${ }^{\text {TM }}$-to-VGA or DisplayPort ${ }^{\text {TM }}$-to-DVI adapters are available as Factory Configuration or Option Kit accessories. |
|  | Maximum Resolution | $7690 \times 4320$ resolution @ 60Hz |
|  | Software API Support | Direct $X^{\circ}$ : 12 |
|  |  | OpenGL' : 4.6, |
|  |  | OpenCL ${ }^{\text {TM }}$ : 2.0 |
|  |  | Vulkan ${ }^{\text {TM }} 1.1$ |
|  | Available Graphics Drivers | HP qualified drivers may be preloaded or available from the HP support Web site: |
|  |  | http://welcome.hp.com/country/us/en/support.html |

AMD Radeon ${ }^{\text {TM }}$ Pro W6800 32GB

Form Factor

Graphics Controller

Full-Height Double Slot

Architecture: RDNA 2
GPU Cores: 3840
Power: 261W
Cooling: Active fan heatsink

## Technical Specifications - Graphics



| AMD Radeon ${ }^{\text {TM }}$ Pro   <br> W5500 8GB Form Factor Full-Height Single Slot <br>  Graphics Controller Architecture: RDNA <br>   GPU: 1408 Stream Processors organized into 22 Compute Units <br>   Power: 125 W <br> Cooling: Active   |  |  |
| :--- | :--- | :--- |
|  | Memory | 8GB GDDR6 memory |
|  |  | Memory Bandwidth: up to $224 \mathrm{~GB} / \mathrm{s}$ |
|  |  | Memory Interface: 128 -bit |

Technical Specifications - Graphics

| Display Output | Max Displays: 4 <br> Video Outputs: $4 \times$ DisplayPort $^{\text {TM }} 1.4$ |
| :--- | :--- |
|  | Factory Configured: No video cable adapter included <br> After market option kit: No video cable adapter included |
|  | Additional DisplayPort™ <br> are available as Factory Configuration or Option Kit accessories. |
| Maximum Resolution | $7690 \times 4320$ resolution @ 60Hz |


| AMD Radeon ${ }^{\text {™ }}$ Pro | Form Factor | Full-Height Double Slot |
| :---: | :---: | :---: |
|  | Graphics Controller | Architecture: RDNA |
|  |  | GPU: 2304 Stream Processors organized into 36 Compute Units |
|  |  | Power: 205W |
|  |  | Cooling: Active |
|  | Memory | 8GB GDDR6 memory |
|  |  | Memory Bandwidth: up to $448 \mathrm{~GB} / \mathrm{s}$ |
|  |  | Memory Interface: 256-bit |
|  | Display Output | Max Displays: 6 |
|  |  | Video Outputs: $5 \times$ Mini-DisplayPort ${ }^{\text {TM }} 1.4$ and 1x USB-C |
|  |  | Factory Configured: No video cable adapter included |
|  |  | After market option kit: No video cable adapter included |
|  |  | Additional DisplayPort ${ }^{\text {TM }}$-to-VGA or DisplayPort ${ }^{\text {TM }}$-to-DVI adapters are available as Factory Configuration or Option Kit accessories. |
|  | Maximum Resolution | $7690 \times 4320$ resolution @ 60Hz |
|  | Software API Support | Direct ${ }^{\circ}$ : 12 |
|  |  | OpenGL': 4.6, OpenClim. 2.0 |

$$
\text { Vulkan™ } 1.1
$$

Available Graphics Drivers

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

AMD Radeon ${ }^{\text {TM }}$ Pro W6800 32GB
Form Factor Full-Height Double Slot

Graphics Controller Architecture: RDNA 2
GPU Cores: 3840
Power: 261W
Cooling: Active fan heatsink
Memory
32GB GDDR6 memory
ECC Capable: Yes
Memory Bandwidth: up to 512 GB/s
Memory Interface: 256-bit
Display Output Max Displays: 6
Video Output: 6x Mini-DisplayPort ${ }^{\text {TM }} 1.4$ with DSC
Display Configurations: 5K Resolution: 6x @ $5120 \times 2880$ resolution @ 60Hz 8K Resolution: 2x @ $7680 \times 4320$ resolution @60Hz

HDR Support: Yes
8K Support: Yes

Notes: W6800 only has mini-DisplayPort ${ }^{\text {TM }}$ (mDP) video ports

- Configure-to-order must specify AV options to add any required mDP-to-DP Adapters
- Two mDP-to-DP Adapters are included in the RTX A2000 AMO kits
- If more mDP-to-DP Adapters are needed, Adapters can be ordered separately as AMO:
- 2MY05AA - HP Single miniDP-to-DP Adapter Cable
- 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables

Bus Type
Software API Support Direct $^{\oplus}$ : 12
OpenGL: 4.6,
OpenCL ${ }^{\text {TM }}: 2.1$
Vulkan: 1.2

Available Graphics Windows 11
Drivers
Windows 10

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

## Technical Specifications - Graphics

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

## Technical Specifications - Optical and Removable Storage

## OPTICAL AND REMOVABLE STORAGE

HP 9.5mm Slim DVD Writer Description
Mounting Orientation
Interface Type
Dimensions (WxHxD)
Supported Media Types


| Disc Capacity | DVD-ROM | 8.5 GB DL or 4.7 GB standard |
| :---: | :---: | :---: |
|  | Full Stroke DVD | < 200 ms (seek) |
|  | Full Stroke CD | < 200 ms (seek) |
| Maximum Data Transfer Rates | CD ROM Read | CD-ROM, CD-R Up to 24X CD-RW Up to 24X |
|  | DVD ROM Read | DVD+RW Up to 8 X DVD-RW Up to 8 X DVD+RDL Up to 8 X DVD-R DL Up to 8 X DVD-ROM Up to 8 X DVD-ROM DL Up to 8 X DVD+R Up to 8 X DVD-R Up to 8 X |
| Power | Source | SATA DC power receptacle |
|  | DC Power Requirements | $5 \mathrm{VDC} \pm 5 \%-100 \mathrm{mV}$ ripple p-p |
|  | DC Current | 5 VDC - < 800 mA typical, $<1600 \mathrm{~mA}$ maximum |
| Operating Environmental (all conditions noncondensing) | Temperature | $41^{\circ}$ to $122^{\circ} \mathrm{F}\left(5^{\circ}\right.$ to $\left.50^{\circ} \mathrm{C}\right)$ |
|  | Relative Humidity | 10\% to 80\% |
|  | Maximum Wet Bulb Temperature | $84^{\circ} \mathrm{F}\left(29^{\circ} \mathrm{C}\right)$ |
| Operating Systems Supported | Windows 11, Windows 10, Windows 7 Professional 64-bit, Red Hat ${ }^{\oplus}$ Enterprise Linux ${ }^{\oplus}$ (RHEL) WS4**, 5, 6 Desktop/Workstation SUSE Linux ${ }^{\circledR}$ Enterprise Desktop 10 \& 11 |  |
|  | * No driver is required for this devic operating system. | . Native support is provided by the |
| Kit Contents | HP SATA DVD Writer drive, installat | on guide. |

9.5 mm height, tray-load Either horizontal or vertical SATA/ATAPI $128 \times 9.5 \times 127 \mathrm{~mm}$
DVD+R
DVD+RW
DVD+RDL DVD-R DL DVD-R DVD-RW
CD-R
CD-RW

DVD ROM Read

Source
DC Power Requirements
DC Current
Temperature
Relative Humidity

Windows 11, Windows 10, Windows 7 Professional 64-bit, Red Hat ${ }^{\oplus}$ Enterprise Linux ${ }^{\oplus}$ (RHEL) WS4**, 5, 6 Desktop/Workstation SUSE Linux ${ }^{\circledR}$ Enterprise Desktop 10 \& 11

* No driver is required for this device. Native support is provided by the HP SATA DVD Writer drive, installation guide.

HP 9.5mm Slim DVD-ROM Drive

Description
Mounting Orientation Interface Type
9.5 mm height, tray-load

Either horizontal or vertical
SATA / ATAPI

## Technical Specifications - Optical and Removable Storage

| Dimensions (WxHxD) | $128 \times 9.5 \times 127 \mathrm{~mm}$ |  |
| :---: | :---: | :---: |
| 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 | $5 \mathrm{VDC} \pm 5 \%-100 \mathrm{mV}$ ripple p-p |
|  | DC Current | 5 VDC - <800mA typical, < 1600 mA maximum |
| Operating Environmental (all conditions noncondensing) | Temperature | $41^{\circ}$ to $122^{\circ} \mathrm{F}\left(5^{\circ}\right.$ to $\left.50^{\circ} \mathrm{C}\right)$ |
|  | Relative Humidity | 10\% to 80\% |
|  | Maximum Wet Bulb Temperature | $84^{\circ} \mathrm{F}\left(29^{\circ} \mathrm{C}\right)$ |
| Operating Systems Supported | Windows 11, Windows 10, Windows 7 Professional 64-bit Red Hat ${ }^{\oplus}$ Enterprise Linux ${ }^{\oplus}($ RHEL $)$ WS4**, 5, 6 Desktop/Workstation SUSE Linux ${ }^{\oplus}$ 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" data/power cable, installation guid | ODD Bay adapter/carrier, slim SATA |


| HP HH DVD Writer (16X RW DVD-R) | Description <br> Mounting Orientation Interface Type <br> Dimensions (WxHxD) <br> Supported Media Types | HP Half Height DVD Writer Either Horizontal or vertical SATA $146 \times 42 \times 165 \mathrm{~mm}$ DVD+R DVD+RW DVD+R DL DVD-R DL DVD-R DVD-RW <br> CD-R <br> CD-RW |  |
| :---: | :---: | :---: | :---: |
|  | Disc Capacity | DVD-ROM | 8.5 GB DL or 4.7 GB standard |
|  |  | Full Stroke DVD | 5 ms (seek) |
|  |  | Full Stroke CD | 120ms (seek) |
|  | Maximum Data Transfer Rates | CD ROM Read | CD-ROM, CD-R Up to 24X CD-RW Up to 24X |
|  |  | DVD ROM Read | DVD+RW Up to 13X <br> DVD-RW Up to 13X <br> DVD+R DL Up to 12X <br> DVD-R DL Up to 12X <br> DVD-ROM Up to 12X <br> DVD-ROM DL Up to 12X |

## Technical Specifications - Optical and Removable Storage

|  |  |  | $\begin{aligned} & \text { DVD+R Up to } 16 X \\ & \text { DVD-R Up to } 16 X \end{aligned}$ |
| :---: | :---: | :---: | :---: |
|  | Power | Source | SATA DC power receptacle |
|  |  | DC Power Requirements | $\begin{aligned} & 5 \text { VDC } \pm 5 \%-100 \mathrm{mV} \text { ripple p-p } \\ & 12 \text { VDC } \pm 10 \%-200 \mathrm{mV} \text { ripple p-p } \end{aligned}$ |
|  |  | DC Current | 5 VDC -<1500mA typical, <2000 mA maximum. |
|  | Operating Environmental (all conditions noncondensing) | Temperature | $41^{\circ}$ to $122^{\circ} \mathrm{F}\left(5^{\circ}\right.$ to $\left.50^{\circ} \mathrm{C}\right)$ |
|  |  | Relative Humidity | 10\% to 90\% (Non-Condensing) |
|  | Operating Systems Supported | Windows 11, Windows 10, Windows 7 Professional 64-bit. Red Hat Enterprise Linux WS4**,5,6 Desktop/Workstation. |  |
|  |  | No driver is required for this device, Native support is provided by operating system. |  |
|  | Kit Contents | HP SATA DVD Writer drive, Installation guide. |  |
| HP 9.5mm Slim BDXL BluRay Writer | Description | 9.5 mm height, tray-load |  |
|  | Mounting Orientation | Either horizontal or vertical |  |
|  | Interface Type | SATA/ATAPI |  |
|  | Dimensions (WxHxD) | $128 \times 9.5 \times 127 \mathrm{~mm}$ |  |
|  | 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 |
|  |  | 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 / 28 S |
|  |  |  | 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 |

Technical Specifications - Optical and Removable Storage

|  |  | CD-ROM |
| :--- | :--- | :--- |
| Maximum Data <br> Rates |  | CD-ROM, CD-R Up to 24X |

SUSE Linux ${ }^{\circledR}$ Enterprise Desktop 12
No driver is required for this device. Native support is provided by the operating system.
9.5mm Slim BDXL Blu-Ray Writer, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide
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.

| HP SD Card Reader | Description | Supports hardware ECC (Error Correction Code) function <br> Supports hardware CRC (Cyclic Redundancy Check) function |
| :--- | :--- | :--- |
|  |  | Supports SD 4-bit parallel transfer mode |

## Technical Specifications - Optical and Removable Storage

|  | SD Ultra High Speed II(SD UHSII) |
| :--- | :--- |
|  | These additional media types are supported with a card adapter. <br> Memory Stick Micro (M2) <br> miniSD <br> miniSD High Capacity |
|  | Micro SD Memory Card (MicroSD) |
|  | Micro SD High Capacity Memory Card (MicroSDHC) |

## Technical Specifications - Controller Cards

## CONTROLLER CARDS

HP Thunderbolt-3 Dual Data Transfer Rate Port2 PCle 1-port I/O Card Devices Supported

Bus Type
Ports

Internal Connectors
System Requirements
Temperature - Operating
Temperature - Storage
Relative Humidity Operating
Compliances

Operating Systems
Supported
Kit Contents

Supports up to $40 \mathrm{~Gb} / \mathrm{s}(40,000 \mathrm{Mb} / \mathrm{s})$
Thunderbolt ${ }^{T M}$, Thunderbolt ${ }^{T M} 2$ and Thunderbolt ${ }^{T M} 3$ certified for Windows devices
PCle card, full height PCle slots
Two Thunderbolt ${ }^{\text {TM }} 3$ external USB type-C output connectors (Rear) Two full size DisplayPort input connectors (Rear)
One $2 \times 5$-Pin header connector
Windows 11, Windows 10 Professional, available dedicated PCH PCle slot.
$50^{\circ}$ to $131^{\circ} \mathrm{F}\left(10^{\circ}\right.$ to $\left.55^{\circ} \mathrm{C}\right)$
$-22^{\circ}$ to $140^{\circ} \mathrm{F}\left(-30^{\circ}\right.$ to $\left.60^{\circ} \mathrm{C}\right)$
20\% to 80\%

FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC
Windows 11, Windows 10 Professional.
HP Thunderbolt ${ }^{\text {TM }} 3$ Dual Port PCle I/O Card, 2-DisplayPort cables, GPIO (General-Purpose Input/Output) cables, Installation documentation and warranty card.
*Maximum speed requires DisplayPort ${ }^{\text {TM }}$ and PCle aggregation.

## Technical Specifications - Networking and Communications

## NETWORKING AND COMMUNICATIONS

| Integrated Intel ${ }^{\circledR}$ I219LM | Connector | RJ-45 |
| :--- | :--- | :--- |
|  | Controller | Intel ${ }^{\circledR}$ I219LM |
|  | Data Rates Supported | $10 / 100 / 1000$ Mbps |
|  | Boot ROM Support | PXE, UEFI |
|  | Connect Speed LED | Link/Activity LED |
|  | Indicators | $\bullet \quad$ Off = No link |
|  |  | $\bullet \quad$ Blinking = Activity |

## Technical Specifications - Networking and Communications

| System Interface | PCI Express 2.1 x1 |
| :---: | :---: |
| Networking Speeds Supported | $10 \mathrm{Mbps}, 100 \mathrm{Mbps}$, 1Gbps |
| Cabling (up to 100m) | Cat3 (or higher) for 10Mbps Cat5 (or higher) for 100Mbps Cat5e (or higher) for 1 Gbps |
| Power Consumption (active-typical) | 0.81W |
| Physical Dimensions | Length: 6.7 cm (2.64 inches) <br> (Bracket) Width: 1.8 cm ( 0.709 inches) <br> Full-height end bracket: 12.07 cm ( 4.755 inches) <br> Low-profile end bracket: 8 cm (3.15 inches) |
| Connect Speed LED Indicators | Link/Activity LED <br> - Off = No link <br> - Blinking = Activity <br> Speed LED <br> - $\quad$ Off $=10 \mathrm{Mbps}$ <br> - Green $=100 \mathrm{Mbps}$ <br> - Amber $=1 \mathrm{Gbps}$ |
| Operating Temperature | $0^{\circ} \mathrm{C}$ to $55^{\circ} \mathrm{C}\left(32^{\circ} \mathrm{F}\right.$ to $\left.131{ }^{\circ} \mathrm{F}\right)$ |
| Hardware Certifications | USA: FCC B, EU: UL CE, <br> Japan: VCCI, <br> Taiwan: BSMI, <br> Australia/New Zealand: CTICK, <br> Korea: KCC, <br> Canada: ICES-003/NMB-003 |



## 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

| Inte ${ }^{(1) 1350-T 4}$ | Networking Interface | 4 RJ -45 |
| :---: | :---: | :---: |
|  | System Interface | PCI Express $2.1 \times 4$ |
|  | Networking Speeds Supported | $10 \mathrm{Mbps}, 100 \mathrm{Mbps}, 1 \mathrm{Gbps}$ |
|  | Cabling (up to 100m) | Cat3 (or higher) for 10 Mbps |
|  |  | Cat5 (or higher) for 100Mbps |
|  |  | Cat5e (or higher) for 1Gbps |
|  | Power Consumption (active-typical) | 5W |
|  | Physical Dimensions | Length: 13.54 cm ( 5.33 inches) |
|  |  | Width: 6.89 (2.71 inches) |
|  |  | Full-height end bracket: 12.0 cm (4.725 inches) |
|  |  | Low-profile end bracket: 7.92 cm (3.117 inches) |
|  | Connect Speed LED |  |
|  | Indicators | - Off = No link |
|  |  | - Blinking = Activity |
|  |  | Speed LED |
|  |  | - $\quad 0 f f=10 \mathrm{Mbps}$ |
|  |  | - Green $=100 \mathrm{Mbps}$ |
|  |  | - Amber $=1 \mathrm{Gbps}$ |
|  | Operating Temperature | $0^{\circ} \mathrm{C}$ to $55^{\circ} \mathrm{C}\left(32^{\circ} \mathrm{F}\right.$ to $\left.131{ }^{\circ} \mathrm{F}\right)$ |
|  | Hardware Certifications | USA: FCCB, |
|  |  | EU: UL CE, |
|  |  | Japan: VCCI, |
|  |  | Taiwan: BSMI, |
|  |  | Australia/New Zealand: CTICK, |
|  |  | Korea: KCC, |
|  |  | Canada: ICES-003/NMB-003 |

Aquantia ${ }^{\circledR}$ AQN-108

| Networking Interface | RJ-45 |
| :--- | :--- |
| System Interface | PCI Express $3 \times 1$ |
| Networking Speeds <br> Supported | 100Mbps, $1 \mathrm{Gbps}, 2.5 \mathrm{Gbps}, 5 \mathrm{Gbps}$ |
| Cabling (up to 100 m ) <br> Power Consumption <br> (active-typical) | Cat5e (or higher) for all speeds |
| Physical Dimensions |  |



| Intel ${ }^{\text {® }}$ K550-T2 | Networking Interface | $2 \times \mathrm{RJ}-45$ |
| :---: | :---: | :---: |
|  | System Interface | PCIExpress $3 \times 4$ |
|  | Networking Speeds Supported | $100 \mathrm{Mbps}, 1 \mathrm{Gbps}, 2.5 \mathrm{Gbps}, 5 \mathrm{Gbps}, 10 \mathrm{Gbps}$ |
|  | Cabling (up to 100m) | Cat5 (or higher) for 100 Mbps <br> Cat5e (or higher) for $1 \mathrm{Gbps}, 2.5 \mathrm{Gbps}$, or 5Gbps <br> Cat6a (or higher) for 10Gbps |
|  | Power Consumption (active-typical) | 3.9 W at 100 Mbps 5.5 W at 1 Gbps 11.2 W at 10 Gbps |
|  | Physical Dimensions | 5.2 in $\times 2.7$ in (without bracket) |
|  | Connect Speed LED Indicators | Link/Activity LED <br> - $\quad 0 f f=$ No link <br> - Blinking = Activity <br> Speed LED <br> - $\quad$ Off $=$ No link <br> - Amber $=<10 \mathrm{Gbps}$ <br> - Green $=10 \mathrm{Gbps}$ |
|  | Operating Temperature | $0^{\circ} \mathrm{C}$ to $55^{\circ} \mathrm{C}\left(32^{\circ} \mathrm{F}\right.$ to $\left.131{ }^{\circ} \mathrm{F}\right)$ |
|  | Hardware Certifications | USA: FCCB, <br> EU: ULCE, <br> Japan: VCCI, <br> Taiwan: BSMI, <br> Australia/New Zealand: CTICK, <br> Korea: KCC, <br> Canada: ICES-003/NMB-003 |


| Allied Telesis | Network Interface |
| :--- | :--- |
| AT-2914SX/LC-901 1GB | System Interface |
| LC Fiber NIC | Networking Speeds |
|  | Supported |

1Gb LC Fiber 850 nm
PCleG2 x1, Half Height, Half Length
1000Base-X (1Gbps)

## Technical Specifications - Networking and Communications

| Cabling | 50/125 $\mu \mathrm{m}$ (core/cladding) multimode fiber optic cable up to 500 m 62.5/125 $\mu \mathrm{m}$ (core/cladding) multimode fiber optic cable up to 220 m |
| :---: | :---: |
| Power Consumption (active- typical) | 1.5 Watts |
| Physical Dimensions | $8.8 \mathrm{~cm} \times 6.9 \mathrm{~cm}$ (3.5 in $\times 2.7 \mathrm{in}$ ) |
| Connect Speed LED | ON: 1Gbps Link OFF: Link down |
| Indicators |  |
| Operating Temperature | $-25^{\circ} \mathrm{C}$ to $70^{\circ} \mathrm{C}\left(-13^{\circ} \mathrm{F}\right.$ to $\left.158^{\circ} \mathrm{F}\right)$ |
| Hardware Certifications | IEEE 802.1p (Quality of Service), IEEE 802.1Q (VLANs), IEEE 802.2 (LLC), IEEE 802.3ac (MAC), IEEE 802.3x (Flow control auto-negotiation), IEEE $802.3 z$ (1000 Base-X), IEEE 802.3ad (Link aggregation) RoHS, UL, FCC/EN55022 Class A, TUV, EN55024, CE, C-TICK, VCCI |


| Intel ${ }^{\text {® }}$ X710-DA2 | Networking Interface | 2 SFP+ Ports for LC SFP+ Transceivers |
| :---: | :---: | :---: |
| 10GBASE-SR Converged Network Adapter | System Interface | PCI Express $3.0 \times 8$ |
|  | 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 $\times 2.703$ in |
|  | Connect Speed LED Indicators | Link/Activity LED <br> - Off = No link <br> - Blinking = Activity |
|  |  | Speed LED |
|  |  | - $\quad$ Off $=10 \mathrm{Mbps}$ <br> - Green $=100 \mathrm{Mbps}$ |
|  |  | - $\mathrm{Amber}=1 \mathrm{Gbps}$ |
|  | Operating Temperature | $0^{\circ} \mathrm{C}$ to $55^{\circ} \mathrm{C}\left(32^{\circ} \mathrm{F}\right.$ to $\left.131{ }^{\circ} \mathrm{F}\right)$ |
|  | Hardware Certifications | USA: FCC B, EU: UL CE, |
|  |  | Japan: VCCI, |
|  |  | Taiwan: BSMI, |
|  |  | Australia/New Zealand: CTICK, |
|  |  | Korea: KCC, |
|  |  | Canada: ICES-003/NMB-003 |

Note: Windows 7 is NOT supported

| 10GbE SFP+ SR | Connector Type | LC |
| :---: | :---: | :---: |
| Transceiver | 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 | $\begin{aligned} & 0.47(\mathrm{~h}) \times 0.54(\mathrm{w}) \times 2.19(\mathrm{~d}) \text { inches } \\ & (1.19 \times 1.38 \times 5.57 \mathrm{~cm}) \end{aligned}$ |

Technical Specifications - Networking and Communications

|  | Operating Temperature Operating Humidity | OC to 45C (32F to 113F) $0 \%$ to $85 \%$, noncondensing |
| :---: | :---: | :---: |
| Intel ${ }^{\oplus} 8265$ WLAN | Networking Speeds | 802.11 ac 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; $802.11 \mathrm{r}, 802.11 \mathrm{k}, 802.11 \mathrm{v}$ pending |
|  | Bluetooth | 4.2 |
|  | System Interface | PCIExpress $2.1 \times 1$ |
|  | Antenna | $2 \times 2$ |

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, HP DisplayPort to VGA Adapter, NVIDIA SLI 3-slot Graphics Connector and NVIDIA Quadro Sync II to Graphics section and Microsemi 3152-8i SAS ROC RAID Controller |
|  |  | 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, Physical Security and Serviceability sections |
| November 29, 2017 | From v2 to v3 | Added | Processors, hard drives and graphics to offerings, added Declared Noise Emissions information |
| January 30, 2018 | From v3 to v4 | Removed | NVIDIA SLI Graphics Connectors from Graphics Cable Adapters section |
| March 27, 2018 | From v4 to v5 | Added | Intel Xeon processors added |
| April 16, 2018 | From v5 to v6 | Removed | RAID 5 |
| August 13, 2018 | From v6 to v7 | Added | Footnote to Networking and Communications section |
|  |  | Changed | Processors section and Operating Systems section |
| September 4, 2018 | From v7 to v8 | Removed | HP IEEE 1394b FireWire PCIe Card |
| September 6, 2018 | From v8 to v9 | Removed | Microsemi 3152-8i SAS ROC RAID Controller |
| September 21, 2018 | From v9 to v10 | Added | Intel Optane SSD 905p AiC 280GB \& 480GB |
| September 26, 2018 | From v10 to v11 | Changed | NVIDIA Quadro P6000 Graphics specs |
| April 8, 2019 | From v11 to v12 | Added | New Intel Xeon Processors and graphics, added HP DX175 Removable HDD Carrier into the HDD Frame/Carriers section |
|  |  | Changed | Storage / Hard Drives, Memory sections and format changes |
| May 15, 2019 | From v12 to v13 | Added | NVIDIA Quadro RTX 8000 48GB Graphics |
|  |  | Changed | External BIOS simulator link on Physical Security and Serviceability section |
|  |  | Removed | Intel 9260 WLAN |
| June 12, 2019 | From v13 to v14 | Changed | Storage section |
| July 7, 2019 | From v14 to v15 | Added | Intel Xeon W Processors |
| July 15, 2019 | From v15 to v16 | Changed | Corrected Intel 905p Series AIC 480GB PCIe SSD |
| August 1, 2019 | From v16 to v17 | Changed | Processors Matrix |
| September 1, 2019 | From v17 to v18 | Added | Footnote to Memory section, Added Optane 905P 380GB M. 2 SSD Module, HP Z Turbo Drive 1TB SED TLC Z4/Z6 G4 SSD Kit \& module to Storage section, Added Intel ${ }^{\oplus}$ Wi-Fi 6 AX200 \& BT PCle to Networking section |
| October 26, 2019 | From v18 to v19 | Changed | Graphics section |
| November 1, 2019 | From v19 to v20 | Added | NVDIMM Memory sections, Added HP QX310 Removable NVMe Frame/Carrier w/PCle card to Optical and Removable Storage section |
| January 2, 2020 | From v20 to v21 | Changed | Storage section |
| February 26, 2020 | From v21 to v22 | Added | New Intel Xeon Processors |
|  |  | Changed | Overview, PCle Solid State Drives sections |
| April 2, 2020 | From v22 to v23 | Changed | Processors and NVDIMM Memory sections |
| July 18, 2020 | From v23 to v24 | Changed | Processors, Graphics section |
| January 5, 2021 | From v24 to v25 | Changed | Processors, Memory, Graphics, Racking and Physical Security, Operating Systems and Hard Drives sections |
| February 1, 2021 | From v25 to v26 | Changed | NETWORKING AND COMMUNICATIONS section |
| March 1, 2021 | From v26 to v27 | Changed | Overview section |
| April 13, 2021 | From v27 to v28 | Changed | Processors, Graphics and Social and Environmental Responsibility sections |
| May 1,2021 | From v28 to v29 | Changed | Graphics section |
| June 1, 2021 | From v29 to v30 | Changed | Memory and Graphics sections |
| July 1, 2021 | From v30 to v31 | Changed | Graphics section |
| August 1, 2021 | From v31 to v32 | Changed | Graphics section |
| September 1, 2021 | From v32 to v33 | Changed | Input Devices and Graphics sections |
| October 1, 2021 | From v33 to v34 | Changed | Graphics and System Board sections |

## Summary of Changes

| November 1, 2021 | From v34 to v35 | Changed | Processors and Graphics sections |
| :--- | :--- | :--- | :--- |
| December 1, 2021 | From v35 to v36 | Changed | Operating Systems, Graphics, Networking and Communications and Input <br> Devices sections |
| December 15, 2021 | From v36 to v37 | Changed | OPERATING SYSTEM and Social and Environmental Responsibility sections |
| January 1, 2022 | From v37 to v38 | Changed | Graphics, OPERATING SYSTEM and Application Software sections |

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