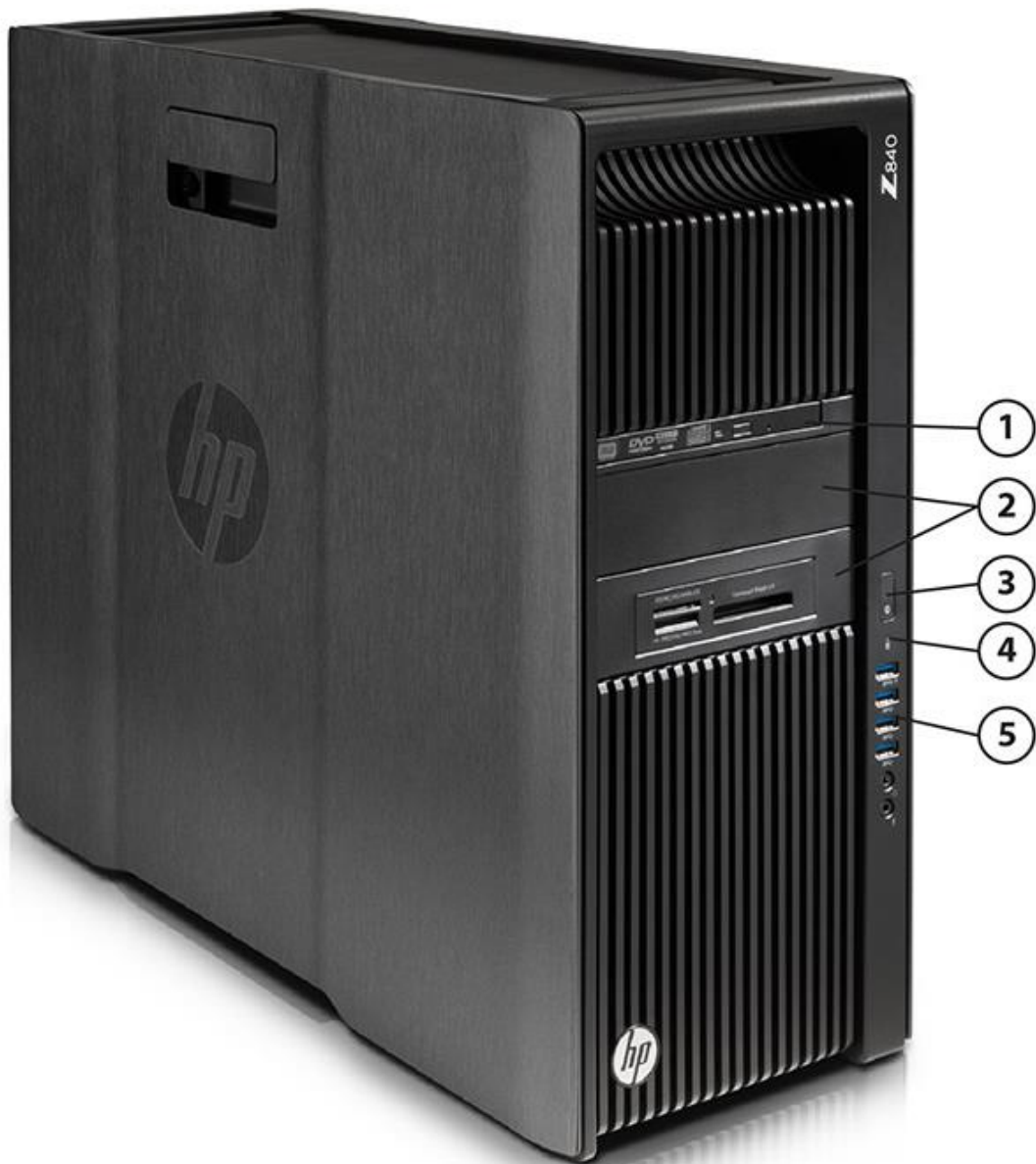


Overview

HP Z840 Workstation



- | | |
|-------------------------------|---|
| 1. Slimline Optical Drive Bay | 4. HDD Activity LED |
| 2. 2 External 5.25" Bays | 5. Front I/O: 4 USB 3.0 (Top Port has Charging Capability), 1 Headset, 1 Microphone |
| 3. Power Button | |

Overview



6. Choice of 850W, 88% or 1125W, 90% Efficient Power Supplies

7. 16 DIMM Slots for DDR4 ECC Memory

8. 2 External 5.25" Bays

9. 4 Internal 3.5" Bays

10. Rear I/O:

Rear Power Button

4 USB 3.0

2 USB 2.0

1 Serial

PS/2 keyboard and mouse

2 RJ-45 to integrated Gigabit LAN

1 Audio Line-In (can be retasked as microphone)

1 Audio Line-Out

11. 2 Intel Xeon Processors E5-2600 v3/v4 family

12.

- Slot 1: PCIe Gen3 x4
- Slot 2: PCIe Gen3 x16
- Slot 3: PCIe Gen3 x8 - Available ONLY when 2nd processor is installed
- Slot 4: PCIe Gen3 x16 - Available ONLY when 2nd processor is installed
- Slot 5: PCIe Gen2 x4 when 1 CPU is installed. Transforms to PCIe Gen3 x8 when 2nd CPU is installed
- Slot 6: PCIe Gen3 x16
- Slot 7: PCIe Gen2 x1

13. 6 SATA, 8 SAS Ports

14. 2 USB 2.0 Port, 1 USB 3.0 Port

Overview

Overview

Form Factor

Rackable Tower

Operating Systems

Preinstalled:

- Windows 10 Pro 64-bit
- Windows 10 Pro 64 to Windows 7 Professional 64-bit
- Windows 10 Home 64 High-end
- Windows 7 Professional 64-bit
- Windows 8.1 Pro 64-bit OS
- Ubuntu 14.04
- HP Installer Kit for Linux (includes drivers for 64-bit OS versions of RHEL 6 & 7, SUSE Linux Enterprise Desktop 11 and Ubuntu 14.04)
- Red Hat Enterprise Linux Desktop (RHEL) Workstation (Paper license with 1 year support; no preinstalled OS)

Supported:

- Windows 8/8.1 Enterprise 64-bit
- Windows 7 Enterprise 64-bit
- Red Hat Enterprise Linux Desktop 6, 7
- SUSE Linux Enterprise Desktop 11 SP3, 12

NOTES: For detailed OS/hardware support information for Linux, see:

http://www.hp.com/support/linux_hardware_matrix

Available Processors

Name	Clock Speed (GHz)	Cores	Cache (MB)	Memory Speed (MT/s)	QPI Speed (GT/s)	Hyper Threading	Featuring Intel® vPro™ Technology	Intel® Turbo Boost Technology ¹	TDP (W)
Intel® Xeon® E5-2643 v3 processor	3.4	6	20	2133	9.6	YES	YES	2/3	135
Intel® Xeon® E5-2630 v3 processor	2.4	8	20	1866	8.0	YES	YES	2/8	85
Intel® Xeon® E5-2620 v3 processor	2.4	6	15	1866	8.0	YES	YES	2/8	85
Intel® Xeon® E5-2699 v4 processor	2.2	22	55	2400	9.6	YES	YES	YES	145
Intel® Xeon® E5-2697 v4 processor	2.3	18	45	2400	9.6	YES	YES	YES	145
Intel® Xeon® E5-2695 v4 processor	2.1	18	45	2400	9.6	YES	YES	YES	120
Intel® Xeon® E5-2687W v4 processor	3.0	12	30	2400	9.6	YES	YES	YES	160
Intel® Xeon® E5-2690 v4 processor	2.6	14	35	2400	9.6	YES	YES	YES	135
Intel® Xeon® E5-2667 v4 processor	3.2	8	25	2400	9.6	YES	YES	YES	135
Intel® Xeon® E5-2683 v4 processor	2.1	16	40	2400	9.6	YES	YES	YES	120
Intel® Xeon® E5-2680 v4 processor	2.4	14	35	2400	9.6	YES	YES	YES	120
Intel® Xeon® E5-2643 v4 processor	3.4	6	20	2400	9.6	YES	YES	YES	135
Intel® Xeon® E5-2660 v4 processor	2.0	14	35	2400	9.6	YES	YES	YES	105
Intel® Xeon® E5-2650 v4 processor	2.2	12	30	2400	9.6	YES	YES	YES	105

Overview

Intel® Xeon® E5-2637 v4 processor	3.5	4	15	2400	9.6	YES	YES	YES	135
Intel® Xeon® E5-2640 v4 processor	2.4	10	25	2133	8.0	YES	YES	YES	90
Intel® Xeon® E5-2630 v4 processor	2.2	10	25	2133	8.0	YES	YES	YES	85
Intel® Xeon® E5-2623 v4 processor	2.6	4	10	2133	8.0	YES	YES	YES	85
Intel® Xeon® E5-2620 v4 processor	2.1	8	20	2133	8.0	YES	YES	YES	85
Intel® Xeon® E5-2609 v4 processor	1.7	8	20	1866	6.4	NO	NO	N/A	85
Intel® Xeon® E5-2603 v4 processor	1.7	6	15	1866	6.4	NO	NO	N/A	85

¹The specifications shown in this column represent the following: (all core maximum turbo steps, one core maximum turbo steps). Turbo boost stepping occurs in 100MHz increments. Processors that do not have turbo functionality are denoted as N/A. E5-2687Wv3, E5-2690v3, E5-2695v3, E5-2697v3 and E5-2699v3 REQUIRE the 1125W (1450W at 200V Input Voltage) Power Supply Option.

Disclaimers

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. See: http://www.intel.com/products/processor_number/ for details.

Quad-Core, Six-Core, Eight-Core, 10-Core, 12-Core, 14-Core, 16-Core, 18-core and 22-Core technologies are designed to improve performance of multithreaded software products and hardware-aware multitasking operating systems and may require appropriate operating system software for full benefits; check with software provider to determine suitability; Not all customers or software applications will necessarily benefit from use of these technologies.

64-bit computing on Intel® 64 architecture requires a computer system with a processor, chipset, BIOS, operating system, device drivers, and applications enabled for Intel® 64 architecture. Processors will not operate (including 32-bit operation) without an Intel® 64 architecture-enabled BIOS. Performance will vary depending on your hardware and software configurations. See: <http://www.intel.com/info/em64t> for more information.

Intel® Xeon® processors E5-2643v3 REQUIRES the 1125W (1450W at 200V Input Voltage) Power Supply Option.

Intel® Xeon® processors E5-2637v4, E5-2643v4, E5-2680v4, E5-2683v4, E5-2667v4, E5-2687Wv4, E5-2690v4, E5-2695v4, E5-2697v4 and E5-2699v4 REQUIRE the 1125W (1450W at 200V Input Voltage) Power Supply Option.

Form Factor

Tower

Color

Black /Hematite

I/O Slots (see system board section for more details)

Slot 1: PCIe Gen3 x4
 Slot 2: PCIe Gen3 x16
 Slot 3: Gen3 x8 - Available ONLY when 2nd processor is installed
 Slot 4: Gen3 x16 - Available ONLY when 2nd processor is installed
 Slot 5: PCIe Gen2 x4 when 1 CPU is installed. Transforms to PCIe Gen3 x8 when 2nd CPU is installed
 Slot 6: PCIe Gen3 x16
 Slot 7: PCIe Gen 2x1

The PCIe x8 connectors are open ended, allowing a PCIe x16 card to be seated in the slot.

Overview

Bays (see storage section for more details)	Total Bays = 7 4 Internal 3.5" storage bays 2 External 5.25" bays 1 External Slim-line Optical bay
Internal Bays	4 internal 3.5" bays (All 4 include acoustic dampening rail assemblies)
External Bays	2 external 5.25" bays <ul style="list-style-type: none">• Top bay device depth limit: 206mm• Bottom bay device depth limit: 206mm
Front I/O	<ul style="list-style-type: none">• 4 USB 3.0• 1 Combo Headset• 1 Microphone
Rear I/O	<ul style="list-style-type: none">• 4 USB 3.0• 2 USB 2.0• 1 Serial• PS/2 keyboard and mouse• 2 RJ-45 to integrated Gigabit LAN• 1 Audio Line-In (can be retasked as microphone)• 1 Audio Line-Out
Internal USB	<ul style="list-style-type: none">• 2 USB 2.0 ports available with a single 2x5 header.• 1 USB 3.0 port available with a shrouded 20-pin connector.

The 2x5 header can be converted to a standard (Type-A) USB connector through the use one HP Internal USB Port Kit (EM165AA). This port kit uses one half of the 2x5 header.

Chassis Dimensions (H x W x D)	Footprint Dimensions: H: 17.5" [444.5mm] W: 8.0" [203.2mm] D: 20.7" [525.8mm] (measured to the rear of service panel) Maximum Dimensions: H: 17.5" [444.5mm] W: 8.0" [203.2mm] D: 20.9" [530.9mm] (measured to the embossment for the rear chassis fans) Rack Dimensions: 5U
---------------------------------------	--

System Weight	Exact weights depend upon configuration. <ul style="list-style-type: none">• Minimum config: 21.1kg (46.7lbs.)• Typical config: 22.8kg (50.4lbs.)• Maximum config: 29.2kg (64.3lbs.)
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Temperature	Operating: 5° to 35°C (40° to 95°F) Non-operating: -40° to 70°C (-40° to 158°F)
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Humidity	Operating: 8% to 85% Non-operating: 8% to 90%
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Overview

Operating: 3,000 m; 10,000 feet
Non-operating: 9,100 m; 30,000 feet

Maximum Altitude (non-pressurized) Operating: 3,048m (10,000feet)
Non-operating: 9,100m (30,000feet)

Power Supply Choice of:

- 850W 88% Efficient wide-ranging, active Power Factor Correction
- 1125W 90% Efficient wide-ranging, active Power Factor Correction

Includes three 6-pin graphics power cables.

NOTE: The 1125W (1450W at 200V Input Voltage) power supply can also supply 1275W of output power when the input voltage is greater than 105V. If the input voltage is less than 105V, but greater than 90V for any reason, the maximum power that can be drawn is 1125W. An uninterruptible power supply (UPS) is highly recommended if 1275W output power is desired.

The 1125W Power Supply can also supply 1450W of output power when the input voltage is greater than 200V under all conditions.

The Z820 power supply efficiency reports can be found at these links:

850W - http://www.plugloadsolutions.com/psu_reports/HEWLETT%20PACKARD_719798-001_850W_ECOS%203882_Report.pdf

1125W - http://www.plugloadsolutions.com/psu_reports/HEWLETT%20PACKARD_719799-001_1125W_ECOS%203883_Report.pdf

Interfaces Supported

- 6 channel SATA 6.0 Gb/s interface
- 8-channel 6 Gb SAS interface
 - 8 SAS connectors on the motherboard, SAS ports can be ported externally by using the SAS Bulkhead and/or Back Panel connector Kits
- Factory integrated RAID available for SATA/SAS drives (RAID 0, 0 Data, 1, 5, and 10)
- USB 3.0, USB 2.0

Hard Drive Controller Supported SATA and SAS controllers

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

Supported Components

Processors*

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Z840 Intel® Xeon® E5-2600 v3 Series CPU				
Xeon E5-2620 v3 2.4 1866 6C CPU	Y	Y	J9V75AA	
Xeon E5-2630 v3 2.4 1866 8C CPU	Y	Y	J9Q17AA	
Xeon E5-2643 v3 3.4 2133 6C CPU	Y	Y	J9Q12AA	
Z840 Intel® Xeon® E5-2600 v4 Series CPU				
Z840 Xeon E5-2623 v4 2.6 2133 4C 2ndCPU	Y	Y	T9U30AA	
Z840 Xeon E5-2620 v4 2.1 2133 8C 2ndCPU	Y	Y	T9U29AA	
Z840 Xeon E5-2637 v4 3.5 2400 4C 2ndCPU	Y	Y	T9U32AA	
Z840 Xeon E5-2699 v4 2.2 2400 22C 2ndCPU	Y	Y	T9U44AA	
Z840 Xeon E5-2697 v4 2.3 2400 18C 2ndCPU	Y	Y	T9U43AA	
Z840 Xeon E5-2683 v4 2.1 2400 16C 2ndCPU	Y	Y	T9U39AA	
Z840 Xeon E5-2680 v4 2.4 2400 14C 2ndCPU	Y	Y	T9U38AA	
Z840 Xeon E5-2643 v4 3.4 2400 6C 2ndCPU	Y	Y	T9U34AA	
Z840 Xeon E5-2640 v4 2.4 2133 10C 2ndCPU	Y	Y	T9U33AA	
Z840 Xeon E5-2609 v4 1.7 1866 8C 2ndCPU	Y	Y	T9U28AA	
Z840 Xeon E5-2603 v4 1.7 1866 6C 2ndCPU	Y	Y	T9U27AA	
Z840 Xeon E5-2690 v4 2.6 2400 14C 2ndCPU	Y	Y	T9U41AA	
Z840 Xeon E5-2650 v4 2.2 2400 12C 2ndCPU	Y	Y	T9U35AA	
Z840 Xeon E5-2630 v4 2.2 2133 10C 2ndCPU	Y	Y	T9U31AA	
Z840 Xeon E5-2687W v4 3.0 2400 12C 2ndCPU	Y	Y	T9U40AA	
Z840 Xeon E5-2660 v4 2.0 2400 14C 2ndCPU	Y	Y	T9U36AA	
Z840 Xeon E5-2667 v4 3.2 2400 8C 2ndCPU	Y	Y	T9U37AA	
Z840 Xeon E5-2695 v4 2.1 2400 18C 2ndCPU	Y	Y	T9U42AA	

Intel® Xeon® processors E5-2643v3 REQUIRES the 1125W (1450W at 200V Input Voltage) Power Supply Option.

Intel® Xeon® processors E5-2637v4, E5-2643v4, E5-2680v4, E5-2683v4, E5-2667v4, E5-2687Wv4, E5-2690v4, E5-2695v4, E5-2697v4 and E5-2699v4 require the 1125W (1450W at 200V Input Voltage) Power Supply Option.

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.

Monitors / Displays

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Z Display Z22i 21.5-inch IPS LED Backlit Monitor			D7Q14A8	
HP Z Display Z23i 23-inch IPS LED Backlit Monitor			D7Q13A8	
HP Z Display Z24i 24-inch IPS LED Backlit Monitor			D7P53A8	
HP Z Display Z27i 27-inch IPS LED Backlit Monitor			D7P92A8	

Supported Components

HP Z Display Z30i 30-inch IPS LED Backlit Monitor	D7P94A8
HP DreamColor LP2480zx Professional Display	GV546A8
HP DreamColor Z24x Professional Display	E9Q82A8
HP DreamColor Z27x Professional Display	D7R00A8

Storage / Hard Drives

Sub-Section Description/Notes

NOTES: NCQ (Native Command Queuing) not supported in Red Hat Enterprise Linux
For hard drives, 1 GB = 1 billion bytes; TB = 1 trillion bytes. Actual formatted capacity is less. Up to 12 GB of hard drive (or system disk) is reserved for the system recovery software (XP and XP Pro). Up to 3 GB of system disk is reserved for system recovery software (Vista).

SAS Hard Drives

SAS Hard Drives for HP Workstations	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
300GB SAS 15K rpm 6Gb/s 3.5" HDD	Y	Y	LU967AA	
HP 300GB SAS 10K SFF HDD	Y	Y	A2Z20AA	
HP 600GB SAS 10K SFF HDD	Y	Y	A2Z21AA	
HP 1.2TB SAS 10K SFF HDD	Y	Y	E2P04AA	
Up to 5 3.5" SATA drives supported Up to 5 3.5" SAS drives supported				
Up to 8 2.5" (SFF) SAS drives with the High Density Storage Option or Up to 8 2.5" (SFF) SATA 2.5" drives with the High Density Storage Option 8 port SAS Controller included on the system board				

SATA Hard Drives

SATA Hard Drives for HP Workstations	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
4TB SATA 7200 rpm 6Gb/s 3.5" HDD HDD (Enterprise Class)	Y	Y	K4T76AA	
3.0TB* SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	QF298AA	
2.0TB* SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	QB576AA	
1TB* SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	LQ037AA	
1TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	Y	Y	W0R10AA	
500GB* SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	LQ036AA	
500GB* SATA 7.2K SED SFF HDD	Y	N	(not available today as After Market Option)	
1TB SATA 7200 rpm 8GB 3.5" SSHD (hybrid)	Y	Y	M7S54AA	
Up to 5 3.5" SATA drives supported Up to 5 3.5" SAS drives supported				
Up to 8 2.5" (SFF) SAS drives with the High Density Storage Option or Up to 8 2.5" (SFF) SATA 2.5" drives with the High Density Storage Option Up to 5 3.5" SATA drives supported				

Supported Components

Up to 5 3.5" SAS drives supported

Up to 8 2.5" (SFF) SAS drives with the High Density Storage Option or
Up to 8 2.5" (SFF) SATA 2.5" drives with the High Density Storage Option

SATA Solid State Drives	SATA SSDs for HP Workstations	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
	HP 128GB* SATA 6Gb/s SSD	Y	Y	A3D25AA	
	HP 256GB* SATA 6Gb/s SSD	Y	Y	A3D26AA	
	HP 512GB* SATA 6Gb/s SSD	Y	Y	D8F30AA	
	HP 1TB* SATA 6Gb/s SSD	Y	Y	F3C96AA	
	HP 2TB SATA 6Gb/s SSD	Y	Y	Y6P08AA	
	HP Enterprise Class 240GB SATA SSD	Y	Y	T3U07AA	
	HP Enterprise Class 480GB SATA SSD	Y	Y	T3U08AA	
	HP 256GB* SATA 6Gb/s SED Opal 1 SSD	Y	Y	G7U67AA	Note 1
	HP 512GB SATA SED SSD	Y	Y	N8T26AA	

NOTE 1:

The 256GB Self-Encrypting Drive (SED) version has similar performance to the standard 256GB SSD. It is also available in Opal 1.0 and Opal 2.0 versions

Up to 8 SATA SSD drives supported with the High Density Storage Option

Supported Components

PCIe Solid State Drives	PCIe SSDs for HP Workstations	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
	HP Z Turbo Drive G2 512GB SSD	Y	Y	M1F74AA	
	HP Z Turbo Drive G2 256GB SSD	Y	Y	M1F73AA	
	HP Z Turbo Drive G2 1TB SSD	Y	Y	T9H98AA	
	HP Z Turbo Drive				
	HP Z Turbo Drive G2 256GB SED SSD	Y	Y	Y1T55AA	
	HP Z Turbo Drive G2 1TB TLC SSD	Y	Y	Y1T52AA	
	HP Z Turbo Drive G2 256GB TLC SSD	Y	Y	Y1T46AA	
	HP Z Turbo Drive G2 512GB TLC SSD	Y	Y	Y1T49AA	
	HP Z Turbo Drive Quad Pro 256GB SSD module	Y	Y	N2M00AA	
	HP Z Turbo Drive Quad Pro 512GB SSD module	Y	Y	N2M01AA	
	HP Z Turbo Drive Quad Pro				
	HP Z Turbo Drive Quad Pro 256GB SSD module	Y	Y	N2M00AA	
	HP Z Turbo Drive Quad Pro 512GB SSD module	Y	Y	N2M01AA	
	HP Z Turbo Drive Quad Pro 1TB SSD module	Y	Y	T9J00AA	
	HP Z Turbo Drive Quad Pro 2x256GB PCIe SSD	Y	Y	N2M98AA	
	HP Z Turbo Drive Quad Pro 2x512GB PCIe SSD	Y	Y	N2M99AA	
	HP Z Turbo Drive Quad Pro 2x1TB PCIe SSD	Y	Y	T9H99AA	
	Intel 750 Series AIC				
	Intel 750 Series AIC 400GB PCIe SSD	Y	Y	Y4A61AV	
	Intel 750 Series AIC 800GB PCIe SSD	Y	Y	Y4A62AV	
	Intel 750 Series AIC 1.2TB PCIe SSD	Y	Y	Y4A63AV	

*For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 30GB of system disk is reserved for system recovery software.

Supported Components

HP 4-Bay SAS-SATA 2.5in High Density Storage Kit

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP 4-Bay SAS-SATA 2.5in High Density Storage Kit		Y	K5J28AA	
<p>This kit converts two of the native 3.5" HDD bays to enable four SFF (2.5") HDDs or SSDs. Once the kit is installed, it enables independent, tool-free access for these SFF drives. Enterprise class SAS HDDs (15mm) are also supported. Up to two modules are supported in the Z840, which enables up to 8 SFF drives to be added to the internal section of the Z840. HDDs and SSDs are supported with up to 6Gb/s bandwidth.</p>				

Notes:

For a video installation guide, please see <http://www2.hp.com/index.html>

The installation guide can also be accessed in the Maintenance and Service Guide for your workstation at http://www.hp.com/support/workstation_manuals

HDD Carrier

HP 4-in-1 SFF (2.5 in) HDD Carrier

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP 4-in-1 SFF (2.5 in) HDD Carrier*		Y	B8K60AA	
<p>* For the Z440, Z640, and Z840, the carrier can be installed in any of the 5.25" ODD bays.</p>				

Notes:

Additional controllers may be required to support the additional drives located in this carrier.

This kit includes an additional 4 carriers which can be mounted to drives for easy external access and transfer of data between systems.

Hard Drive Controllers

Factory integrated RAID on motherboard for SATA drives

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
RAID 0 Configuration – Striped Array	Y	N		Note 1
RAID 0 Data Configuration -- Boot/OS Drive + 2 Drive Striped Array	Y	N		Note 2
RAID 1 Configuration – Mirrored Array	Y	N		Note 3
RAID 10 Configuration - Striped/Mirrored Array	Y	N		
RAID 5 Configuration - Parity Array	Y	N		Note 4
HP SAS Back Panel Connector kit	Y	Y		

Must have 4 or fewer SAS hard drives to configure this option

HP SAS Back Panel Bulkhead Connector Kit

HP SAS Back Panel Connector kit required. Internal SAS HD drives are not supported

LSI iBBU09 Battery Backup Unit	Y	Y	E0X19AA	
LSI 9270-8i SAS 6Gb/s ROC RAID Card	Y	Y	E0X21AA	
Integrated LSI SAS 2308 Controller with RAID 0/1/1E/10	Y	N		
Integrated SATA 6.0 Gb/s Controller	Y	N		

Integrated RAID for PCIe SSDs

Supported Components

RAID 0 Data Configuration	Y	N	Not available for Boot RAID Configurations
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NOTE 1: Minimum of 2 storage drives needed. All drives must be identical (size/speed/type/bus/functional capabilities). Must have 2, 3 or 4 storage Drives.

NOTE 2: Minimum of 3 SATA hard drives needed. All hard drives must be identical (size/speed/type/bus/functional capabilities).

At least 3 HD Drives required. May have 4th and 5th HD Drives. Drives must be the same drive (size/speed/type/functional capability).

NOTE 3: 2 storage drives required. All hard drives must be identical (size/speed/type/bus/functional capabilities).

NOTE 4: Minimum of 3 storage drives needed. All drives must be identical (size/speed/type/bus/functional capabilities).

NOTE: SATA hardware RAID is supported on Linux systems that have support for the Intel RSTe technology. The Linux kernel, with built-in software RAID, provides excellent functionality and performance. It is a good alternative to hardware-based RAID. Please visit http://www.hp.com/support/linux_hardware_matrix for RAID capabilities with Linux.

LSI RAID Definitions:

IS: Striping of 2 or more HDDs into a single logical volume

IM: Mirroring of 2 HDDs into a single logical volume

IME: Mirroring of 3 or more HDDs into a single logical volume

NOTE: Specific user-configured hardware SAS RAID configurations are supported on this Linux system. Please visit: http://www.hp.com/support/linux_hardware_matrix for details

Supported Components

Graphics

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes	Supported # of cards	Mixed?
Professional 2D						
NVIDIA NVS 310 1GB Graphics	Y	Y	M6V51AA	Note 1	3	
NVIDIA NVS 315 1GB Graphics (for HP Workstations)	Y	Y	E1U66AA	Note 1	4	
NVIDIA NVS 510 2GB Graphics	N	Y	C2J98AA	Note 2	2	
Entry 3D						
NVIDIA® Quadro® K420 2GB Graphics	Y	Y	N1T07AA		2	
NVIDIA® Quadro® K620 2GB Graphics	Y	Y	J3G87AA		2	
NVIDIA® Quadro® P600 2GB Graphics	Y	Y	1ME42AA		2	
AMD FirePro W2100 2GB Graphics	Y	Y	J3G91AA		2	
Mid-range 3D						
NVIDIA® Quadro® K1200 4GB Graphics	Y	Y	L4D16AA		3	
NVIDIA® Quadro® K2200 4GB Graphics	Y	Y	J3G88AA		2	
NVIDIA® Quadro® M2000 4GB Graphics	Y	Y	T7T60AA		2	
NVIDIA® Quadro® P2000 5GB Graphics	Y	Y	1ME41AA		2	
AMD FirePro W4300 4GB Graphics	Y	Y	T7T58AA		2	
AMD FirePro W5100 4GB Graphics	Y	Y	J3G92AA		2	
Radeon Pro™ WX4100 4GB 1st GFX Graphics	Y	Y	Z0B15AA		1	
High End 3D						
NVIDIA® Quadro® M4000 8GB Graphics	Y	Y	M6V52AA		3	
NVIDIA® Quadro® M5000 8GB Graphics	Y	Y	M6V53AA		3	
NVIDIA® Quadro® M6000 12 GB Graphics	Y	Y	L2K02AA		2	
NVIDIA® Quadro® M6000 24GB Graphics	Y	Y	T7T61AA		2	
NVIDIA® Quadro® P4000 8GB Graphics	Y	Y	1ME40AA		2	
NVIDIA® Quadro® P5000 16GB Graphics	Y	Y	Z0B13AA		3	
AMD FirePro W7100 8GB Graphics	Y	Y	J3G93AA		2	
Radeon Pro™ WX7100 8GB Graphics*	Y	Y	Z0B14AA		3	
Ultra 3D						
NVIDIA® Quadro® GP100 16GB Graphics	Y	Y	1ZE81AA		2	
NVIDIA® Quadro® P6000 24GB Graphics	Y	Y	Z0B12AA		2	
NVIDIA® Quadro® Sync II	Y	Y	1WT20AA			

For configurations not listed in this specification, please contact the factory for review

NOTE 1: 3rd and 4th graphics possible by using Option Kits.

NOTE 2: NVIDIA NVS 510 graphics available by using Option Kits only.

Supported Components

Memory

CTO

	DDR4-2133 ECC Registered DIMMs	Option Kit Part Number	Support Notes
	16GB DDR4-2133 ECC Registered RAM	J9P83AA	
	8GB DDR4-2133 ECC Registered RAM	J9P82AA	
	DDR4-2400 ECC Registered DIMMs		
	HP 64GB (1x64GB) DDR4-2400 ECC LR RAM	T9V42AA	
	HP 32GB (1x32GB) DDR4-2400 ECC Reg RAM	T9V41AA	
	HP 8GB (1x8GB) DDR4-2400 ECC Reg RAM	T9V39AA	
	HP 16GB (1x16GB) DDR4-2400 ECC Reg RAM	T9V40AA	
	HP 4GB (1x4GB) DDR4-2400 ECC Reg RAM	T9V38AA	

NOTES:

For details on the supported memory configurations on the HP Z840 Workstation, please refer to the System Technical Specifications - System Board section of this document.

DIMMs should be equally distributed across all four memory channels for optimal performance.

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

The CPUs determine the speed at which the memory is clocked. For example, if a 1600MT/s capable CPU is used in the system, the maximum speed the memory will run at is 1600MT/s regardless of the specified speed of the memory.

MT/s = Million Transfers per second

You cannot intermix LR DIMMs with Registered DIMMs. The system will not work.

The Z840 is designed to work ONLY with DDR4 memory. The system will not work with DDR3 memory.

Supported Components

Multimedia and Audio Devices

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Thin USB Powered Speakers	N	Y	KK912AA	
Integrated IDT 92HD94 Audio	Y	N	NA	

Optical and Removable Storage

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP DX115 Removable Drive Enclosure				
HP DX115 Removable HDD Frame/Carrier	N	Y	FZ576AA	Note 1
HP DX115 Removable HDD Carrier	Y	Y	NB792AA	Note 2
HP 15-in-1 Media Card Reader				
HP 15-in-1 Media Card Reader	Y	Y	F4N90AA	
HP SlimTray Optical Drives				
HP 9.5mm Slim DVD Writer	Y	Y	K3R64AA	
HP 9.5mm Slim DVD-ROM Drive	Y	Y	K3R63AA	Note 3
HP 9.5mm Slim BDXL Blu-Ray Writer	Y	Y	K3R65AA	Note 4

Actual speeds may vary. 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 DVD drives and players.

In order for some Blu-ray titles to play, they may require a DVI or HDMI digital connection and your display may require HDCP support. HD-DVD movies cannot be played on this workstation.

NOTE 1: Z840 support is for two DX115, in both of the 5.25" ODD bays.

NOTE 2: Carrier requires the workstation to have the DX115 frame installed. This part number is for the carrier only.

NOTE 3: Not supported as a 2nd Optical Drive

NOTE 4: Cannot be ordered in combination with another Blu-ray Writer drive.

Controller Cards

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP IEEE 1394b FireWire® PCIe Card	Y	Y	NK653AA	
HP Thunderbolt™-2 PCIe 1-port I/O Card*	Y	Y	F3F43AA	

Networking and Communications

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP X520 10GbE Dual Port Adapter	Y	Y	C3N52AA	
HP 10GbE SFP+ SR Transceiver	Y	Y	C3N53AA	
Intel® Ethernet I210-T1 PCIe NIC	Y	Y	E0X95AA	

Supported Components

Intel® 7260 802.11 a/b/g/n PCIe WLAN NIC	N	Y		
Integrated Intel I210AT PCIe GbE Controller	Y	N		Note 1
Integrated Intel I218LM PCIe GbE Controller	Y	N		Note 1
HP 361T PCIe Dual Port Gigabit NIC	Y	Y	C3N37AA	Note 1
Intel® Ethernet I350-T4 4-port 1Gb NIC	N	Y	W8X25AA	Note 1

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

*Wireless access point and internet service required. Availability of public wireless access points limited.

Racking and Physical Security

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Security Cable with Kensington Lock	N	Y	PC766A	
HP Chassis Intrusion Sensor	Y	N		Standard on all systems
HP Z6/8 Adjustable Rail Rack Kit, Flush Mount	N	Y	B8S55AA	
HP Keyed Cable Lock 10mm	N	Y	T1A62AA	

Input Devices

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP USB Smart Card Keyboard	Y	Y	ED707AA	
HP 2.4GHz Wireless Keyboard & Mouse	N	Y	NB896AA	
HP SpaceExplorer 3D USB Controller	N	Y	RY429AA	
HP SpacePilot 3D USB Intelligent Controller	N	Y	WH343AA	
HP PS/2 Keyboard	Y	Y	QY774AA	
HP PS/2 Mouse	Y	Y	QY775AA	
HP USB Keyboard	Y	Y	QY776AA	
HP USB Optical Mouse	Y	Y	QY777AA	
HP USB 1000dpi Laser Mouse	Y	Y	QY778AA	
3Dconnexion CAD Mouse	Y	Y	M5C35AA	
HP PS/2 Business Slim Keyboard	Y	Y	N3R86AA	
HP USB Business Slim Keyboard	Y	Y	N3R87AA	
HP Wireless Business Slim Keyboard	Y	Y		
HP USB Hardened Mouse	Y	Y	P1N77AA	

Supported Components

Other Hardware

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Internal USB Port Kit	N	Y	EM165AA	Note 1
HP SAS Back Panel Connector Kit	N	Y	EM164AA	
HP eSATA PCI Cable Kit	Y	Y	GM110AA	Note 2
HP Power Cord Kit	Y	N		
HP Workstation Mouse Pad	Y	N		Japan Only
HP Optical Bay HDD Mounting Bracket	N	Y	NQ099AA	
HP ENERGY STAR® Qualified Configuration	Y	N		
HP 4-Bay SAS-SATA 2.5in High Density Storage Kit	Y	Y	K5J28AA	Note 3
Z840 HP Z Cooler	Y	Y	N3R54AA	

NOTE 1: The HP Internal USB Port kit has a single USB 2.0 type A connector.

NOTE 2: No hot plug / hot swap supported with eSATA

NOTE 3: The CTO option (J8J30AV) installs two of these kits to create room for 8 2.5" bays.

Software

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Performance Advisor	Y	Y		Note 1
HP Remote Graphics Software (RGS) 6.0	Y	Y		Note 2
MS Office Home & Business 2013	Y	N		Note 3
Cyberlink PowerDVD and Power2Go	Y	N		
Foxit PhantomPDF Express	Y	N		

NOTE 1: Available as a free download here: www.hp.com/go/performanceadvisor

NOTE 2: Supports Windows 7, Windows 8.1, SLED 11, and RHEL v6.5

NOTE 3: Must be selected as a Configure to Order option. Delivered in the form of a "Drop in the Box" CD.

Operating Systems

	Support Notes
Windows 10 Pro 64	
Windows 10 Pro downgrade to Windows 7 Professional 64	
Windows 10 Home 64	Note 1
Windows 8.1 Pro 64-bit	
Genuine Windows® 7 Professional 64-bit	
HP Linux Installer Kit	
Red Hat Enterprise Linux (RHEL) Workstation - Paper License (1yr)	Note 2

NOTE 1: Windows 10 Home High-End, not supported with dual-processor configurations

NOTE 2: This second OS must be ordered with the HP Linux Installer Kit as the first OS

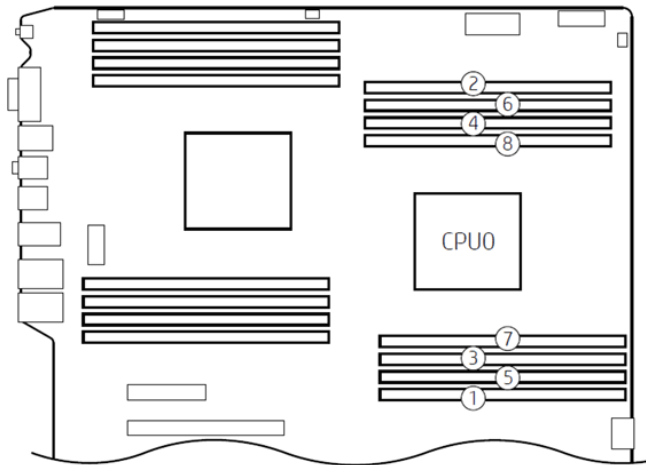
System Technical Specifications

Capacity	Notes	CPU 0								CPU 1								Rating
		Bottom Slots				Top Slots				Bottom Slots				Top Slots				
		DIMM 1	DIMM 2	DIMM 3	DIMM 4	DIMM 5	DIMM 6	DIMM 7	DIMM 8	DIMM 1	DIMM 2	DIMM 3	DIMM 4	DIMM 5	DIMM 6	DIMM 7	DIMM 8	
8 GB		4 GB								4 GB								Fair
16 GB		4 GB 8 GB							4 GB	4 GB 8 GB							4 GB	Good Fair
32 GB		4 GB 8 GB 16 GB		4 GB			4 GB		4 GB 8 GB	4 GB 8 GB 16 GB		4 GB			4 GB		4 GB 8 GB	Best Good Fair
64 GB		4 GB 8 GB	4 GB	4 GB 8 GB	4 GB	4 GB	4 GB 8 GB	4 GB	4 GB 8 GB	4 GB 8 GB	4 GB	4 GB 8 GB	4 GB	4 GB	4 GB 8 GB	4 GB	4 GB 8 GB	Best Best
96 GB	~	8 GB	4 GB	8 GB	4 GB	4 GB	8 GB	4 GB	8 GB	8 GB	4 GB	8 GB	4 GB	4 GB	8 GB	4 GB	8 GB	Best
128 GB	~	8 GB 16 GB 32 GB	8 GB	8 GB 16 GB	8 GB	8 GB	8 GB 16 GB	8 GB	8 GB 16 GB 32 GB	8 GB 16 GB 32 GB	8 GB	8 GB 16 GB	8 GB	8 GB	8 GB 16 GB	8 GB	8 GB 16 GB 32 GB	Best Best Good
192 GB	~	16 GB 16 GB	8 GB 16 GB	16 GB 16 GB	8 GB	8 GB	16 GB 16 GB	8 GB 16 GB	16 GB 16 GB	16 GB 16 GB	8 GB 16 GB	16 GB 16 GB	8 GB	8 GB	16 GB 16 GB	8 GB 16 GB	16 GB 16 GB	Best Better
256 GB		16 GB 32 GB	16 GB	16 GB 32 GB	16 GB	16 GB	16 GB 32 GB	16 GB	16 GB 32 GB	16 GB 32 GB	16 GB	16 GB 32 GB	16 GB	16 GB	16 GB 32 GB	16 GB 32 GB	16 GB 32 GB	Best Best
512 GB	~	32 GB 64 GB	32 GB	32 GB 64 GB	32 GB	32 GB	32 GB 64 GB	32 GB	32 GB 64 GB	32 GB 64 GB	32 GB	32 GB 64 GB	32 GB	32 GB	32 GB 64 GB	32 GB 64 GB	32 GB 64 GB	Best Best
1 TB	~	64 GB 128 GB	64 GB	64 GB 128 GB	64 GB	64 GB	64 GB 128 GB	64 GB	64 GB 128 GB	64 GB 128 GB	64 GB	64 GB 128 GB	64 GB	64 GB	64 GB 128 GB	64 GB	64 GB 128 GB	Best Best
Slot Load Order		1	9	5	13	15	7	11	3	2	10	6	14	16	8	12	4	

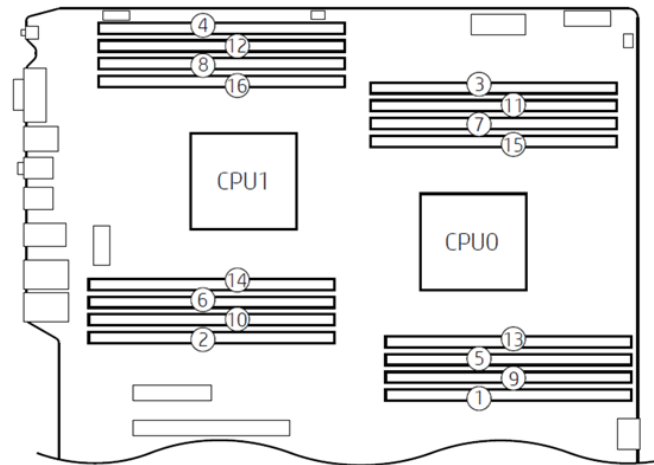
System Technical Specifications

Memory Loading Order:

Load Order for Single Processor Configuration



Load Order for Dual Processor Configuration



Maximum Memory

Supports up to 256GB using RDIMMs
Supports up to 1024GB using LRDIMMs

Memory Configuration (Supported)

- Not all memory configurations possible are represented. Not all memory configurations shown are available as CTO. Please check Ordering Guide for supported configurations.
- Only ECC DIMMs are supported.
- RDIMM (Registered) and LR DIMM (Load Reduction) memory cannot be mixed. All memory installed in the system must be either RDIMM or LR DIMM.
- Do not install memory modules into memory slots if corresponding processor is not installed.
- Dual processor configurations with memory modules installed for only one processor is not supported.

Notes

Please refer to the table above for details on how supported memory configurations are installed in your system.

* For 32 bit operating systems, there is a memory limit of 4GB.

*For systems installed with Microsoft Windows 7 (Ultimate, Enterprise or Pro), the maximum accessible system memory is 192GB

*For systems installed with Microsoft Windows 8.x (Enterprise or Pro), the maximum accessible system memory is 512GB

~ Although technically possible, these configurations are not available to order at this time.

The Z840 will support up to 512GB at initial release.

The Z840 will support up to 1024GB when 64GB DIMM support is added following initial Z840 release.

The Z840 will support up to 2048GB when 128GB DIMM support is added following initial Z840 release.

System Technical Specifications

PCI Express Connectors

Two PCIe Gen3 x16 with latch
 One PCIe Gen3 x16 with latch.

- Enabled only with optional 2nd CPU is installed.

One PCIe Gen3 x8 open-ended connector.

- Enabled only with optional 2nd CPU is installed.

One PCIe x8 open-ended connector.

- Enabled for One PCIe Gen2 x4 slot with 1 CPU
- Enabled for One PCIe Gen3 x8 with optional 2nd CPU installed

One PCIe Gen3 x4 open-ended connector.
 One PCIe Gen2 x1 open-ended connector

Supported Drive Interfaces

SATA

2 SATA @6Gb/s, supports RAID 0,1 and NCQ.
 4 sSATA @6Gb/s, Supports RAID 0,1,5,10 and NCQ.
 Factory integrated RAID is Microsoft Windows only.

External SATA (eSATA)*
 Supported on all SATA and sSATA ports configurable with optional eSATA* After-Market Option cable kit)
 * hot plug / hot swap not supported with eSATA

Serial Attached SCSI

Integrated 8-channel SAS 6.0Gb/sec controller with HW RAID 0, 1, 10

Integrated RAID

SATA: RAID 0, 1 (Supports one RAID)
 SATA: RAID 0, 1, 5, 10 (Supports up to 2 RAIDs)
 SAS: HW RAID 0, 1, 10 (Supports up to 2 RAIDs)

Integrated Graphics

None

Network Controller

Integrated Intel I218LM

Memory Integrated 3KB receive buffer and 3KB transmit buffer
 Data rates supported: 10/100/1000 Mb/s
 Compliance IEEE 802.1as, 802.1p, 802.1Q, 802.3, 802.3ab, 802.3az, 802.3i 802.3u, 802.3x, 802.3z
 Bus architecture PCIe 1.0 x1 and SMBus
 Power requirement 0.5 watts
 Boot ROM support
 Network transfer rates:
 10BASE-T (half-duplex) 10 Mb/s
 10BASE-T (full-duplex) 20 Mb/s
 100BASE-TX (half-duplex) 100 Mb/s
 100BASE-TX (full-duplex) 200 Mb/s
 1000BASE-T (full-duplex) 2000 Mb/s
 Management capabilities: WOL, auto MDI crossover, PXE, Multi-port teaming, RSS, Advanced cable diagnostics

AMT 9.1 support, vPro compliant

Integrated I210AT

System Technical Specifications

		Adjustable FIFO packet buffer memory up to 24KB Tx, 16KB Rx Data rates supported 10/100/1000 Mb/s Compliance IEEE 802.1as, 802.1q, 802.1Q, 802.3, 802.3ab, 802.3ap, 802.3az, 802.3u, 802.3x, 802.3z
		Bus architecture PCIe 1.0 x1 and SMBus Boot ROM support Network transfer rates: 10BASE-T (half-duplex) 10 Mb/s 10BASE-T (full-duplex) 20 Mb/s 100BASE-TX (half-duplex) 100 Mb/s 100BASE-TX (full-duplex) 200 Mb/s 1000BASE-T (full-duplex) 2000 Mb/s Management capabilities: WOL, auto MDI crossover, PXE, Multi-port teaming, RSS, Advanced cable diagnostics
	PCI-X Connectors	None
	PCI Card Guide	Yes
	Wake on LAN	Yes, both ports
	Integrated Trusted Platform Module	Trusted Platform Module (TPM) 1.2 (Infineon SLB 9660). Common Criteria EAL4+ Certified. Upgradable to TPM 2.0 through Firmware v5.51 upgrade (Infineon SLB9665). Convertible to FIPS 140-2 Certified mode. (TPM 2.0 is not available for Win 7 32-bit.). When the SLB 9660 is converted (via Firmware v5.51) to TPM 2.0 mode then it is renamed as SLB 9665. Once converted to TPM2.0 the SLB9665 is CC EAL4+ certified. CG TPM Certified products list: http://www.trustedcomputinggroup.org/certification/tpm-certified-products/
IEEE 1394 Connector(s)	Front	None
	Rear	None
	Internal	None
USB Connector(s)	Front	4 USB 3.0
	Rear	4 USB 3.0 2 USB 2.0
	Internal	1 USB 3.0 available with a single 20-pin shrouded connector. This header supports a USB Media Card reader. 2 USB 2.0 port available with one 2x5 header. This header supports an HP Internal USB Port Kit (EM165AA) to provide a single USB Type-A connector. This port kit uses one half of the 2x5 header. Third party adapters are also available.
HD Integrated Audio	Realtek ALC221	
Flash ROM	Yes	
CPU Fan Header	One header (blind mate) for CPU fans and memory fans	
Chassis Fan Header	One Chassis Fan Header	
Front PCI Fan Header	2 Front PCI Fan Headers	

System Technical Specifications

Front Control Panel/Speaker Header	Yes	
CMOS Battery Holder - Lithium Integrated Trusted Platform Module	Yes Trusted Platform Module (TPM) 1.2 (Infineon SLB 9660). Common Criteria EAL4+ Certified. Upgradable to TPM 2.0 through Firmware v5.51 upgrade (Infineon SLB9665). Convertible to FIPS 140-2 Certified mode. (TPM 2.0 is not available for Win 7 32-bit.). When the SLB 9660 is converted (via Firmware v5.51) to TPM 2.0 mode then it is renamed as SLB 9665. Once converted to TPM2.0 the SLB9665 is CC EAL4+ certified.	
	TCG TPM Certified products list: http://www.trustedcomputinggroup.org/certification/tpm-certified-products/	
Power Supply Headers	Yes	
Power Switch, Power LED & Hard Drive LED Header	Front power switch, front power and hard drive LED. Rear power switch and rear power LED. Drive LED header on system board.	
Clear Password Jumper	Yes	
Serial Port	Yes, on rear panel	
Parallel Port	No	
Keyboard/Mouse	Yes	
Power Supply	850W 88% Efficient, Custom PSU (Wide-Ranging, Active PFC)	1125W/1275W*/1450W* 90% Efficient, Custom PSU (Wide-Ranging, Active PFC)
Operating Voltage Range	90-269 VAC	
Rated Voltage Range	100-127 VAC 200-240 VAC	118 VAC
Rated Line Frequency	50-60 Hz	400 Hz
Operating Line Frequency Range	47-66 Hz	393-407 Hz
Rated Input Current	11A @ 100-127 VAC 5.5A @ 200-240 VAC	11A @ 118 VAC
Heat Dissipation (Configuration and software dependent)	Typical = 2142 btu/hr (540kg-cal/hr) Max = 3335 btu/hr (840 kg-cal/hr)	Typical = 2773 btu/hr (699 kg-cal/hr) Max-1 = 3878 btu/hr (977 kg-cal/hr) Max-2 = 5002 btu/hr (1260 kg-cal/hr) Max-3 = 5624 btu/hr (1417 kg-cal/hr)
Power Supply Fan	(2) 80x25 mm variable speed	
ENERGY STAR Qualified (Configuration dependent)	Yes	
Power Supply Efficiency	88% Efficient	90% Efficient
	The Z840 850W power supply efficiency report can be found at this link: plugloadsolutions.com/psu_reports/HEWLETT%20PAC_KARD_719799-001_850W_ECOS%203882_Report.pdf	The Z840 1125W (1450W at 200V Input Voltage) power supply efficiency report can be found at this link: plugloadsolutions.com/psu_reports/HEWLETT%20PAC_KARD_719799-001_1125W_ECOS%203883_Report.pdf
FEMP Standby Power Compliant @115V (<2W in S5 - Power Off)	Yes	Yes

System Technical Specifications

EuP Compliant @ 230V (<0.5 W in S5 - Power Off)	Yes	Yes
CECP Compliant @ 220V (<4W in S3 - Suspend to RAM)	Yes; Configuration dependent	Yes; Configuration dependent
Power Consumption in sleep mode (as defined by ENERGY STAR) - Suspend to RAM (S3) (Instantly Available PC)	<23W	<30W
Built-in Self-Test LED	Yes	Yes
Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)	Yes	Yes

*Input voltage restriction

NOTE: The 1125W (1450W at 200V Input Voltage) power supply can also supply 1275W of output power when the input voltage is greater than 105V. If the input voltage is less than 105V, but greater than 90V for any reason, the maximum power that can be drawn is 1125W. An uninterruptible power supply (UPS) is highly recommended if 1275W output power is desired.

The 1125W Power Supply can also supply 1450W of output power when the input voltage is greater than 180V under all conditions.

AUX IN (audio)	No
Clear CMOS Button	Yes
Multibay Header	No
Integrated Gigabit Ethernet	Yes, dual port.
Access Panel Solenoid Lock Header	No
Access Panel Intrusion Sensor Header	Yes, as part of Front UI (Control Panel) cable header
Memory Fan Connector	Yes, blind-mate

SYSTEM CONFIGURATION

Example Configuration #1	Processor Info	1x Intel Xeon E5-2609v3 (Six-Core) 85W
	Memory Info	16GB DDR4-2133 (2x8GB) 1CPU RegRAM
	Graphics Info	1x NVIDIA® Quadro® K620
	Disks/Optical/Floppy	1x 500GB SATA 7200 rpm HDD/1x DVD-ROM SATA
	Power Supply	850W 88% Custom PSU
	Other	-

System Technical Specifications

Energy Consumption	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	103.41 W		102.23 W		103.92 W	
Windows Busy Typ (S0)	183.75 W		181.88 W		189.37 W	
Windows Busy Max (S0)	204.93 W		201.28 W		206.74 W	
Sleep (S3)	3.711 W	3.587 W	3.785 W	3.711 W	3.587 W	3.785 W
Off (S5)	1.053 W	0.992 W	1.159 W	1.053 W	0.992 W	1.159 W
Zero Power Mode (ErP)	0.182 W		0.298 W		0.172 W	
Heat Dissipation** (Btu/hr)	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	352.83 btu/hr		348.81 btu/hr		354.58 btu/hr	
Windows Busy Typ (S0)	626.96 btu/hr		620.57 btu/hr		646.13 btu/hr	
Windows Busy Max (S0)	699.22 btu/hr		686.77 btu/hr		705.40 btu/hr	
Sleep (S3)	12.66 btu/hr	12.24 btu/hr	12.91 btu/hr	12.66 btu/hr	12.24 btu/hr	12.91 btu/hr
Off (S5)	3.59 btu/hr	3.38 btu/hr	3.95 btu/hr	3.59 btu/hr	3.38 btu/hr	3.95 btu/hr
Zero Power Mode (ErP)	0.621 btu/hr		1.018 btu/hr		0.586 btu/hr	

Example Configuration #2 (ENERGY STAR QUALIFIED)	Processor Info	2x Intel Xeon E5-2640v3 (Eight-Core) 90W
	Memory Info	32GB DDR4-2133 (8x4GB) 2CPU RegRAM
	Graphics Info	1x NVIDIA® Quadro® K2200
	Disks/Optical/Floppy	3x 500GB SATA 7200/1x DVD-ROM SATA
	Power Supply	1125W (1450W at 200V Input Voltage) 90% Custom PSU
	Other	-

Energy Consumption	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	142.17 W		141.01 W		142.47 W	
Windows Busy Typ (S0)	324.18 W		320.33 W		323.91 W	
Windows Busy Max (S0)	398.27 W		396.25 W		398.75 W	
Sleep (S3)	6.08 W	6.03 W	6.13 W	6.08 W	6.03 W	6.13 W
Off (S5)	1.04 W	0.99 W	1.10 W	1.04 W	0.99 W	1.10 W
Zero Power Mode (ErP)	0.181 W		0.308 W		0.172 W	
Heat Dissipation** (Btu/hr)	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	485.08 btu/hr		481.13 btu/hr		486.11 btu/hr	
Windows Busy Typ (S0)	1106.10 btu/hr		1092.97 btu/hr		1105.18 btu/hr	
Windows Busy Max (S0)	1358.90 btu/hr		1352.01 btu/hr		1360.54 btu/hr	
Sleep (S3)	20.75 btu/hr	20.57 btu/hr	20.91 btu/hr	20.75 btu/hr	20.57 btu/hr	20.91 btu/hr
Off (S5)	3.55 btu/hr	3.38 btu/hr	3.76 btu/hr	3.55 btu/hr	3.38 btu/hr	3.76 btu/hr
Zero Power Mode (ErP)	0.619 btu/hr		1.051 btu/hr		0.587 btu/hr	

Example Z840 Configuration #3	Processor Info	2x Intel Xeon E5-2680v3 (12-Core) 120W
	Memory Info	64GB DDR4-2133 (8x8GB) 2CPU RegRAM

System Technical Specifications

	Graphics Info	1x NVIDIA® Quadro® K4200					
	Disks/Optical/Floppy	2x 300GB SAS 15K/1x DVDRW SATA					
	Power Supply	1125W (1450W at 200V Input Voltage) 90% Custom PSU					
	Other	-					
Energy Consumption		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	123.26 W		121.40 W		124.07 W	
	Windows Busy Typ (S0)	413.33 W		393.34 W		412.26 W	
	Windows Busy Max (S0)	496.46 W		483.26 W		498.07 W	
	Sleep (S3)	7.114 W	7.086 W	7.148 W	7.114 W	7.086 W	7.148 W
	Off (S5)	1.054 W	0.993 W	1.161 W	1.054 W	0.993 W	1.161 W
	Zero Power Mode (ErP)	0.181 W		0.307 W		0.177 W	
Heat Dissipation** (Btu/hr)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	420.56 btu/hr		414.22 btu/hr		423.33 btu/hr	
	Windows Busy Typ (S0)	1410.28 btu/hr		1342.08 btu/hr		1406.63 btu/hr	
	Windows Busy Max (S0)	1693.95 btu/hr		1648.88 btu/hr		1700.10 btu/hr	
	Sleep (S3)	24.27 btu/hr	24.17 btu/hr	24.39 btu/hr	24.27 btu/hr	24.17 btu/hr	24.39 btu/hr
	Off (S5)	3.597 btu/hr	3.388 btu/hr	3.962 btu/hr	3.597 btu/hr	3.388 btu/hr	3.962 btu/hr
	Zero Power Mode (ErP)	0.619 btu/hr		1.049 btu/hr		0.607 btu/hr btu/hr	

Example Z840 Configuration #4	Processor Info	2x Intel Xeon E5-2697v3 (14-Core) 145W					
	Memory Info	64GB DDR4-2133 (16x4GB) 2CPU RegRAM					
	Graphics Info	2x NVIDIA® Quadro® K5200					
	Disks/Optical/Floppy	4x 300GB SAS 15K/1x DVDRW SATA					
	Power Supply	1125W (1450W at 200V Input Voltage) 90% Custom PSU					
	Other	-					
	Energy Consumption		115 VAC		230 VAC		100 VAC
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)		141.75 W		140.45 W		141.63 W	
Windows Busy Typ (S0)		510.66 W		498.90 W		510.82 W	
Windows Busy Max (S0)		569.34 W		559.38 W		568.48 W	
Sleep (S3)		6.454 W	3.669 W	6.497 W	6.454 W	3.669 W	6.497 W
Off (S5)		1.105 W	0.987 W	1.165 W	1.105 W	0.987 W	1.165 W
Zero Power Mode (ErP)		0.180 W		0.306 W		0.178 W	
Heat Dissipation** (Btu/hr)							
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	483.65 btu/hr		497.22 btu/hr		483.24 btu/hr	
	Windows Busy Typ (S0)	1742.37 btu/hr		1702.25 btu/hr		1742.91 btu/hr	
	Windows Busy Max (S0)	1942.29 btu/hr		1908.60 btu/hr		1939.65 btu/hr	
	Sleep (S3)	22.02 btu/hr	21.63 btu/hr	22.16 btu/hr	22.02 btu/hr	21.63 btu/hr	22.16 btu/hr

System Technical Specifications

Off (S5)	3.77 btu/hr	3.37 btu/hr	3.97 btu/hr	3.77 btu/hr	3.37 btu/hr	3.97 btu/hr
Zero Power Mode (ErP)	0.616 btu/hr		1.046 btu/hr		0.608 btu/hr	

Example Configuration #5 (ENERGY STAR QUALIFIED)	Processor Info	2x Intel Xeon 2687Wv3 (10-Core) 160W					
	Memory Info	512GB DDR4-2133 (16x32GB) 2CPU LR RAM					
	Graphics Info	2x NVIDIA® Quadro® K6000					
	Disks/Optical/Floppy	6x 300GB 10K SAS SFF/1x DVD RW SATA					
	Power Supply	1125W (1450W at 200V Input Voltage) 90% Custom PSU					
	Other	-					
Energy Consumption		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	On-Idle (ENERGY STAR® Idle (S0))	174.56 W		173.77 W		175.26 W	
	ENERGY STAR® P _{MAX} Windows running Linpack and Viewperf	561.98 W		559.23 W		567.75 W	
	ENERGY STAR® "Sleep" (S3)	16.426 W	16.279 W	16.099 W	16.426 W	16.279 W	16.099 W
	ENERGY STAR® "Standby" (Off) (S5)	1.047 W	0.997 W	1.144 W	1.047 W	0.997 W	1.144 W
	Heat Dissipation** (Btu/hr)		115 VAC		230 VAC		100 VAC
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
On-Idle (ENERGY STAR® Idle (S0))		595.60 btu/hr		592.90 btu/hr		597.99 btu/hr	
ENERGY STAR® P _{MAX} Windows running Linpack and Viewperf		1917.48 btu/hr		1908.09 btu/hr		1937.16 btu/hr	
ENERGY STAR® "Sleep" (S3)		56.046 btu/hr	55.545 btu/hr	54.935 btu/hr	56.046 btu/hr	55.545 btu/hr	54.935 btu/hr

DECLARED NOISE EMISSIONS (ENTRY-LEVEL AND HIGH-END CONFIGURATIONS)

System Configuration (Entry level)	Processor Info	1x Intel Xeon E5-2609v3 2.4GHz CPU
	Memory Info	2x 8GB DDR4-2133 RDIMM
	Graphics Info	1x NVIDIA® Quadro® K620
	Disks/Optical/Floppy	1x Seagate 500GB 6Gb/s 7200 RPM HDD 1x SATA DVD-RW

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		Sound Power (LWAd, bels)	Deskside Sound Pressure (LpAm, decibels)
	Idle	4.3	24
	Hard drive Operating (random reads)	4.3	24
	DVD-ROM Operating (sequential reads)	4.6	31

Processor Info 2x Intel Xeon 2687Wv3 (10-Core) 160W

System Technical Specifications

System Configuration (High-end)	Memory Info	16x 32GB DDR4-2133 RDMIM
	Graphics Info	2x NVIDIA® Quadro® K6000 Graphics Cards
	Disks/Optical/Floppy	4x Seagate 300GB 10K SFF HDDs
		1x Blue-ray DVD-RW

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		Sound Power (LWAd, bels)	Deskside Sound Pressure (LpAm, decibels)
		Idle	4.3
	Hard drive Operating (random reads)	4.3	26
	DVD-ROM Operating (sequential reads)	4.5	29

ENVIRONMENTAL DATA

Environmental Requirements	Temperature	Operating: 5° to 35° C (40° to 95° F) Non-operating: -40° to 60° C (-40° to 140° F)
	Humidity	Operating: 8% to 85% RH, non-condensing Non-operating: 8% to 90% RH, non-condensing
	Maximum Altitude	Operating: 3,000 m (10,000 feet) Non-operating: 9,100 m (30,000 feet)
	Dynamic (new)	Shock Operating: ½-sine: 40g, 2-3ms (~62 cm/sec) Non-operating: ½-sine: 160 cm/s, 2-3ms (~105g) square: 422 cm/s, 20g NOTE: Values represent individual shock events and do not indicate repetitive shock events.
		Vibration Operating random: 0.5g (rms), 5-300 Hz, up to 0.0025 g ² /Hz Non-operating random: 2.0g (rms), 5-500 Hz, up to 0.0150 g ² /Hz NOTE: Values do not indicate continuous vibration.
	Cooling	Above 1524 m (5000 ft.) altitude, maximum operating temperature is de-rated by 1° C (1.8° F) per 305 m (1000 ft.) elevation increase

System Technical Specifications

PHYSICAL SECURITY AND SERVICEABILITY

Access Panel	Tool-less Includes system board and memory information
Optical Drive	Tool-less, no carrier or rails required
Hard Drives	Tool-less
Expansion Cards	Tool-less
Processor Socket	Tool-less
Green User Touch Points	Yes, on tool-free internal chassis components
Color-coordinated Cables and Connectors	Yes
Memory	Tool-less
System Board	Tool-less, retained by Front PCI Card Guide
Dual Color Power and HD LED on Front of Computer	Yes
Configuration Record SW	Yes
Over-Temp Warning on Screen	Yes
Restore CD/DVD Set	Restores the computer to its original factory shipping image - Can be obtained via HP Support
Dual Function Front Power Switch	Yes, causes a fail-safe power off when held for 4 seconds
Padlock Support	No
Cable Lock Support	Yes, Kensington Cable Lock (optional): Prevents entire system theft only. 3mm x 7mm slot at rear of system
Universal Chassis Clamp Lock Support	No
Solenoid Lock and Hood Sensor	No
Rear Port Control Cover	No
Serial, Parallel, USB, Audio, Network, Enable/Disable Port Control	Yes
Removable Media Write/Boot Control	Yes, prevents ability to boot from removable media on supported devices (and can disable writes to media)
Power-On Password Setup Password	Yes, prevents an unauthorized person from booting up the workstation Yes, prevents an unauthorized person from changing the workstation configuration
3.3V Aux Power LED on System PCA	No
NIC LEDs (integrated) (Green & Amber)	Yes
CPUs and Heatsinks	A torx driver (T15) is needed to remove the CPU heatsink(s) before the CPU can be removed. CPU removal is tool-less
Power Supply Diagnostic LED	Yes
Front Power Button	Yes
Front Power LED	Yes, white (normal), red (fault)
Front Hard Drive Activity LED	Yes, white
Front ODD Activity LED	Yes
Internal Speaker	Yes

System Technical Specifications

System/Emergency ROM Flash Recovery	Recovers corrupted system BIOS
Cooling Solutions	Air cooled forced convection
Power Supply Fans	2x - 80mm x 25mm
CPU Heatsink Fan	92 x 25mm 5-wire PWM for each CPU
Chassis Fan	Rear: 2x - 92mm x 25mm Front (850W config): 1x - 92mm x 25mm (upper position) Front (1125W (1450W at 200V Input Voltage) config): 2x - 92mm x 25mm
Memory Heatsink Fan	3x - 75 x 90 x 35mm memory blowers 80 x 25 mm 4-wire PW fan
HP Vision Diagnostics Offline Edition	HP Vision Diagnostics Offline Edition The diagnostics utility enables you to perform testing and to view critical computer hardware and software configuration information from various sources. This utility enables you to:

- Run diagnostics
- View the hardware configuration of the system

Key features and benefits

HP Vision Diagnostics simplifies the process of effectively identifying, diagnosing, and isolating the hardware issues. In addition to robust management tools, service tools can be invaluable in quickly resolving system problems. To streamline the service process and resolve problems quickly, it is necessary to have the right information available at the time that a service call is placed. The primary information requirement, which is also the one that provides the greatest Vision into potential system issues, is the configuration of the system. Vision Diagnostics helps provide higher system availability. Typical uses of the Vision Diagnostics are:

- Testing and diagnosing apparent hardware failures
- Documenting system configurations for upgrade planning, standardization, inventory tracking, disaster recovery, and maintenance
- Sending configuration information to another location for more in-depth analysis

Access Panel Key Lock	Yes, prevents removal of the access panel and all internal components including optical and floppy drives
ACPI-Ready Hardware	Advanced Configuration and Power Management Interface (ACPI). <ul style="list-style-type: none"> • Allows the system to wake from a low power mode. • Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system

Trusted Platform Module Chip	Yes
Integrated Chassis Handles	Yes, front and rear
Power Supply	Tool-less, direct-connect (blind-mate)
PCIe Card Retention	Yes, rear (all), middle (full-height cards), front (full-length with extender cards)
Flash ROM	Yes. SPI ROM
Diagnostic Power Switch LED on board	Yes
Clear Password Jumper	Yes
Clear CMOS Button	Yes
CMOS Battery Holder	Yes

System Technical Specifications

DIMM Connectors Yes

System Technical Specifications

BIOS	
BIOS 32-bit Services	Standard BIOS 32-Bit Service Directory Proposal v0.4. BIOS supports 32 and 64-bit Operating systems.
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 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 diskette or USB flash drive in human readable file. Repset.exe utility can then replicate these settings on machines being deployed without entering Computer Configuration Utility (F10 setup).
SMBIOS	System Management BIOS 2.7, 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: - NORMAL - normal temperature ranges. - ALERTED - excessive temperatures are detected. Raises a flag so action can be taken to avoid shutdown or provide for a smoother system shutdown. - SHUTDOWN - excessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs.
Remote ROM Flash	Provides secure, fail-safe ROM image management from a central network console.
ACPI (Advanced Configuration and Power Management Interface)	Allows the system to enter and wake 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 4.0 for full compatibility with 64-Bit operating systems.
Ownership Tag	A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen.
Remote Wakeup/Remote Shutdown	System administrators can power on, restart, and power off a client computer from a remote location.
Instantly Available PC (Suspend to RAM - ACPI sleep state S3)	Allows for very low power consumption with quick resume time.
Remote System Installation via F12 (PXE 2.1) (Remote Boot from Server)	Allows a new or existing system to boot over the network and download software, including the operating system.
ROM revision levels	Reports the system BIOS revision level in Computer Configuration Utility (F10 Setup). Version is available through an industry standard interface (SMBIOS) so that management SW applications can use and report this information.

System Technical Specifications

System board revision level	Allows management SW to read the revision level of the system board Revision level is digitally encoded into the HW and cannot be modified.
Start-up Diagnostics (Power-on Self-Test)	Assesses system health at boot time with selectable levels of testing.
Auto Setup when new hardware installed	System automatically detects addition of new hardware.
Keyboard-less Operation	The system can be booted without a keyboard.
Localized ROM Setup	Common BIOS image supports System Configuration Utility (F10 Setup) menus in 12 languages with local keyboard mappings.
Asset Tag	Allows the user or MIS to set a unique tag string in non-volatile memory.
Per-slot Control	Allows I/O slot parameters (option ROM enable/disable, bus latency) to be configured individually.
Adaptive Cooling	Fan control parameters are set according to detected hardware configuration for optimal acoustics.
Pre-boot Diagnostics	Early (pre-video) critical errors are reported via beeps and blinks on the power LED.
Industry Standard Specification Support	
Industry Standard UEFI Specification Revision	Revision Supported by the BIOS 2.3.1
ACPI	Advanced Configuration and Power Management Interface, Version 4.0
ATA (IDE)	AT Attachment 6 with Packet Interface (ATA/ATAPI-6), Revision 3b
CD Boot	"El Torito" Bootable CD-ROM Format Specification Version 1.0
EDD	- Enhanced Disk Drive Specification Version 1.1 - BIOS Enhanced Disk Drive Specification Version 3.0
EHCI	Enhanced Host Controller Interface for Universal Serial Bus, Revision 1.0
PCI	- PCI Local Bus Specification, Revision 2.3 - PCI Power Management Specification, Revision 1.1 - PCI Firmware Specification, Revision 3.0, Draft .7
PCI Express	PCI Express Base Specification, Revision 2.0 PCI Express Base Specification, Revision 3.0
PMM	POST Memory Manager Specification, Version 1.01
SATA	Serial ATA Specification, Revision 1.0a Serial ATA 3 Gb/s: Serial ATA Specification, Revision 2.5 Serial ATA 6 Gb/s: Serial ATA Specification, Revision 3.0
SPD	PC SDRAM Serial Presence Detect (SPD) Specification, Revision 1.2B
TPM	Trusted Platform Module (TPM) 1.2 (Infineon SLB 9660). Common Criteria EAL4+ Certified. Upgradable to TPM 2.0 through Firmware v5.51 upgrade (Infineon SLB9665). Convertible to FIPS 140-2 Certified mode. (TPM 2.0 is not available for Win 7 32-bit.). When the SLB 9660 is converted (via Firmware v5.51) to TPM 2.0 mode then it is renamed as SLB 9665. Once converted to TPM2.0 the SLB9665 is CC EAL4+ certified.
	TCG TPM Certified products list: http://www.trustedcomputinggroup.org/certification/tpm-certified-products/
UHCI	Universal Host Controller Interface Design Guide, Revision 1.1
USB	Universal Serial Bus Revision 1.1 Specification Universal Serial Bus Revision 2.0 Specification Universal Serial Bus Revision 3.0 Specification
SMBIOS	System Management BIOS Reference Specification, Version 2.7 External BIOS Simulator found at: http://h20464.www2.hp.com/index.html
	External BIOS Simulator found at: http://h20464.www2.hp.com/index.html

System Technical Specifications

Social and Environmental Responsibility

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

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

Batteries

The battery in this product complies with EU Directive 2006/66/EC
Battery size: CR2032 (coin cell)
Battery type: Lithium Metal

The battery in this product does not contain:

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

Restricted Material Usage This product meets the material restrictions specified in HP's General Specification for the Environment. <http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/gse.pdf>

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

Low Halogen Statement

This product is low halogen except for power cords, cables and peripherals, as well as the following customer-configurable internal components: 3 ½" SAS HDDs, LSI 9260-8i SAS 6Gb/s ROC RAID Card, Creative Recon3D PCIe Audio Card, Liquid Cooling Solution and Broadcom 5761 Gigabit PCIe NIC are not Low Halogen. Service parts obtained after purchase may not be Low Halogen.

End-of-Life Management and Recycling

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

HP Inc. Corporate Environmental Information

For more information about HP's commitment to the environment:
Global Citizenship Report <http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html>

Eco-label certifications
<http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html>

Additional Information

- ISO 14001 certificates:
<http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html>
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
 - Plastic parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.
 - This product is >90% recycle-able when properly disposed of at end of life.

EPEAT Gold - ENERGY STAR qualified configurations of this product are in compliance with the IEEE 1680 (EPEAT) standard at the Gold level where HP registers workstation products. See <http://ww2.epeat.net/CompanyDetail.aspx?CompanyID=24> for registration status in your country.

System Technical Specifications

Packaging

HP Workstation product packaging meets the HP General Specification for the Environment at http://www.hp.com/hpinfo/globalcitizenship/society/gen_specifications.html

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

Packaging Materials

Internal

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

External

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

MANAGEABILITY

Industry Standard Specifications

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

- DASH 1.1 (via Intel LAN on motherboard)

Intel Active Management Technology (AMT)

Intel® Active Management Technology (AMT) 9.1

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 9.1 includes the following advanced management functions:

- Power Management (on, off, reset, graceful shutdown, sleep and hibernate)
- Support in Max Power Savings (Shutdown and Hibernate Modes)
- Hardware Inventory (includes BIOS and firmware revisions)
- Hardware Alerting
- Agent Presence
- System Defense Filters
- Serial Over LAN (SOL)
- IDE Redirect
- ME Wake-on-LAN (WOL)
- DASH 1.1 compliance
- IPv6 Support
- Fast Call for Help - a client inside or outside the firewall may initiate a call for help via BIOS screen, periodic connections, or alert triggered connection
- Remote Scheduled Maintenance - pre-schedule when the system connects to the IT or service provider console for maintenance.
- Remote Alerts - automatically alert IT or service provider if issues arise
- Access Monitor - Provides oversight into Intel® AMT actions to support security requirements
- PC Alarm Clock
- Microsoft NAP Support
- Host Base set-up and configuration
- Management Engine (ME) firmware roll back

System Technical Specifications

- Local Time Sync to UTC Remote Memory Dump Command – Creates memory dump for debug

Intel® vPro™ Technology The HP Z840 Workstation supports Intel vPro technology when configured as outlined below:

- Intel® Xeon® processor E5-1600 v3 product family or E5-2600 v3 product family featuring Intel® vPro™ Technology
- Intel® C610 chipset
- Intel® I218LM GbE LAN

Remote Manageability Software Solutions

The HP Z840 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

System Software Manager Service, Support, and Warranty

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

On-site Warranty and Service (**Note 1**): Three-years, limited warranty and service offering delivers on-site, next business-day (**Note 2**) service for parts and labor and includes free telephone support (**Note 3**) 8am - 5pm. Global coverage (**Note 2**) ensures that any product purchased in one country and transferred to another, non-restricted country will remain fully covered under the original warranty and service offering.

NOTE 1: Terms and conditions may vary by country. Certain restrictions and exclusions apply.

NOTE 2: On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.

NOTE 3: Technical telephone support applies only to HP-configured, HP and HP-qualified, third-party hardware and software. Toll-free calling and 24x7 support service may not be available in some countries.

HP Care Pack Services are extended service contracts that go beyond the standard limited warranties. Service starts from date of hardware purchase. To choose the right level of service for your HP product, use the HP Care Pack Services Lookup Tool at: <http://www.hp.com/go/lookuptool>. Additional HP Care Pack Services information by product is available at: <http://www.hp.com/hps/carepack>. Service levels and response times for HP Care Packs may vary depending on your geographic location. HP services are governed by the applicable HP terms and conditions of service provided or indicated to Customer at the time of purchase. Customer may have additional statutory rights according to applicable local laws, and such rights are not in any way affected by the HP terms and conditions of service or the HP Limited Warranty provided with your HP Product.

Product Change Notification

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

Stable & Consistent Offerings

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.

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
J6F75AV	Intel Xeon E5-2620v3 2.4 1866 6C 1stCPU
J6F73AV	Intel Xeon E5-2630v3 2.4 1866 8C 1stCPU
J6F71AV	Intel Xeon E5-2637v3 3.5 2133 4C 1stCPU
J6F94AV	Intel Xeon E5-2620v3 2.4 1866 6C 2ndCPU
J6F92AV	Intel Xeon E5-2630v3 2.4 1866 8C 2ndCPU
J6F90AV	Intel Xeon E5-2637v3 3.5 2133 4C 2ndCPU

Hard Drives

Product #	Offering
J3K71AV	500GB 7200 RPM SATA 1st HDD
J3K72AV	1TB 7200 RPM SATA 1st HDD
J3K92AV	500GB 7200 RPM SATA 2nd HDD
J3K93AV	1TB 7200 RPM SATA 2nd HDD
J3L13AV	500GB 7200 RPM SATA 3rd HDD
J3L14AV	1TB 7200 RPM SATA 3rd HDD
J3L36AV	500GB 7200 RPM SATA 4th HDD
J3L37AV	1TB 7200 RPM SATA 4th HDD
J3L54AV	500GB 7200 RPM SATA 5th HDD
J3L55AV	1TB 7200 RPM SATA 5th HDD

Graphics

Product #	Offering
J1Q20AV	NVIDIA® Quadro® K2200 4GB 1st GFX
J1Q24AV	AMD FirePro W2100 2GB 1st GFX
J1Q30AV	NVIDIA® Quadro® K620 2GB 2nd GFX
J1Q31AV	NVIDIA® Quadro® K2200 4GB 2nd GFX
J1Q35AV	AMD FirePro W2100 2GB 2nd GFX
J1Q38AV	NVIDIA® Quadro® K2200 4GB 3rd GFX

Memory

Product #	Offering
G8X58AV	8GB DDR4-2133 (1x8GB) 1CPU RegRAM
G8X61AV	16GB DDR4-2133 (2x8GB) 1CPU RegRAM
G8X63AV	32GB DDR4-2133 (4x8GB) 1CPU RegRAM

Stable & Consistent Offerings

G8X64AV	64GB DDR4-2133 (8x8GB) 1CPU RegRAM
G8X74AV	32GB DDR4-2133 (4x8GB) 2CPU RegRAM
G8X77AV	64GB DDR4-2133 (8x8GB) 2CPU RegRAM
G8X78AV	128GB DDR4-2133 (16x8GB) 2CPU RegRAM
G8X65AV	64GB DDR4-2133 (4x16GB) 1CPU RegRAM
G8X66AV	128GB DDR4-2133 (8x16GB) 1CPU RegRAM
G8X79AV	128GB DDR4-2133 (8x16GB) 2CPU RegRAM
G8X80AV	256GB DDR4-2133 (16x16GB) 2CPU RegRAM

Input Devices

Product #	Offering
G8U76AV	HP USB Keyboard
G8U87AV	HP USB Optical Mouse

Technical Specifications - Processors

PROCESSORS

Xeon E5-2603 v3 1.6 1600 6C CPU	J9V77AA
Xeon E5-2609 v3 1.9 1600 6C CPU	J9V76AA
Xeon E5-2620 v3 2.4 1866 6C CPU	J9V75AA
Xeon E5-2623 v3 3.0 1866 4C CPU	J9Q18AA
Xeon E5-2630 v3 2.4 1866 8C CPU	J9Q17AA
Xeon E5-2640 v3 2.6 1866 8C CPU	J9Q16AA
Xeon E5-2637 v3 3.5 2133 4C CPU	J9Q15AA
Xeon E5-2650 v3 2.3 2133 10C CPU	J9Q14AA
Xeon E5-2660 v3 2.6 2133 10C CPU	J9Q13AA
Xeon E5-2643 v3 3.4 2133 6C CPU	J9Q12AA
Xeon E5-2670 v3 2.3 2133 12C CPU	J9Q11AA
Xeon E5-2680 v3 2.5 2133 12C CPU	J9Q10AA
Xeon E5-2683 v3 2.0 2133 14C CPU	J9Q09AA
Xeon E5-2667 v3 3.2 2133 8C CPU	J9Q08AA
Xeon E5-2690 v3 2.6 2133 12C CPU	J9Q07AA
Xeon E5-2687Wv3 3.1 2133 10C CPU	J9Q06AA
Xeon E5-2695 v3 2.3 2133 14C CPU	J9Q05AA
Xeon E5-2697 v3 2.6 2133 14C CPU	J9Q04AA
Xeon E5-2699 v3 2.3 2133 18C CPU	J9Q03AA

Technical Specifications – Storage Hard Drives

HARD DRIVES

HP SAS (Serial Attached SCSI) Hard Drives for HP Workstations	300GB SAS 15K rpm 6Gb/s 3.5" HDD	Capacity	300GB	
		Height	1 in; 2.54 cm	
		Width	Media Diameter	3.5 in; 8.9 cm
			Physical Size	4 in; 10.17 cm
		Interface	SAS	
		Synchronous Transfer Rate (Maximum)	6Gb/s	
		Buffer	16MB	
		Seek Time (typical reads, includes controller overhead, including settling)	Single Track	0.2 ms
			Average	3.4 ms
			Full Stroke	6.6 ms
			Rotational Speed	15,000 rpm
	Operating Temperature	50° to 95° F (10° to 35° C)		
	600GB SAS 15K SFF HDD	Capacity	600GB	
		Height	5.9 in; 15 cm	
		Width	Media Diameter	Media Diameter
		Interface	12Gb/s SAS	
		Synchronous Transfer Rate (Maximum)	up to 1200 MB/s (SAS single port)	
		Cache	128MB	
		Seek Time (typical reads, includes controller overhead, including settling)	Average	2.0ms
		Rotational Speed	15K rpm	
		Operating Temperature	41° to 131° F (5° to 55° C)	
	300GB SAS 15K SFF HDD	Capacity	300GB	
		Height	5.9 in; 15 cm	
		Width	Media Diameter	2.5 in; 6.36 cm
		Interface	12Gb/s SAS	
		Synchronous Transfer Rate (Maximum)	up to 1200 MB/s (SAS single port)	
		Cache	128MB	
		Seek Time (typical reads, includes controller overhead, including settling)	Average	2.0ms
		Rotational Speed	15K rpm	
		Operating Temperature	41° to 131° F (5° to 55° C)	

Technical Specifications – Storage Hard Drives

HP 300GB SAS 10K SFF HDD	Capacity	300GB	
	Height	0.6 in; 1.53 cm	
	Width		Media Diameter 2.5 in; 6.36 cm
			Physical Size 2.75 in; 6.99 cm
	Interface	SAS 6Gb/s	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
	Buffer	64MB	
	Cache	multi-segmentable cache buffer	
	Seek Time (typical reads, includes controller overhead, including settling)		Single Track 0.4 ms (max)
			Average 3.6 ms
			Full Stroke 7.3 ms
	Rotational Speed	10,000 rpm	
	Logical Blocks	585,937,500	
	Operating Temperature	41° to 131° F (5° to 55° C)	
	HP 600GB SAS 10K SFF HDD	Capacity	600GB
Height		0.6 in; 1.53 cm	
Width			Media Diameter 2.5 in; 6.36 cm
			Physical Size 2.75 in; 6.99 cm
Interface		SAS 6Gb/s	
Synchronous Transfer Rate (Maximum)		Up to 600MB/s	
Buffer		64MB	
Cache		multi-segmentable cache buffer	
Seek Time (typical reads, includes controller overhead, including settling)			Single Track 0.4 ms (max)
			Average 3.6 ms
			Full Stroke 7.3 ms
Rotational Speed		10,000 rpm	
Logical Blocks		1,172,123,568	
Operating Temperature		41° to 131° F (5° to 55° C)	
HP 1.2TB SAS 10K SFF HDD		Capacity	1.2TB
	Height	0.6 in; 1.53 cm	
	Width		Media Diameter 2.5 in; 6.36 cm
			Physical Size 2.75 in; 6.99 cm
	Interface	SAS 6Gb/s	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
	Buffer	64MB	
	Seek Time (typical reads, includes controller overhead, including settling)		Single Track 0.18ms (max)
			Average 3.5ms
			Full Stroke 7.17ms
	Rotational Speed	10,000 rpm	

Technical Specifications – Storage Hard Drives

Logical Blocks	2,344,225,968
Operating Temperature	41° to 131° F (5° to 55° C)

SATA Hard Drives for HP Workstations

500GB SATA 10K rpm SFF HDD

Capacity	500GB
Height	0.6 in; 1.53 cm
Width	Media Diameter 2.5 in; 6.36 cm
	Physical Size 2.75 in; 6.99 cm
Interface	Serial ATA (6Gb/s)
Synchronous Transfer Rate (Maximum)	Up to 600MB/s
Buffer	64MB
Cache	Adaptive
Seek Time (typical reads, includes controller overhead, including settling)	Single Track 1.2ms (typical)
	Average 3.6ms
	Full Stroke 9.0ms (typical)
Rotational Speed	10K rpm
Operating Temperature	41° to 131° F (5° to 55° C)

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

Capacity	1TB
Height	1 in; 2.54 cm
Width	Media Diameter 3.5 in; 8.9 cm
	Physical Size 4 in; 10.17 cm
Interface	Serial ATA (6Gb/s)
Synchronous Transfer Rate (Maximum)	Up to 600 MB/s
Buffer	64MB
Seek Time (typical reads, includes controller overhead, including settling)	Single Track 1.2ms (typical)
	Average 11ms
	Full Stroke 21ms (typical)
Rotational Speed	7,200 rpm
Logical Blocks	1,953,525,168
Operating Temperature	41° to 131° F (5° to 55° C)

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

Capacity	2.0TB
Height	1 in; 2.54 cm
Width	Media Diameter 3.5 in; 8.9 cm
	Physical Size 4 in; 10.17 cm
Interface	Serial ATA (6.0 Gb/s), NCQ Enabled
Synchronous Transfer Rate (Maximum)	Up to 600 MB/s
Buffer	64MB
Seek Time (typical reads, includes controller)	Single Track 1.0 ms
	Average 11 ms
	Full Stroke 18 ms

Technical Specifications – Storage Hard Drives

		overhead, including settling)		
		Rotational Speed	7,200 rpm	
		Logical Blocks	3,907,029,168	
		Operating Temperature	41° to 131° F (5° to 55° C)	
3.0TB SATA 7200 rpm 6Gb/s 3.5" HDD	Capacity	3.0TB		
	Height	1 in; 2.54 cm		
	Width		Media Diameter	3.5 in; 8.9 cm
			Physical Size	4.0 in; 10.17 cm
	Interface	Serial ATA (6.0Gb/s), NCQ enabled		
	Synchronous Transfer Rate (Maximum)	Up to 6.0 Gb/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° to 140° F (5° to 60° C)		
1TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	Capacity	1TB		
	Protocol	SATA		
	Form Factor	3.5"		
	Controller	AHCI		
	Reliability (MTBF)	2.0M hours		
	Rated Power On Hours	8760/yr		
	Annualized Failure Rate (based on Rated POH)	<0.62%		
	Rated for 24/7/365 operation	YES		
	Physical Size (Height)	1 in; 2.54 cm		
	Physical Size (Width)	4 in; 10.17 cm		
	Media Diameter	3.5 in; 8.9 cm		
	Interface	Serial ATA (6Gb/s), NCQ enabled		
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s		
	Buffer	128MB		
	Seek Time (typical reads, includes controller overhead, including settling)		Single Track	0.32ms
			Average	7.45ms
			Full Stroke	14.2ms
	Operating Temperature	41° to 140° F (5° to 60° C)		
	Performance		Sequential Read	up to 226MB/s
			Sequential Write	up to 226MB/s
	Enterprise Class Features	High Reliability		

Technical Specifications – Storage Hard Drives

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

Capacity	4TB
Height	1 in; 2.54 cm
Width	Media Diameter 2.5 in; 6.36 cm
	Physical Size 2.75 in; 6.99 cm
Interface	Serial ATA (6Gb/s), NCQ enabled
Synchronous Transfer Rate (Maximum)	Up to 600MB/s
Buffer	128MB
Seek Time (typical reads, includes controller overhead, including settling)	Single Track 0.7ms
	Average 8.5ms
	Full Stroke 15.7ms
Rotational Speed	7,200 rpm
Operating Temperature	41° to 131° F (5° to 55° C)

**500GB SATA 7.2K SED SFF
HDD**

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

**1TB SATA 7200 rpm 8GB
3.5" SSHD (hybrid)**

Capacity	1TB
Height	1 in; 2.54 cm
Width	Media Diameter 3.5 in; 8.9 cm
	Physical Size 4 in; 10.17 cm
Interface	6Gb/s SATA
Synchronous Transfer Rate (Maximum)	Up to 600MB/s
Buffer	64MB standard HDD cache buffer
Cache	8GB NAND flash
Rotational Speed	7200 rpm
Operating Temperature	32° to 140° F (0° to 60° C)

Technical Specifications – Storage Hard Drives

SATA SSDs for HP Workstations

HP 128GB SATA 6Gb/s SSD

Capacity	128GB
Protocol	SATA
Form Factor	2.5"
Controller	AHCI
NAND Type	MLC
Endurance	100TBW (TB Written)
Reliability (MTTF)	1.5M hours
Physical Size (Height)	0.28 in; 0.7 cm
Physical Size (Width)	2.5 in; 6.36 cm
Interface	SATA 6Gb/s
Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)
Operating Temperature	32° to 158° F (0° to 70° C)
Performance	
	Sequential Read 560 MB/s
	Sequential Write 400 MB/s
	Random Read 90K IOPS
	Random Write 88K IOPS

HP 256GB SATA 6Gb/s SSD

Capacity	256GB
Protocol	SATA
Form Factor	2.5"
Controller	AHCI
NAND Type	MLC
Endurance	200TBW (TB Written)
Reliability (MTTF)	1.5M hours
Physical Size (Height)	0.28 in; 0.7 cm
Physical Size (Width)	2.5 in; 6.36 cm
Interface	SATA 6Gb/s
Synchronous Transfer Rate (Maximum)	Up to 600MB/s
Operating Temperature	32° to 158° F (0° to 70° C)
Performance	
	Sequential Read 560MB/s (max)
	Sequential Write 510MB/s (max)
	Random Read 100K IOPS (max)
	Random Write 88K IOPS (max)

HP 256GB SATA 6Gb/s SED Opal 1 SSD

Capacity	256GB
Protocol	SATA
Form Factor	2.5"
Controller	AHCI
NAND Type	MLC
Endurance	200TBW (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

Technical Specifications – Storage Hard Drives

	Interface	6Gb/s SATA								
	Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)								
	Operating Temperature	32° to 158° F (0° to 70° C)								
	Performance	<table border="0"> <tr> <td>Sequential Read</td> <td>560MB/s</td> </tr> <tr> <td>Sequential Write</td> <td>510 MB/s</td> </tr> <tr> <td>Random Read</td> <td>100K IOPS</td> </tr> <tr> <td>Random Write</td> <td>88K IOPS</td> </tr> </table>	Sequential Read	560MB/s	Sequential Write	510 MB/s	Random Read	100K IOPS	Random Write	88K IOPS
Sequential Read	560MB/s									
Sequential Write	510 MB/s									
Random Read	100K IOPS									
Random Write	88K IOPS									
	Self-Encrypting Drive Support	OPAL 1								
HP 512GB SATA 6Gb/s SSD	Capacity	512GB								
	Protocol	SATA								
	Form Factor	2.5"								
	Controller	AHCI								
	NAND Type	MLC								
	Endurance	300TBW (TB Written)								
	Reliability (MTTF)	1.5M hours								
	Physical Size (Height)	0.28 in; 0.7 cm								
	Physical Size (Width)	2.5 in; 6.36 cm								
	Interface	SATA 6Gb/s								
	Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)								
	Operating Temperature	32° to 158° F (0° to 70° C)								
	Performance	<table border="0"> <tr> <td>Sequential Read</td> <td>560 MB/s</td> </tr> <tr> <td>Sequential Write</td> <td>510 MB/s</td> </tr> <tr> <td>Random Read</td> <td>100K IOPS</td> </tr> <tr> <td>Random Write</td> <td>88K IOPS</td> </tr> </table>	Sequential Read	560 MB/s	Sequential Write	510 MB/s	Random Read	100K IOPS	Random Write	88K IOPS
Sequential Read	560 MB/s									
Sequential Write	510 MB/s									
Random Read	100K IOPS									
Random Write	88K IOPS									
HP 512GB SATA SED SSD	Capacity	512GB								
	Protocol	SATA								
	Form Factor	2.5"								
	Controller	AHCI								
	NAND Type	MLC								
	Endurance	300TBW (TB Written)								
	Reliability (MTTF)	1.5M hours								
	Physical Size (Height)	0.28 in; 0.7 cm								
	Physical Size (Width)	2.5 in; 6.36 cm								
	Interface	SATA 6Gb/s								
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s								
	Operating Temperature	32° to 158° F (0° to 70° C)								
	Performance	<table border="0"> <tr> <td>Sequential Read</td> <td>560 MB/s</td> </tr> <tr> <td>Sequential Write</td> <td>510 MB/s</td> </tr> <tr> <td>Random Read</td> <td>100K IOPS</td> </tr> <tr> <td>Random Write</td> <td>88K IOPS</td> </tr> </table>	Sequential Read	560 MB/s	Sequential Write	510 MB/s	Random Read	100K IOPS	Random Write	88K IOPS
Sequential Read	560 MB/s									
Sequential Write	510 MB/s									
Random Read	100K IOPS									
Random Write	88K IOPS									

Technical Specifications – Storage Hard Drives

	Self-Encrypting Drive Support	OPAL 1 and 2								
HP 1TB SATA 6Gb/s SSD	Capacity	1TB								
	Protocol	SATA								
	Form Factor	2.5"								
	Controller	AHCI								
	NAND Type	MLC								
	Endurance	400TBW (TB Written)								
	Reliability (MTTF)	1.5M hours								
	Physical Size (Height)	0.28 in; 0.7 cm								
	Physical Size (Width)	2.5 in; 6.36 cm								
	Interface	SATA 6Gb/s								
	Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)								
	Operating Temperature	32° to 158° F (0° to 70° C)								
	Performance	<table border="0"> <tr> <td>Sequential Read</td> <td>560 MB/s</td> </tr> <tr> <td>Sequential Write</td> <td>510 MB/s</td> </tr> <tr> <td>Random Read</td> <td>100K IOPS</td> </tr> <tr> <td>Random Write</td> <td>88K IOPS</td> </tr> </table>	Sequential Read	560 MB/s	Sequential Write	510 MB/s	Random Read	100K IOPS	Random Write	88K IOPS
	Sequential Read	560 MB/s								
Sequential Write	510 MB/s									
Random Read	100K IOPS									
Random Write	88K IOPS									
HP 2TB SATA 6Gb/s SSD	Capacity	2TB								
	Protocol	SATA								
	Form Factor	2.5"								
	Controller	AHCI								
	NAND Type	3D TLC								
	Endurance	400TBW (TB Written)								
	Reliability (MTTF)	1.5M hours								
	Physical Size (Height)	0.28 in; 0.7 cm								
	Physical Size (Width)	2.5 in; 6.36 cm								
	Interface	SATA 6Gb/s								
	Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)								
	Operating Temperature	32° to 158° F (0° to 70° C)								
	Performance	<table border="0"> <tr> <td>Sequential Read</td> <td>530 MB/s</td> </tr> <tr> <td>Sequential Write</td> <td>500 MB/s</td> </tr> <tr> <td>Random Read</td> <td>92K IOPS</td> </tr> <tr> <td>Random Write</td> <td>83K IOPS</td> </tr> </table>	Sequential Read	530 MB/s	Sequential Write	500 MB/s	Random Read	92K IOPS	Random Write	83K IOPS
	Sequential Read	530 MB/s								
Sequential Write	500 MB/s									
Random Read	92K IOPS									
Random Write	83K IOPS									
HP Enterprise Class 240GB SATA SSD	Capacity	240GB								
	Protocol	SATA								
	Form Factor	2.5"								
	Controller	AHCI								
	NAND Type	MLC								
	Endurance	920TBW (TB Written)								
	Reliability (MTTF)	2.0M hours								
Physical Size (Height)	0.28 in; 0.7 cm									

Technical Specifications – Storage Hard Drives

		Physical Size (Width)	2.5 in; 6.36 cm
		Interface	6Gb/s SATA
		Synchronous Transfer Rate (Maximum)	Up to 600MB/s
		Operating Temperature	32° to 158° F (0° to 70° C)
		Performance	Sequential Read 420 MB/s Sequential Write 290 MB/s Random Read 63K IOPS Random Write 18K IOPS
		Enterprise Class Features	High Endurance NAND Power Loss Protection End-to-End Data Protection
HP Enterprise Class 480GB SATA SSD		Capacity	480GB
		Protocol	SATA
		Form Factor	2.5"
		Controller	AHCI
		NAND Type	MLC
		Endurance	1850TBW (TB Written)
		Reliability (MTTF)	2.0M hours
		Physical Size (Height)	0.28 in; 0.7 cm
		Physical Size (Width)	2.5 in; 6.36 cm
		Interface	6Gb/s SATA
		Synchronous Transfer Rate (Maximum)	Up to 600MB/s
		Operating Temperature	32° to 158° F (0° to 70° C)
		Performance	Sequential Read 420 MB/s Sequential Write 380 MB/s Random Read 63K IOPS Random Write 23K IOPS
		Enterprise Class Features	High Endurance NAND Power Loss Protection End-to-End Data Protection
PCIe SSDs for HP Workstations	HP Z Turbo Drive G2 256GB SSD	Capacity	256GB
		Protocol	PCIe
		Form Factor	Half-height, half-length
		Controller	NVMe
		NAND Type	MLC
		Endurance	146TB
		Reliability (MTBF)	1.5M hours
		Interface	PCI Express 3.0 x4 electrical x4 physical
		Operating Temperature	32° to 158° F (0° to 70° C)
		Performance	Sequential Read 2150 MB/s Sequential Write 1260 MB/s Random Read 300K IOPS

Technical Specifications – Storage Hard Drives

		Random Write	100K IOPS
HP Z Turbo Drive G2 512GB SSD	Capacity	512GB	
	Protocol	PCIe	
	Form Factor	Half-height, half-length	
	Controller	NVMe	
	NAND Type	MLC	
	Endurance	292TB	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	2150 MB/s
		Sequential Write	1550 MB/s
		Random Read	300K IOPS
		Random Write	100K IOPS
HP Z Turbo Drive G2 1TB SSD	Capacity	1TB	
	Protocol	PCIe	
	Form Factor	Half-height, half-length	
	Controller	NVMe	
	NAND Type	MLC	
	Endurance	600TB	
	Reliability (MTTF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	2500 MB/s
		Sequential Write	1550 MB/s
		Random Read	210K IOPS
		Random Write	130K IOPS
HP Z Turbo Drive G2 256GB TLC SSD	Capacity	256GB	
	Protocol	PCIe	
	Form Factor	M.2 in Half-height, half-length card	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	75TBW (TB Written)	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	2800 MB/s
		Sequential Write	320 MB/s (1100 MB/s max/Turbo)
		Random Read	250K IOPS
		Random Write	180K IOPS

Technical Specifications – Storage Hard Drives

HP Z Turbo Drive G2 512GB TLC SSD	Capacity	512GB
	Protocol	PCIe
	Form Factor	M.2 in Half-height, half-length card
	Controller	NVMe
	NAND Type	3D TLC
	Endurance	150TBW (TB Written)
	Reliability (MTBF)	1.5M hours
	Interface	PCI Express 3.0 x4 electrical x4 physical
	Operating Temperature	32° to 158° F (0° to 70° C)
	Performance	Sequential Read 2800 MB/s
		Sequential Write 660 MB/s (1600 MB/s max/Turbo)
		Random Read 260K IOPS
		Random Write 260K IOPS
HP Z Turbo Drive G2 1TB SSD	Capacity	1TB
	Protocol	PCIe
	Form Factor	M.2 in Half-height, half-length card
	Controller	NVMe
	NAND Type	3D TLC
	Endurance	300TBW (TB Written)
	Reliability (MTTF)	1.5M hours
	Interface	PCI Express 3.0 x4 electrical x4 physical
	Operating Temperature	32° to 158° F (0° to 70° C)
	Performance	Sequential Read 3000 MB/s
		Sequential Write 1150 MB/s (1700 MB/s max/Turbo)
		Random Read 360K IOPS
		Random Write 330K IOPS
HP Z Turbo Drive Quad Pro 2x256GB PCIe SSD	Capacity	512GB
	Protocol	PCIe
	Form Factor	PCIe Card, Full Height PCIe Slot
	Controller	NVMe
	NAND Type	MLC
	Endurance	146TB
	Reliability (MTTF)	1.5M hours
	Interface	PCIe Gen3 x4 architecture
	Operating Temperature	32° to 158° F (0° to 70° C)
	Performance	Sequential Read 2150 MB/s
		Sequential Write 1260 MB/s
		Random Read 300K IOPS
		Random Write 100K IOPS

Technical Specifications – Storage Hard Drives

HP Z Turbo Drive Quad Pro 2x512GB PCIe SSD	Capacity	1TB	
	Protocol	PCIe	
	Form Factor	PCIe Card, Full Height PCIe Slot	
	Controller	NVMe	
	NAND Type	MLC	
	Endurance	292TB	
	Reliability (MTTF)	1.5M hours	
	Interface	PCIe Gen3 x4 architecture	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	2150 MB/s
		Sequential Write	1550 MB/s
		Random Read	300K IOPS
		Random Write	100K IOPS
HP Z Turbo Drive Quad Pro 2x1TB PCIe SSD	Capacity	2TB	
	Protocol	PCIe	
	Form Factor	PCIe Card, Full Height PCIe Slot	
	Controller	NVMe	
	NAND Type	MLC	
	Endurance	600TB	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	3200 MB/s
		Sequential Write	1800 MB/s
		Random Read	430K IOPS
		Random Write	320K IOPS
	HP Z Turbo Drive G2 256GB TLC SSD	Capacity	256GB
Protocol		PCIe	
Form Factor		M.2 in Half-height, half-length card	
Controller		NVMe	
NAND Type		3D TLC	
Endurance		75TBW (TB Written)	
Reliability (MTBF)		1.5M hours	
Interface		PCI Express 3.0 x4 electrical x4 physical	
Operating Temperature		32° to 158° F (0° to 70° C)	
Performance		Sequential Read	2800 MB/s
		Sequential Write	320 MB/s (1100 MB/s max/Turbo)
		Random Read	250K IOPS
		Random Write	180K IOPS
Capacity	512GB		

Technical Specifications – Storage Hard Drives

HP Z Turbo Drive G2 512GB TLC SSD	Protocol	PCIe
	Form Factor	M.2 in Half-height, half-length card
	Controller	NVMe
	NAND Type	3D TLC
	Endurance	150TBW (TB Written)
	Reliability (MTBF)	1.5M hours
	Interface	PCI Express 3.0 x4 electrical x4 physical
	Operating Temperature	32° to 158° F (0° to 70° C)
	Performance	Sequential Read 2800 MB/s
		Sequential Write 660 MB/s (1600 MB/s max/Turbo)
		Random Read 260K IOPS
		Random Write 260K IOPS
	HP Z Turbo Drive G2 1TB TLC SSD	Capacity
Protocol		PCIe
Form Factor		M.2 in Half-height, half-length card
Controller		NVMe
NAND Type		3D TLC
Endurance		300TBW (TB Written)
Reliability (MTBF)		1.5M hours
Interface		PCI Express 3.0 x4 electrical x4 physical
Operating Temperature		32° to 158° F (0° to 70° C)
Performance		Sequential Read 3000 MB/s
		Sequential Write 1150 MB/s (1700 MB/s max/Turbo)
		Random Read 360K IOPS
		Random Write 330K IOPS
HP Z Turbo Drive G2 256GB SED SSD	Capacity	256GB
	Protocol	PCIe
	Form Factor	Half-height, half-length
	Controller	NVMe
	NAND Type	MLC
	Endurance	150TBW (TB Written)
	Reliability (MTTF)	1.5M hours
	Interface	PCI Express 3.0 x4 electrical x4 physical
	Operating Temperature	32° to 158° F (0° to 70° C)
	Performance	Sequential Read 3100 MB/s
		Sequential Write 1400 MB/s
		Random Read 330K IOPS
		Random Write 280K IOPS
	Self-Encrypting Drive Support OPAL 2	

Technical Specifications – Storage Hard Drives

**HP Z Turbo Drive G2
512GB SED SSD**

Capacity	512GB	
Protocol	PCIe	
Form Factor	Half-height, half-length	
Controller	NVMe	
NAND Type	MLC	
Endurance	300TBW (TB Written)	
Reliability (MTBF)	1.5M hours	
Interface	PCI Express 3.0 x4 electrical x4 physical	
Operating Temperature	32° to 158° F (0° to 70° C)	
Performance	Sequential Read	3200 MB/s
	Sequential Write	1700 MB/s
	Random Read	330K IOPS
	Random Write	300K IOPS
Self-Encrypting Drive Support	OPAL 2	

Technical Specifications – Storage Hard Drives

HP Z Turbo Drive Quad Pro 256GB SSD module	Capacity	256GB (one M.2 PCIe NVMe module)
	Interface	PCI Express 3.0 x4 electrical x4 physical
	Operating Temperature	32° to 158° F (0° to 70° C)

HP Z Turbo Drive Quad Pro 512GB SSD module	Capacity	512GB (one M.2 PCIe NVMe module)
	Interface	PCI Express 3.0 x4 electrical x4 physical
	Operating Temperature	32° to 158° F (0° to 70° C)

HP Z Turbo Drive Quad Pro 1TB SSD module	Capacity	1TB (one M.2 PCIe NVMe module)
	Interface	PCI Express 3.0 x4 electrical x4 physical
	Operating Temperature	32° to 158° F (0° to 70° C)

Intel 750 Series AIC PCIe SSD	Intel 750 Series AIC 400GB PCIe SSD	Capacity	400GB	
		Protocol	PCIe	
		Form Factor	PCIe Card, Half Height	
		Controller	NVMe	
		NAND Type	MLC	
		Endurance	127TBW (TB Written)	
		Reliability (MTBF)	1.2M hours	
		Operating Temperature	32° to 131° F (0° to 55° C)	
		Performance	Sequential Read	2200 MB/s
			Sequential Write	900 MB/s
			Random Read	430K IOPS
			Random Write	230K IOPS

Intel 750 Series AIC PCIe SSD	Intel 750 Series AIC 800GB PCIe SSD	Capacity	800GB	
		Protocol	PCIe	
		Form Factor	PCIe Card, Half Height	
		Controller	NVMe	
		NAND Type	MLC	
		Endurance	127TBW (TB Written)	
		Reliability (MTBF)	1.2M hours	
		Operating Temperature	32° to 131° F (0° to 55° C)	
		Performance	Sequential Read	2100 MB/s
			Sequential Write	800 MB/s
			Random Read	420K IOPS
			Random Write	210K IOPS

Technical Specifications – Storage Hard Drives

Intel 750 Series AIC 1.2TB PCIe SSD	Capacity	1.2TB
	Protocol	PCIe
	Form Factor	PCIe Card, Half Height
	Controller	NVMe
	NAND Type	MLC
	Endurance	127TBW (TB Written)
	Reliability (MTBF)	1.2M hours
	Operating Temperature	1.2TB
	Performance	Sequential Read 2500 MB/s
		Sequential Write 1200 MB/s
		Random Read 460K IOPS
	Random Write 290K IOPS	

HDD Carrier	HP 4-in-1 SFF (2.5in) HDD Carrier	Dimensions (L x W x H)	6.70 x 5.75 x 1.63 in
		Kit Contents	Drive Carrier, Drive trays (4), Power adapter
		Weight	1.77 lbs

Technical Specifications - Hard Drive Controllers

LSI 9270-8i SAS 6Gb/s ROC RAID Card and iBBU9 Battery Backup Unit	PCI Bus	x8 lane PCIe 3.0 compliant
	RAID Levels	RAID 0, 1, 5, and 6 RAID spans 10, 50 and 60
	PCI Card Type	Low profile, single PCIe slot design with full height bracket.
	PCI Voltage	+3.3V Add-in Card
	PCI Power	+3.3V, +12V
	Certification Level	PCI-Express 3.0
	IO Bus	Eight 6Gb/s and 3Gb/s compatible SAS/SATA ports
	SAS Processor	LSISAS2208 Dual-Core RAID on Chip (ROC)
	Internal Connectors	Two SAS SFF8087 x4 (Mini-SAS)
	External Connectors	None
	Maximum Number of SCSI Devices	Up to 128 SAS and/or SATA hard drives and SSDs Note: HP Workstations do not support this many internal drives.
	LED Indicators	Heartbeat LED on card

Technical Specifications – Graphics

GRAPHICS

NVIDIA NVS 310 1GB Graphics

Form Factor

Low Profile:
2.713 inches in height × 6.150 inches in length
Weight: ~142 grams

Graphics Controller

NVIDIA NVS 310
GPU: GF119-825

Bus Type

PCI Express x16, 2.0 compliant

Memory

Size: 1GBB DDR3
Clock: 875Mhz
Memory Bandwidth: 14GB/

Connectors

2x DisplayPort 1.2

Maximum Resolution

Up to 2560 × 1600 (digital display) per display.

Image Quality Features

The following video formats are supported:

- MPEG2
- MPEG4 Part 2 Advanced Simple Profile
- H.264 SVC codec support
- Support for 3D Blu Ray
- VC1
- DivX version 3.11 and later
- MVC

A full range of video resolutions are supported including 1080p, 1080i, 720p, 480p and 480i. The NVS 310 GPU provides hardware acceleration for the computationally intensive parts of video processing, as well as provides improved video playback speeds via faster decode and transcode.

Display Output

Up to 2 displays in the following configurations:

DisplayPort output:

- Drives two DisplayPort enabled digital display at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking, when connected natively using the 2 DisplayPort connectors on the NVS 310 graphics card
- Supports 2 monitors up to resolution of 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort 1.2 multi stream topology technology.

DVI-D output:

- Drives two digital display at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort to DVI-D single-link cable adaptors
- Drives two digital display at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking using DisplayPort to DVI-D dual-link cable adaptors

HDMI output:

Technical Specifications – Graphics

- NVS 310 is capable of driving two high definition (HD) panels up to resolutions of 1920 × 1080P at 60 Hz using DisplayPort to HDMI cable adaptors

VGA display output:

- Drives two analog display at resolutions up to 1920 × 1200 at 60 Hz using DisplayPort to VGA cable adaptors

Shading Architecture Shader Model 5.0

Supported Graphics APIs DX11, OpenGL 4.1

Available Graphics Drivers
Windows 8.1
Windows 8
Genuine Windows 7 Professional (64-bit and 32-bit)
Red Hat Enterprise Linux(RHEL)
SUSE Linux Enterprise Desktop 11 (64-bit and 32-bit)

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

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

SUSE Linux Enterprise drivers may also be obtained from:

<ftp://download.nvidia.com/novell> or <http://www.nvidia.com>

Notes

1. The thermal solution used on this card is an active fan heatsink.
2. Factory configured NVS 310 graphics card have no cable adaptors included. Adapters must be ordered separately.
3. Option kit NVS 310 includes 2 DP to DVI-D cable adapters.
4. Configurations of three NVS 310 graphics cards in HP Z440 Workstation require the HP Z440 Fan and Front Card Guide Kit, configurable from the factory (CTO PN: G8T99AV) or as an Aftermarket Option (AMO PN: J9P80AA).

Technical Specifications – Graphics

NVIDIA NVS 315 512MB Graphics	Form Factor	Low Profile: 2.713 inches in height × 5.7 inches in length Weight: ~142 grams
	Graphics Controller	NVIDIA NVS 315 (using GF119-825 GPU) Number of Cores: 48 CUDA cores Max. Power: 19.3W Cooling Solution: Active fan heatsink
	Bus Type	PCI Express x16, 2.0 compliant
	Memory	Size: 1GB DDR3 Clock: 875MHz Memory Bandwidth: 14GB/s
	Connectors	DMS-59 output Cables included: - For CTO: DMS-59 to DVI cable - For AMO: DMS-59 to DVI cable and DMS-59 to VGA cable
	Maximum Resolution	Maximum number of displays supported: 2 Maximum Resolution Support: - DMS-59 to VGA: 2048 x 1536 @ 85Hz - DMS-59 to DVI: 1980 x 1200 @ 60Hz - DMS-59 to DP: 2560 x 1600 @ 60Hz
	Image Quality Features	See Display Output section. The following video formats are supported: - MPEG2 - MPEG4 Part 2 Advanced Simple Profile - H.264 SVC codec support - Support for 3D Blu Ray - VC1 - DivX version 3.11 or later A full range of video resolutions are supported including 1080p, 1080i, 720p, 480p and 480i. The NVS 315 GPU provides hardware acceleration for the computationally intensive parts of video processing, as well as provides improved video playback speeds via faster decode and transcode.
	Display Output	Up to 2 displays using one of the following DMS-59 cables: - DMS-59 to DVI - DMS-59 to VGA - DMS-59 to DP DisplayPort output: <ul style="list-style-type: none">• Drives two DisplayPort enabled digital displays at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking, when connected via the DMS-59 to DP adapter. DVI-D output: <ul style="list-style-type: none">• Drives two digital displays at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking using DMS-59 to DVI-D single-link cable adaptor

Technical Specifications – Graphics

VGA display output:

- Drives two analog displays at resolutions up to 2048 × 1536 at 85 Hz using DMS-59 to VGA cable adaptor.

Shading Architecture Shader Model 5.0
Supported Graphics APIs DX11, OpenGL 4.3

Available Graphics Drivers Windows 8
 Microsoft Windows 7 Professional (64-bit and 32-bit)
 Microsoft Windows XP Professional (64-bit and 32-bit)
 Red Hat Enterprise Linux(RHEL)
 SUSE Linux Enterprise Desktop 11 (64-bit and 32-bit)

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

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

SUSE Linux Enterprise drivers may also be obtained from:

<ftp://download.nvidia.com/novell> or <http://www.nvidia.com>

NOTES:

1. The thermal solution used on this card is an active fan heatsink.
2. Factory configured graphics card includes DMS-59 to DVI cable.
3. Option kit graphics card includes DMS-59 to DVI and DMS-59 to VGA cables (one each).

NVIDIA NVS 510 2GB Graphics

Form Factor	Low Profile, 2.713 inches × 6.3 inches, single slot
Graphics Controller	NVS 510 GPU Core Clock: 797 MHz Memory Clock: 891 MHz CUDA Cores: 192
Bus Type	PCI Express x16, Generation 2.0
Memory	2GB DDR3
Connectors	Four mini-DisplayPort. Four mini-DisplayPort to DisplayPort adapters included. (DisplayPort to DVI-D, DisplayPort to VGA, DisplayPort to HDMI, and DisplayPort to Dual-Link DVI adapters available as separate accessories)
Maximum Resolution	Mini-DisplayPort connectors support ultra-high-resolution panels (up to 3840 x 2160 @ 60Hz) NOTE: This card supports up to four displays. For Windows XP, only 2 active displays are supported.
Image Quality Features	10-bit internal display processing, including hardware support for 10-bit scan-out
Display Output	DisplayPort with Multi-Stream Technology (MST) and High Bit Rate 2 (HBR2) support. Digital Display Support 1. DisplayPort Output

Technical Specifications – Graphics

- Drives four DisplayPort enabled digital display at resolutions up to 3840 × 2160 at 60 Hz with reduced blanking, when connected natively using the 4 DisplayPort connectors on the NVS 510 graphics card.
- DisplayPort Multi-Stream Topology (MST) Technology: Supports various combinations of display resolutions and number of displays when using DisplayPort multi stream topology technology – up to a maximum of 4 monitors at a resolution of 1920 × 1200 at 60 Hz with reduced blanking.

2. DVI-D Output

- Drives four digital displays at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort to DVI-D single-link cable adaptors.
- Drives four digital displays at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking using DisplayPort to DVI-D dual-link cable adaptors.

HDMI Output

- The NVS 510 graphics board is capable of driving four high definition (HD) panels up to resolutions of 1920 × 1080P at 60 Hz using DisplayPort to HDMI cable adaptors.

Analog Display Support

1. VGA display output

- Drives four analog displays at resolutions up to 1920 × 1200 at 60 Hz using DisplayPort to VGA cable adaptors.

Supported Graphics APIs Full Microsoft DirectX 11, Shader Model 5.0 support
Full OpenGL 4.3 support

Available Graphics Drivers Genuine Windows 7 Professional (64-bit and 32-bit)
Microsoft Windows XP Professional (64-bit and 32-bit)
Red Hat Enterprise Linux(RHEL) 6 Desktop/Workstation
SUSE Linux Enterprise Desktop 11 (64-bit and 32-bit)

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

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

NOTE: Heatsink cooler design is active.

Graphics Cable Adapter option choice is available starting Feb 1 2013 for the following graphics cards:

NVS 310, Quadro 410, Quadro K5000, FirePro V3900, FirePro W7000

New Graphics Cards introduced after Feb 1 2013 will be eligible for choosing Graphics Cable Adapters, unless otherwise specified.

No cable choice for NVS 300, NVS 510.

Maximum number of cables allowed is 8.

Graphics Cable Adapters

Technical Specifications – Graphics

NVIDIA® Quadro® K420 2GB Graphics	Form Factor	<p>Low Profile: 2.713 inches × 6.3 inches Cooling: Active</p>
	Graphics Controller	<p>NVIDIA® Quadro® K420 GPU: GK107 with 192 CUDA cores Power: 41W</p>
	Bus Type	<p>PCI Express x16, 2.0 compliant</p>
	Memory	<p>Size: 2GB DDR3 Clock: 891MHz Memory Bandwidth: 29GB/s Memory Width: 128 bit</p>
	Connectors	<p>One dual-link DVI-I connector One DisplayPort connector</p> <p>Factory Configured: No video cable adapter included After market option kit: One DP-to-DVI adapter included with card</p> <p>Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.</p>
	Maximum Resolution	<p>VGA (via adapter cable): - 2048 × 1536 × 32 bpp at 85 Hz</p> <p>Dual-link DVI - 2560 × 1600 × 32 bpp at 60 Hz (reduced blanking)</p> <p>Single-link DVI - 1920 × 1200 × 32 bpp at 60 Hz (reduced blanking)</p> <p>DisplayPort 1.2 - 3840 × 2160 × 30 bpp at 60 Hz</p>
	Image Quality Features	<p>12-bit internal display pipeline (hardware support for 12-bit scanout on supported panels, applications and connection)</p> <p>Stereoscopic 3D display support including NVIDIA® 3D Vision™ technology, 3D DLP, Interleaved, and passive stereo</p>
	Display Output	<p>Maximum number of displays: - 2 direct attached monitors - 4 using DP 1.2a with MST and HBR2 enabled monitors</p> <p>Maximum number of DisplayPort displays possible (may require MST and/or HBR2): - 4 1920x1200 - 2 2560x1600 - 1 3840x2160</p> <p>Maximum number of monitors across all available Quadro K420 outputs is 4.</p>
	Shading Architecture	<p>Shader Model 5.0</p>

Technical Specifications – Graphics

Supported Graphics APIs	DX11, OpenGL 4.4 Programming support for CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Python, and Fortran
Available Graphics Drivers	Microsoft Windows 8.1 Microsoft Windows 8 Microsoft Windows 7 Linux - Full OpenGL implementation, complete with NVIDIA and ARB extensions
Notes	<ol style="list-style-type: none"> 1. Factory configured Quadro K420 does not include any video adapters. Adapters must be ordered separately. 2. Option kit Quadro K420 includes one DP to DVI-D adapter. 3. Full Height Profile bracket installed. Low Profile bracket included in after market kit.

NVIDIA® Quadro® K620 2GB Graphics	Form Factor	2.713" H x 6.3" L Single Slot, Low Profile Full Height Profile bracket installed Low Profile bracket included Weight: 133 grams
	Graphics Controller	NVIDIA® Quadro® K620 Graphics Card GM107 GPU 384 CUDA cores Max Power: 45 Watts
	Bus Type	PCI Express 2.0 x16
	Memory	2 GB GDDR3, 900 MHz 128-bit memory I/O path 29 GB/s memory bandwidth
	Connectors	1 DL-DVI(I) output, 1 DisplayPort output Factory Configured: No video cable adapter included Option Kit: One DP-to-DVI adapter included with card
	Maximum Resolution	<p>Additional DVI-to-VGA, DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.</p> <p>DisplayPort 1.2: - up to 4096x2160 x 30 bpp @ 60Hz - supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST)</p> <p>Dual Link DVI(I) output: - up to 2560 x 1600 x 32 bpp @ 60Hz</p> <p>Single Link-DVI(I) output: - up to 1920 x 1200 x 32 bpp @ 60Hz</p>
	Image Quality Features	10-bit internal display processing pipeline 10-bit scan-out support
	Display Output	1 Dual-link DVI-I connector 1 Display Port connector
	Shading Architecture	Full Microsoft DirectX 11.1 Shader Model 5.0
	Supported Graphics APIs	OpenGL 4.4 DirectX 11.1 API support includes:

Technical Specifications – Graphics

Available Graphics Drivers

CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran
 Microsoft Windows 8.1
 Microsoft Windows 8
 Microsoft Windows 7
 Linux

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

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

1. Factory configured Quadro K620 does not include a video cable adapter. Video cable adapters must be ordered separately.
2. Quadro K620 offered as an Option Kit (AMO) includes one DP-to-DVI video cable adapter. Additional cables must be ordered separately.

NVIDIA® Quadro® P600 2GB Graphics

Form Factor

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

Graphics Controller

NVIDIA® Quadro® P600 Graphics Card
 GP107-850 GPU
 384 CUDA cores
 Max Power: 40 Watts

Bus Type

PCI Express 3.0 x16

Memory

Size: 2 GB GDDR5, 2000 MHz
 Memory Interface: 128-bit
 Memory Bandwidth: 64 GB/s

Connectors

4mDP Outputs*

Maximum Resolution

DisplayPort 1.4:
 - up to 4x 5120 x 2880 x 24 bpp @ 60Hz
 - supports Multi-Stream Transport (MST)

Image Quality Features

10-bit internal display processing pipeline
 10-bit scan-out support

Display Output

4 mDP Connectors

Shading Architecture

Full Microsoft DirectX 12 Shader Model 5.1

Supported Graphics APIs

OpenGL 4.5
 DirectX 12
 Vulkan 1.0
 API support includes:
 CUDA C, CUDA C++, DirectCompute , OpenCL

Available Graphics Drivers

Microsoft Windows 10
 Microsoft Windows 8.1
 Microsoft Windows 7
 Linux

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

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

Technical Specifications – Graphics

Notes

- *P400, P600 and P1000 only have mini-DisplayPort (mDP) video ports.
- Note 1:** Two mDP-to-DP adapters will ship with each P400, P600 or P1000 configured in HP Z Workstations Compatibles.
- Note 2:** AMO kits for P400, P600, P1000 and Adapters will ship in July 2017.
- Two mDP-to-DP Adapters are included in the P400, P600 and P1000 AMO kits.
 - If mDP-to-DP Adapters are needed, Adapters can be ordered separately:
 - 2KW86A6 - HP (Bulk 4) miniDP-to-DP Adapter Cables
 - 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables

AMD FirePro W4300 4GB Graphics

Form Factor

Low Profile, single slot (6.6" x 3.118")
Full Height, single slot (6.6" x 4.725")

Graphics Controller

AMD FirePro W4300 graphics
GPU Frequency: 930Mhz
Memory Clock Speed: 1500Mhz
GPU: 768 Stream Processors organized into 12 Compute Units
Power: <50 Watts
Cooling: Active

Bus Type

PCI Express® x16, Generation 3.0

Memory

4GB GDDR5 memory
Memory Bandwidth: up to 96 GB/s
Memory Width: 128 bit

Connectors

4x Mini Display Port 1.2 connectors with HBR2 and MST support.

Factory Configured: No video cable adapter included
After market option kit: No video cable adapter included

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

Maximum Resolution

DisplayPort:
- 4096x2160 @24bpp (3 x 4K @ 60Hz, 4 x 4K @ 30Hz)

Image Quality Features

Advanced support for 8-bit, 10-bit, and 16-bit per RGB color component.
High bandwidth scaler for high quality up and downscaling
Incorporated Adaptive-Sync enables FreeSync™ technology from AMD that allows GPU control of display refresh rates for tear-free and jitter-free image quality when rotating models or viewing video content.(Requires FreeSync compliant displays)

Display Output

Max number of monitors supported using DisplayPort 1.2a:

- 4 direct attached monitors
- 6 using DP 1.2a with MST and HBR2 enabled monitors

Monitor chaining from a single DisplayPort (subject to a max of 6 total monitors across all outputs, requires use of DisplayPort enabled monitors supporting MST and HBR2):

Technical Specifications – Graphics

- one 4096x2160 display
- two 2560x1600 displays
- four 1920x1200 displays

Shading Architecture	Shader Model 5.0
Supported Graphics APIs	OpenGL 4.4 OpenCL 2.0 DirectX 12.0
Available Graphics Drivers	Windows 10 (64-bit and 32-bit) Windows® 7 (64-bit and 32-bit) Linux

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

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

Notes	<ol style="list-style-type: none"> 1. AMD Eyefinity technology supports up to six DisplayPort™ monitors on an enabled graphics card. Supported display quantity, type and resolution vary by model and board design; confirm specifications with manufacturer before purchase. To enable more than two displays, or multiple displays from a single output, additional hardware such as DisplayPort-ready monitors or DisplayPort 1.2 MST-enabled hubs may be required. A maximum of two active adapters is recommended for consumer systems. See www.amd.com/eyefinityfaq for full details. 2. Configurations of two FirePro W4300 graphics cards in HP Z440 Workstation require the HP Z440 Fan and Front Card Guide Kit, configurable from the factory (CTO PN: G8T99AV) or as an Aftermarket Option (AMO PN: J9P80AA).
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AMD FirePro W2100 2GB Graphics	Form Factor	Low Profile, half length (full-height bracket included)
	Graphics Controller	AMD FirePro™ W2100 professional graphics based on Oland GPU. GPU: 320 Stream Processors organized into 5 Compute Units GPU Frequency: 630MHz Power: 35W Cooling: Active
	Bus Type	PCI Express® x8, Generation 3.0
	Memory	2GB DDR3 memory Memory Bandwidth: 28.8 GB/s Memory Width: 128bit
	Connectors	2x Display Port 1.2 connectors Factory Configured: No video cable adapter included Option Kit: One DP-to-DVI adapter included with card Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.
	Maximum Resolution	DisplayPort 1.2: up to 4096x2160 x 30 bpp @ 60Hz Dual Link DVI(I) (requires adapter cable):

Technical Specifications – Graphics

	up to 2560 x 1600 x 32 bpp @ 60Hz
	Single Link-DVI(I)(requires adapter): up to 1920 x 1200 x 32 bpp @ 60Hz
	VGA(requires adapter): up to 1920 x 1200 x 32 bpp @ 60Hz
Image Quality Features	Advanced support for 8-bit, 10-bit, and 16-bit per RGB color component. High bandwidth scaler for high quality up and downscaling.
Display Output	2 x DisplayPort® 1.2 Maximum number of displays: 2
Shading Architecture	Shader Model 5.0
Supported Graphics APIs	OpenCL™ 2.0, DirectX® 11.2/12 and OpenGL 4.4
Available Graphics Drivers	Windows 8.1 (64-bit and 32-bit) Windows 7 (64-bit and 32-bit) Linux HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html

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

NVIDIA® Quadro® K1200 4GB Graphics	Form Factor	Dimensions: 2.71" H x 6.875" L Single Slot, Low Profile Cooling: Active Weight: ~175 grams
	Graphics Controller	NVIDIA® Quadro® K1200 Graphics Card GPU: GM107 with 512 CUDA cores Power: 46 Watts
	Bus Type	PCI Express 2.0 x16
	Memory	Size: 4GB GDDR5 Memory Bandwidth: 80 GB/s Memory Width: 128-bit
	Connectors	4 mini-DisplayPort 1.2a Factory Configured Option: 4 mini-DP-to-DP adapters included with card Option Kit: 4 mini-DP-to-DP adapters included with card Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as accessories
	Maximum Resolution	DisplayPort: - up to 4096 x 2160 x 30 bpp @ 60Hz - supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST)

Technical Specifications – Graphics

DL-DVI(I) output:
- up to 2560 x 1600 x 32 bpp @ 60Hz

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

VGA (via adapter cable):
- 2048 x 1536 x 32 bpp at 85 Hz

Image Quality Features 12-bit internal display pipeline (hardware support for 12-bit scanout on supported panels, applications and connection)

Display Output Maximum number of displays
- 4 direct attached monitors

Maximum number of DisplayPort displays possible:
- 4 1920x1200
- 4 2560x1600
- 4 4096x2160

Maximum number of monitors across all available Quadro K1200 outputs is 4.

Shading Architecture Shader Model 5.0

Supported Graphics APIs OpenGL 4.4
DirectX 11.1

API support includes:
CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran

Available Graphics Drivers Microsoft Windows 8.1
Microsoft Windows 8
Microsoft Windows 7
Linux - Full OpenGL implementation, complete with NVIDIA 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

1. Quadro K1200 offered as Factory Configured Option includes 4 miniDP to DP video cable adapters. Other video cable adapters must be ordered separately.
2. Quadro K1200 offered as an Option Kit includes 4 mini-DP to DP adapters. Additional cables must be ordered separately.
3. A total maximum of 4 active monitors are supported across all display output types. This may be accomplished by using daisy chained DisplayPort 1.2 displays (displays must support MST and HBR2).

Technical Specifications – Graphics

NVIDIA® Quadro® K2200 4GB Graphics	Form Factor	Dimensions: 4.38" H x 7.97" L Single Slot, Full Height Cooling: Active
	Weight:	240 grams
	Graphics Controller	NVIDIA® Quadro® K2200 Graphics Card GM107 GPU with 640 CUDA cores Power: 68 Watts
	Bus Type	PCI Express 2.0 x16
	Memory	Size: 4 GB GDDR5 Memory Bandwidth: 80 GB/s Memory Width: 128-bit
	Connectors	1 DL-DVI(I) 2 DisplayPort 1.2a
		Factory Configured Option: No video cable adapter included Option Kit: One DP-to-DVI adapter included with card
		Additional DVI-to-VGA, DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as accessories
	Maximum Resolution	DisplayPort: - up to 4096 x 2160 x 30 bpp @ 60Hz - supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST) DL-DVI(I) output: - up to 2560 x 1600 x 32 bpp @ 60Hz Single Link-DVI(I) output: - up to 1920 x 1200 x 32 bpp @ 60Hz VGA (via adapter cable): - 2048 x 1536 x 32 bpp at 85 Hz
	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® 3D Vision™ technology, 3D DLP, Interleaved, and passive stereo
	Display Output	Maximum number of displays - 3 direct attached monitors - 4 using DP 1.2a with MST and HBR2 enabled monitors Maximum number of DisplayPort displays possible (may require MST and/or HBR2): - 4 1920x1200 - 4 2560x1600 - 2 4096x2160 Maximum number of monitors across all available Quadro K2200 outputs is 4.
	Shading Architecture	Shader Model 5.0

Technical Specifications – Graphics

Supported Graphics APIs	OpenGL 4.4 DirectX 11.1
	API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran
Available Graphics Drivers	Microsoft Windows 8.1 Microsoft Windows 8 Microsoft Windows 7 Linux - Full OpenGL implementation, complete with NVIDIA 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
	<ol style="list-style-type: none"> 1. Quadro K2200 offered as Factory Configured Option does not include a video cable adapter. Video cable adapters must be ordered separately. 2. Quadro K2200 offered as an Option Kit includes one DP-to-DVI video cable adapter. Additional cables must be ordered separately. 3. A total maximum of 4 active monitors are supported across all display output types. This may be accomplished by using daisy chained DisplayPort 1.2 displays (displays must support MST and HBR2).

NVIDIA® Quadro® M2000 4GB Graphics	Form Factor	Dimensions: 4.376" H x 6.6" L Single Slot, Full Height Cooling: Active Weight: 239 grams
	Graphics Controller	NVIDIA® Quadro® M2000 Graphics Card GPU: GM206 with 768 CUDA cores Power: 75 Watts
	Bus Type	PCI Express 3.0 x16
	Memory	Size: 4GB GDDR5 Memory Bandwidth: 105.7 GB/s Memory Width: 128-bit
	Connectors	4x DisplayPort 1.2a Factory Configured Option: No video cable adapter included After Market Option: No video cable adapter included Additional DisplayPort-to-VGA, DisplayPort-to-HDMI, or DisplayPort-to-DVI adapters are available as accessories
	Maximum Resolution	DisplayPort: - up to 4096 x 2160 x 30 bpp @ 60Hz - up to 2560 x 1600 x 30 bpp @ 120 Hz - supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST)

Technical Specifications – Graphics

Using two DP outputs, the M2000 can drive one dual DP input display with 5120 x 2880 x 30 bpp @ 60Hz resolution.

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® 3D Vision™ technology, 3D DLP, Interleaved, and passive stereo
Display Output	Maximum number of displays - 4 direct attached monitors Maximum number of monitors across all available Quadro M2000 outputs is 4.
Shading Architecture	Shader Model 5.0
Supported Graphics APIs	OpenGL 4.5 DirectX 12 API support includes: CUDA C, CUDA C++, DirectCompute 5.0, and OpenCL software
Available Graphics Drivers	Microsoft Windows 10 Microsoft Windows 7 Linux - Full OpenGL implementation, complete with NVIDIA 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	<ol style="list-style-type: none"> 1. Quadro M2000 offered as Factory Configured Option does not include a video cable adapter. Video cable adapters must be ordered separately. 2. Quadro M2000 offered as an After Market Option does not include video cables. Video cable adapters must be ordered separately.

NVIDIA Quadro P2000 5GB Graphics

Form Factor	Dimensions: 4.4"Hx7.9"L Single Slot Cooling: Active Weight: 260 grams
Graphics Controller	NVIDIA Quadro P2000 Graphics Card Power: 75 Watts
Bus Type	PCI Express 3.0 x16
Memory	Size: 5GB GDDR5 Memory Bandwidth: 140 GB/s Memory Width: 160-bit

Technical Specifications – Graphics

Connectors	<p>4x DisplayPort 1.4</p> <p>Factory Configured Option: No adapter included with card After Market Option: No video cable adapter included</p> <p>Additional DVI to VGA, DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories.</p>
Maximum Resolution	<p>DisplayPort:</p> <ul style="list-style-type: none"> - up to 5120 x 2880 x 24 bpp @ 60Hz - supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST) DP 1.3 & 1.4 ready. <p>DL-DVI(I) output:</p> <ul style="list-style-type: none"> - up to 2560 x 1600 x 32 bpp @ 60 Hz <p>Single Link-DVI(I) output:</p> <ul style="list-style-type: none"> - up to 1920 x 1200 x 32 bpp @ 60Hz <p>HDMI 2.0 (requires DP to HDMI adapter): 5120 x 2880 x 24 bpp @ 60Hz</p>
Image Quality Features	<p>12-bit internal display pipeline (hardware support for 12-bit scanout on supported panels, applications and connection)</p> <p>Stereoscopic 3D display support including NVIDIA® 3D Vision™ technology, NVIDIA® Mosaic and nView.</p>
Display Output	<p>Maximum number of displays - 4 direct attached monitors</p> <p>Maximum number of monitors across all available Quadro P2000 outputs is 4.</p>
Shading Architecture	Shader Model 5.1
Supported Graphics APIs	<p>OpenGL® 4.5 DirectX® 12</p> <p>API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran software</p>
Available Graphics Drivers	<p>Microsoft Windows 10 Microsoft Windows 7 Professional 64bit Linux - Full OpenGL implementation, complete with NVIDIA and ARB extensions</p> <p>HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html</p>

Technical Specifications – Graphics

Notes

1. Quadro P2000 offered as Factory Configured Option does not include a video cable adapter. Video cable adapters must be ordered separately.
2. Quadro P2000 offered as an After Market Option does not include video cables. Video cable adapters must be ordered separately.

AMD FirePro W4300 4GB Graphics

Form Factor

Low Profile, single slot (6.6" x 3.118")
Full Height, single slot (6.6" x 4.725")

Graphics Controller

AMD FirePro W4300 graphics
GPU Frequency: 930Mhz
Memory Clock Speed: 1500Mhz
GPU: 768 Stream Processors organized into 12 Compute Units
Power: <50 Watts
Cooling: Active

Bus Type

PCI Express® x16, Generation 3.0

Memory

4GB GDDR5 memory
Memory Bandwidth: up to 96 GB/s
Memory Width: 128 bit

Connectors

4x Mini Display Port 1.2 connectors with HBR2 and MST support.

Factory Configured: No video cable adapter included
After market option kit: No video cable adapter included

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

Maximum Resolution

DisplayPort:
- 4096x2160 @24bpp (3 x 4K @ 60Hz, 4 x 4K @ 30Hz)

Image Quality Features

Advanced support for 8-bit, 10-bit, and 16-bit per RGB color component.
High bandwidth scaler for high quality up and downscaling
Incorporated Adaptive-Sync enables FreeSync™ technology from AMD that allows GPU control of display refresh rates for tear-free and jitter-free image quality when rotating models or viewing video content.(Requires FreeSync compliant displays)

Display Output

Max number of monitors supported using DisplayPort 1.2a:

- 4 direct attached monitors
- 6 using DP 1.2a with MST and HBR2 enabled monitors

Monitor chaining from a single DisplayPort (subject to a max of 6 total monitors across all outputs, requires use of DisplayPort enabled monitors supporting MST and HBR2):

- one 4096x2160 display
- two 2560x1600 displays
- four 1920x1200 displays

Shading Architecture

Shader Model 5.0

Supported Graphics APIs OpenGL 4.4

Technical Specifications – Graphics

Available Graphics Drivers

OpenCL 2.0
DirectX 12.0
Windows 10 (64-bit and 32-bit)
Windows® 7 (64-bit and 32-bit)
Linux

Notes

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

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

3. AMD Eyefinity technology supports up to six DisplayPort™ monitors on an enabled graphics card. Supported display quantity, type and resolution vary by model and board design; confirm specifications with manufacturer before purchase. To enable more than two displays, or multiple displays from a single output, additional hardware such as DisplayPort-ready monitors or DisplayPort 1.2 MST-enabled hubs may be required. A maximum of two active adapters is recommended for consumer systems. See www.amd.com/eyefinityfaq for full details.
4. Configurations of two FirePro W4300 graphics cards in HP Z440 Workstation require the HP Z440 Fan and Front Card Guide Kit, configurable from the factory (CTO PN: G8T99AV) or as an Aftermarket Option (AMO PN: J9P80AA).

Technical Specifications – Graphics

AMD FirePro W5100 4GB Graphics	Form Factor	Full height, single slot (6.75" X 4.376")
	Graphics Controller	AMD FirePro W5100 graphics GPU Frequency: 930Mhz GPU: 768 Stream Processors organized into 12 Compute Units Power: <75 Watts Cooling: Active
	Bus Type	PCI Express® x16, Generation 3.0
	Memory	4GB GDDR5 memory Memory Bandwidth: up to 96 GB/s Memory Width: 128 bit
	Connectors	4x Display Port 1.2 connectors with HBR2 and MST support. Factory Configured: No video cable adapter included After market option kit: No video cable adapter included Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.
	Maximum Resolution	DisplayPort: - 4096x2160 @24bpp 60Hz Dual Link DVI: - 2560x1600 (requires DP to DL-DVI adapter) Single Link DVI: - 1920x1200 (requires DP to DVI adapter) VGA: - 1920x1200 (requires DP to VGA adapter)
	Image Quality Features	Advanced support for 8-bit, 10-bit, and 16-bit per RGB color component. High bandwidth scaler for high quality up and downscaling
	Display Output	Max number of monitors supported using DisplayPort 1.2a: - 4 direct attached monitors - 6 using DP 1.2a with MST and HBR2 enabled monitors Monitor chaining from a single DisplayPort (subject to a max of 6 total monitors across all outputs, requires use of DisplayPort enabled monitors supporting MST and HBR2): - one 4096x2160 display - two 2560x1600 displays - four 1920x1200 displays
	Shading Architecture	Shader Model 5.0
	Supported Graphics APIs	OpenGL 4.4 OpenCL 1.2 and 2.0 DirectX 11.2 / 12 AMD Mantle

Technical Specifications – Graphics

Available Graphics Drivers

Windows 8.1 / 8 (64-bit and 32-bit)
Windows® 7 (64-bit and 32-bit)
Linux

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

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

NOTES:

1. AMD Eyefinity technology supports up to six DisplayPort™ monitors on an enabled graphics card. Supported display quantity, type and resolution vary by model and board design; confirm specifications with manufacturer before purchase. To enable more than two displays, or multiple displays from a single output, additional hardware such as DisplayPort-ready monitors or DisplayPort 1.2 MST-enabled hubs may be required. A maximum of two active adapters is recommended for consumer systems. See <http://www.amd.com/eyefinityfaq> for full details.
2. Configurations of two FirePro W5100 graphics cards in HP Z440 Workstation require the HP Z440 Fan and Front Card Guide Kit, configurable from the factory (CTO PN: G8T99AV) or as an Aftermarket Option (AMO PN: J9P80AA).

**Radeon™ Pro WX 4100
4GB Graphics**

**Form Factor
Graphics Controller**

Low-Profile Single Slot (6.6" Length)
Polaris 11 Baffin GL XT
GPU: 1024 Stream Processors organized into 16 Compute Units
Power: 50 Watts
Cooling: Active

Memory

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

Connectors

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

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

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

Maximum Resolution

5K support @ 60Hz

- 1x single-cable 5K monitor, or 2x dual-cable 5K monitors

4x 4K support @ 60Hz

Image Quality Features

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

Display Output

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

Technical Specifications – Graphics

GPU Architecture	GCN 4th Generation
Supported Graphics APIs	DirectX® 12 OpenGL® 4.5 OpenCL™ 2.0 Vulkan™ 1.0
Available Graphics Drivers	Windows 10 64-bit Windows® 7 64-bit Linux 64-bit (selected Enterprise distributions)

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

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

Notes	<ol style="list-style-type: none"> 1. HDR content requires that the system be configured with a fully HDR-ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support. 2. AMD PowerTune and AMD ZeroCore Power are technologies offered by certain FirePro™ and Radeon™ Pro products, which are designed to intelligently manage GPU power consumption in response to certain GPU load conditions. 3. As of September 2016, certified for DisplayPort™ 1.4 HBR3 and ready for DisplayPort™ 1.4 HDR based on independent verification by DisplayPort™ testing authority. HDR content requires that the system be configured with a fully HDR-ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support.
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NVIDIA® Quadro® M4000 8GB Graphics	Form Factor	Dimensions: 4.4" H x 9.5" L Single Slot, Full Height Cooling: Active Weight: 475 grams (without extender)
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Graphics Controller	NVIDIA® Quadro® M4000 GPU: GM204 with 1664 CUDA cores Power: 120 Watts
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Bus Type	PCI Express 3.0 x16
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Memory	Size: 8GB GDDR5 Memory Bandwidth: 192 GB/s Memory Width: 256-bit
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Connectors	4 DisplayPort 1.2a Factory configured Option: No video cable adapter included After market option kit: No video cable adapter included
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Technical Specifications – Graphics

Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as accessories

Maximum Resolution

DisplayPort:
- single DisplayPort up to 4096 x 2160 x 30 bpp @ 60Hz
- supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST)

DL-DVI(I) output:
- up to 2560 x 1600 x 32 bpp @ 60Hz

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

VGA (via adapter cable):
- 2048 x 1536 x 32 bpp at 85 Hz

Image Quality Features

12-bit internal display pipeline (hardware support for 12-bit scanout on supported panels, applications and connection)

NVIDIA® 3D Vision™ technology, 3D DLP, Interleaved, and other 3D stereo format support

Full OpenGL quad buffered stereo support

Support for large-scale, ultra-high resolution visualization using the NVIDIA® SVS platform which includes NVIDIA® Mosaic, NVIDIA® Sync and NVIDIA® Warp/Blend technologies

Display Output

Maximum number of displays
- 4 direct attached monitors
- 4 using DP 1.2a with MST and HBR2 enabled monitors

Maximum number of DisplayPort displays possible:
- 4 1920x1200
- 4 2560x1600
- 4 4096x2160
- 2 5120x2880 (requires dual DP input capable 5k displays)

Maximum number of monitors across all available Quadro M4000 outputs is 4.

Shading Architecture

Shader Model 5.0

Supported Graphics APIs

OpenGL 4.5
DirectX 12

API support includes:
CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran

Available Graphics Drivers

Microsoft Windows 10
Microsoft Windows 8.1
Microsoft Windows 8
Microsoft Windows 7

Technical Specifications – Graphics

Linux - Full OpenGL implementation, complete with NVIDIA 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

1. Configurations using the Quadro M4000 graphics card in HP Z440 Workstation require the HP Z440 Fan and Front Card Guide Kit, configurable from the factory (CTO PN: G8T99AV) or as an Aftermarket Option (AMO PN: J9P80AA).

NVIDIA® Quadro® M5000 8GB Graphics **Form Factor**

Dimensions: 4.4" H x 10.5" L
Dual Slot, Full Height
Cooling: Active
Weight: 525 grams (without extender)

Graphics Controller

NVIDIA® Quadro® M5000
GPU: GM204 with 2048 CUDA cores
Power: 150 Watts

Bus Type

PCI Express 3.0 x16

Memory

Size: 8GB GDDR5 ECC capable
Memory bandwidth: 211GB/s
Memory Width: 256-bit

Connectors

1 Dual Link DVI-I
4 DisplayPort 1.2a

Factory configured option: No adapter included with card.
After market option kit: No adaptor included with card.

Additional DVI to VGA, DisplayPort to VGA, DisplayPort to DVI, and DisplayPort to Dual-Link DVI adapters available as accessories

Maximum Resolution

DisplayPort:
- up to four 4096 x 2160 x 30 bpp @ 60Hz displays
- up to two 5120 x 2880 @ 60Hz displays
- supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST)

DL-DVI(I) output:
- up to 2560 x 1600 x 32 bpp @ 60Hz

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

VGA (via adapter cable):
- 2048 x 1536 x 32 bpp at 85 Hz

Technical Specifications – Graphics

Image Quality Features	<p>12-bit internal display pipeline (hardware support for 12-bit scanout on supported panels, applications and connection)</p> <p>NVIDIA® 3D Vision™ technology, 3D DLP, Interleaved, and other 3D stereo format support.</p> <p>Full OpenGL quad buffered stereo support.</p> <p>Support for large-scale, ultra-high resolution visualization using the NVIDIA® SVS platform which includes NVIDIA® Mosaic, NVIDIA® Sync and NVIDIA® Warp/Blend technologies.</p>
Display Output	<p>Maximum number of displays</p> <ul style="list-style-type: none">- 4 direct attached monitors- 4 using DP 1.2a with MST and HBR2 enabled monitors <p>Maximum number of DisplayPort displays possible (may require MST and/or HBR2):</p> <ul style="list-style-type: none">- 4 1920x1200- 4 2560x1600- 4 4096x2160- 2 5120x2880 (requires dual DP input 5k displays) <p>Maximum number of monitors across all available Quadro M5000 outputs is 4.</p>
Shading Architecture	Shader Model 5.0
Supported Graphics APIs	OpenGL 4.5 DirectX 12
	API support for NVIDIA's CUDA™ C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, Fortran
Available Graphics Drivers	Microsoft Windows 10 Microsoft Windows 8.1 Microsoft Windows 8 Microsoft Windows 7 Linux - Full OpenGL implementation, complete with NVIDIA 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	<ol style="list-style-type: none">1. Factory configured Quadro M5000 does not include a video cable adapter. Video cable adapters must be ordered separately.2. A total maximum of 4 active monitors are supported across all display output types. This may be accomplished by using daisy chained DisplayPort 1.2 displays (displays must support MST and HBR2).3. Configurations of a single Quadro M5000 graphics card in HP Z440 Workstation require the HP Z440 Fan and Front Card Guide Kit, configurable from the factory (CTO PN: G8T99AV) or as an Aftermarket Option (AMO PN: J9P80AA).

Technical Specifications – Graphics

AMD FirePro W7100 8GB Graphics	Form Factor	Full height, single slot (9.5" X 4.376")
	Graphics Controller	AMD FirePro W7100 graphics GPU: 1792 Stream Processors organized into 28 Compute Units Power: <75 Watts Cooling: Active
	Bus Type	PCI Express® x16, Generation 3.0
	Memory	8GB GDDR5 memory Memory Bandwidth: up to 176 GB/s Memory Width: 256 bit
	Connectors	4x Display Port 1.2a connectors with HBR2 and MST support. Factory Configured: No video cable adapter included After market option kit: No video cable adapter included Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.
	Maximum Resolution	DisplayPort: - 4096x2160 @24bpp 60Hz Dual Link DVI: - 2560x1600 (requires DP to DL-DVI adapter) Single Link DVI: - 1920x1200 (requires DP to DVI adapter) VGA: - 1920x1200 (requires DP to VGA adapter)
	Image Quality Features	Advanced support for 8-bit, 10-bit, and 16-bit per RGB color component. High bandwidth scaler for high quality up and downscaling
	Display Output	Max number of monitors supported using DisplayPort 1.2a: - 4 direct attached monitors - 6 using DP 1.2a with MST and HBR2 enabled monitors Monitor chaining from a single DisplayPort (subject to a max of 6 total monitors across all outputs, requires use of DisplayPort enabled monitors supporting MST and HBR2): - one 4096x2160 display - two 2560x1600 displays - four 1920x1200 displays
	Shading Architecture	Shader Model 5.0
	Supported Graphics APIs	OpenGL 4.4

Technical Specifications – Graphics

OpenCL 1.2 and 2.0
DirectX 11.2 / 12
AMD Mantle

Available Graphics Drivers

Windows 8.1 / 8 (64-bit and 32-bit)
Windows® 7 (64-bit and 32-bit)
Linux

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

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

Notes

1. AMD Eyefinity technology supports up to six DisplayPort™ monitors on an enabled graphics card. Supported display quantity, type and resolution vary by model and board design; confirm specifications with manufacturer before purchase. To enable more than two displays, or multiple displays from a single output, additional hardware such as DisplayPort-ready monitors or DisplayPort 1.2 MST-enabled hubs may be required. See www.amd.com/eyefinityfaq for full details.
2. OpenGL 4.4 support available with driver 14.301.xxx or later.
3. OpenCL 2.0 support planned in driver updates for early 2015.
4. Configurations of a single FirePro W7100 graphics card in HP Z440 Workstation require the HP Z440 Fan and Front Card Guide Kit, configurable from the factory (CTO PN: G8T99AV) or as an Aftermarket Option (AMO PN: J9P80AA).

Radeon™ Pro WX 7100 8GB Graphics

Form Factor Graphics Controller

Full-Height Single Slot (9.5" Length)
Radeon™ Pro WX 7100 graphics
GPU: 2304 Stream Processors organized into 36 Compute Units
Power: 130 Watts
Cooling: Active

Memory

8GB GDDR5 memory
Memory Bandwidth: 7 Gbps / 224 GB/s
Memory Width: 256 bit

Connectors

4x Display Port 1.4 – HDR ready connectors with HBR3 and MST support.

Factory Configured: No video cable adapter included
After market option kit: No video cable adapter included

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

Maximum Resolution

- 5K support @ 60Hz
- 1x single-cable 5K monitor, or 2x dual-cable 5K monitors

Image Quality Features

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

Technical Specifications – Graphics

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

GPU Architecture GCN 4th Generation

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

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

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

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

Notes

4. 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.
5. Radeon VR Ready Creator Products are select Radeon Pro and AMD FirePro™ GPUs that meet or exceed the Oculus Rift or HTC Vive recommended specifications for video cards/GPUs. Other hardware (including CPU) and system requirements recommended by Oculus Rift or HTC Vive should also be met in order to operate the applicable HMDs as intended. As VR technology, HMDs and other VR hardware and software evolve and/or become available, these criteria may change without notice.
6. AMD PowerTune and AMD ZeroCore Power are technologies offered by certain FirePro™ and Radeon™ Pro products, which are designed to intelligently manage GPU power consumption in response to certain GPU load conditions.
7. As of September 2016, certified for DisplayPort™ 1.4 HBR3 and ready for DisplayPort™ 1.4 HDR based on independent verification by DisplayPort™ testing authority. HDR content requires that the system be configured with a fully HDR-ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support.

Technical Specifications – Graphics

NVIDIA® QUADRO® M6000 Compatibility 12GB Graphics

HP Z840, Z640

Form Factor

4.42" H x 10.5" L
Dual Slot
Power: 250 Watts
Weight: 1030 grams

Graphics Controller

NVIDIA® QUADRO® M6000 Graphics Card based on the GM200 GPU
Core Count: 3072
Base Clock: 1026 MHz
Boost Clock: 1152 MHz
Idle Clock: 324 MHz

Bus Type

PCI Express 3.0 x16

Memory

12GB GDDR5
384-bit memory I/O path
317 GB/s memory bandwidth
ECC Memory (disabled by default)

Connectors

DP (x4)
Dual-Link DVI-I
3-pin mini-DIN connector
SLI connector
QUADRO® Sync connector
One 8-pin auxiliary power connector

Factory configured option: No adapter included with card.
Option Kit: No adaptor included with card.

DVI to VGA, DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories.

Image Quality Features

- DisplayPort™ with Multi-Stream Technology (MST) and High Bit Rate 2 (HBR2), HDMI 1.4, and HDCP 1.3 support
- NVIDIA® 3D Vision™ technology
- NVIDIA® Premium Mosaic and nView

Display Output

400 MHz integrated RAMDAC
• Maximum resolution over VGA (requires DVI to VGA cable or DP to VGA adapter): 2048 × 1536 × 32 bpp at 85 Hz

Dual-link internal TMDS (DVI 1.0)

- Maximum resolution over digital port (single GPU and SLI mode): 2560 × 1600 × 32 bpp at 60 Hz (reduced blanking)

Single-link internal TMDS (DVI 1.0)

- Maximum resolution over digital port (single GPU and SLI mode): 1920 × 1200 × 32 bpp at 60 Hz (reduced blanking)

DisplayPort™ 1.2a with MST and HBR2. Each DisplayPort™ connector has the following capabilities:

Technical Specifications – Graphics

- Maximum pixel clock: 592 MPixel/s
- Maximum bandwidth: 17.2 Gbps
- Example maximum resolution: 4096 × 2160 × 30 bpp at 60Hz

HDMI

- Maximum resolution (requires DP to HDMI adapter): 4096 × 2160 × 8 bpp at 60Hz

Shading Architecture Shader Model 5.0

Supported Graphics APIs Full OpenGL 4.4
Full DirectX 12
API support includes:
CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran

Available Graphics Drivers Windows 10
Windows 8.1
Windows 8
Windows 7 Professional
Linux®

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

<http://www8.hp.com/us/en/drivers.html>

Notes

1. NVIDIA® GRID VGX Pass Through feature supported on NVIDIA® QUADRO® M6000 to enable direct mapping of GPU to Virtual Machine.
2. No display output adapter included.
3. For HP Z840 Workstation configurations, the 1125W power supply option must be used.

NVIDIA® Quadro® M6000 24GB Graphics

Form Factor 4.4" H x 10.5" L
Dual Slot
Power: 250 Watts
Weight: 1023 grams

Graphics Controller NVIDIA® Quadro® M6000 Graphics Card based on the GM200 GPU
Core Count: 3072
Base Clock: 1026 MHz
Boost Clock: 1152 MHz
Idle Clock: 324 MHz

Bus Type PCI Express 3.0 x16

Memory 24GB GDDR5
384-bit memory I/O path
317 GB/s memory bandwidth
ECC Memory (disabled by default)

Connectors DP (x4)

Technical Specifications – Graphics

Dual-Link DVI-I
Optional Stereo
SLI connector
Quadro Sync connector
One 8-pin auxiliary power connector

Factory configured option: No adapter included with card.
Option Kit: No adaptor included with card.

Dual-Link DVI to VGA, DisplayPort to VGA, DisplayPort to DVI, and DisplayPort to Dual-Link DVI adapters available as accessories.

Image Quality Features	<ul style="list-style-type: none">• DisplayPort with Multi-Stream Technology (MST) and High Bit Rate 2 (HBR2), HDMI 1.4, and HDCP 1.3 support• NVIDIA 3D Vision™ technology• NVIDIA Premium Mosaic and nView
Display Output	<p>400 MHz integrated RAMDAC</p> <ul style="list-style-type: none">• Maximum resolution over VGA (requires DVI to VGA cable or DP to VGA adapter): 2048 × 1536 × 32 bpp at 85 Hz <p>Dual-link internal TMDS (DVI 1.0)</p> <ul style="list-style-type: none">• Maximum resolution over digital port (single GPU and SLI mode): 2560 × 1600 × 32 bpp at 60 Hz (reduced blanking) <p>Single-link internal TMDS (DVI 1.0)</p> <ul style="list-style-type: none">• Maximum resolution over digital port (single GPU and SLI mode): 1920 × 1200 × 32 bpp at 60 Hz (reduced blanking) <p>DisplayPort 1.2a with MST and HBR2. Each DisplayPort connector has the following capabilities:</p> <ul style="list-style-type: none">• Maximum pixel clock: 592 MPixel/s• Maximum bandwidth: 17.2 Gbps• Example maximum resolution: 4096 × 2160 × 30 bpp at 60Hz <p>HDMI</p> <ul style="list-style-type: none">• Maximum resolution (requires DP to HDMI adapter): 4096 × 2160 × 8 bpp at 60Hz
Shading Architecture	Shader Model 5.0
Supported Graphics APIs	Full OpenGL 4.4 Full DirectX 12 API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran
Available Graphics Drivers	Windows 10 Windows 8.1 Windows 8 Windows 7 Professional Linux

Technical Specifications – Graphics

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

<http://www8.hp.com/us/en/drivers.html>

Notes

1. NVIDIA GRID VGX Pass Through feature supported on NVIDIA® Quadro® M6000 to enable direct mapping of GPU to Virtual Machine.
2. No display output adapter included.
3. For HP Z840 Workstation configurations, the 1125W power supply option must be used.

NVIDIA® Quadro® P4000 8GB Graphics	Form Factor	Dimensions: 4.376" H x 9.5" L Single-slot, full-height Weight: 475 grams
	Graphics Controller	NVIDIA® Quadro® P4000 Graphics Card GPU: GP104 with 1792 CUDA cores Power: 105 Watts
	Bus Type	PCI Express 3.0 x16
	Memory	Size: 8GB GDDR5 Memory Bandwidth: 243 GB/s Memory Width: 256-bit
	Connectors	4x DisplayPort 1.4 Factory Configured Option: No video cable adapter included After Market Option: No video cable adapter included Additional DisplayPort-to-VGA, DisplayPort-to-HDMI, or DisplayPort-to-DVI adapters are available as accessories
	Maximum Resolution	DisplayPort: - up to 4096 x 2160 x 30 bpp @ 60Hz - up to 2560 x 1600 x 30 bpp @ 120 Hz - supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST) Using two DP outputs, the P4000 can drive one dual DP input display with 5120 x 2880 x 30 bpp @ 60Hz resolution.
	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® 3D Vision™ technology, 3D DLP, Interleaved, and passive stereo
	Display Output	Maximum number of displays - 4 direct attached monitors Maximum number of monitors across all available Quadro P4000 outputs is 4.
	Shading Architecture	Shader Model 5.0
	Supported Graphics APIs	OpenGL 4.5 DirectX 12

Technical Specifications – Graphics

API support includes:
 CUDA C, CUDA C++, DirectCompute 5.0, and OpenCL software

Available Graphics Drivers

Microsoft Windows 10
 Microsoft Windows 7
 Linux - Full OpenGL implementation, complete with NVIDIA and ARB extensions

Notes

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

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

1. Quadro P4000 offered as Factory Configured Option does not include a video cable adapter. Video cable adapters must be ordered separately.
2. Quadro P4000 offered as an After Market Option does not include video cables. Video cable adapters must be ordered separately.

**NVIDIA® Quadro® P5000
 16GB Graphics**

Form Factor

Full-Height Dual Slot (4.4" Height x 10.5" Length)
 Weight: 815 grams / 1.80 lbs

Graphics Controller

Quadro™ P5000 graphics
 GPU: 2560 NVIDIA CUDA® Parallel Processing Cores
 Power: 180 Watts
 Cooling: Active

Memory

16GB GDDR5X memory
 Memory Bandwidth: Up to 288 GB/s
 Memory Width: 256 bit
 ECC Memory (disabled by default)

Connectors

DP (x4) with HDR support
 DL-DVI(D)
 3-pin mini-DIN connector
 SLI connector
 Quadro Sync connector (compatible with Quadro II Sync)
 One 8-pin auxiliary power connector

Factory configured option: No video cable adapter included with card.
 After market option Kit: No video cable adaptor included with card.

DVI to VGA, DisplayPort to VGA, DisplayPort to DVI, and DisplayPort to Dual-Link DVI adapters available as accessories.

Maximum Resolution

5K support @ 60Hz
 1x single-cable 5K monitor, or 2x dual-cable 5K monitors

Technical Specifications – Graphics

Image Quality Features	Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component. HDCP 2.2 support over DisplayPort, DVI, and HDMI connectors NVIDIA 3D Vision™ and other 3D stereo technologies NVIDIA Mosaic and nView Desktop Management
Display Outputs¹	4x DP1.4 HDR outputs (up to 3840x2160 UHD @ 120Hz refresh, or up to 8K at 30Hz) 1x Dual-link DVI-D output (up to 2560 x 1600 @ 60 Hz and 1920x1200 @ 120 Hz)
GPU Architecture	NVIDIA Pascal™
Supported Graphics APIs	DirectX®12 , OpenGL® 4.5, OpenCL™ 1.0, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran
Available Graphics Drivers	Windows® 10 64-bit Windows® 7 64-bit Linux 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
Notes	<ol style="list-style-type: none">1- Supports up to a total of 4 displays2- For HP Z440 Workstations, the 700W power supply option must be used.3- For HP Z840 Workstation configurations, the 1125W power supply option must be used for multiple P5000 configurations.

Technical Specifications – Graphics

NVIDIA® Quadro® P6000 24GB Graphics	Form Factor	Full-Height Dual Slot (4.4" Height x 10.5" Length) Weight: 967 grams / 2.14 lbs
	Graphics Controller	Quadro™ P6000 graphics GPU: 3840 NVIDIA CUDA® Parallel Processing Cores Power: 250 Watts Cooling: Active
	Memory	24GB GDDR5X memory Memory Bandwidth: Up to 432 GB/s Memory Width: 384 bit ECC Memory (disabled by default)
	Connectors	DP (x4) with HDR support DL-DVI(I) 3-pin mini-DIN connector SLI connector Quadro Sync connector (compatible with Quadro II Sync) One 8-pin auxiliary power connector Factory configured option: No video cable adaptor included with card. After market option Kit: No video cable adaptor included with card. DVI to VGA, DisplayPort to VGA, DisplayPort to DVI, and DisplayPort to Dual-Link DVI adapters available as accessories.
	Maximum Resolution	5K support @ 60Hz 1x single-cable 5K monitor, or 2x dual-cable 5K monitors
	Image Quality Features	Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component. HDCP 2.2 support over DisplayPort, DVI, and HDMI connectors NVIDIA 3D Vision™ and other 3D stereo technologies NVIDIA Mosaic and nView
	Display Outputs¹	4x DP1.4 HDR outputs (up to 3840x2160 UHD @ 120Hz refresh, or up to 8K at 30Hz) 1x Dual-link DVI-D output (up to 2560 x 1600 @ 60 Hz and 1920x1200 @ 120 Hz)
	GPU Architecture	NVIDIA Pascal™
	Supported Graphics APIs	DirectX®12 , OpenGL® 4.5, OpenCL™ 1.0, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran
	Available Graphics Drivers	Windows® 10 64-bit Windows® 7 64-bit Linux 64-bit

Technical Specifications – Graphics

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
- 2- For HP Z440 Workstations, the 700W power supply option must be used.
- 3- For HP Z840 Workstation configurations, the 1125W power supply option must be used for multiple P5000 configurations.

NVIDIA® Quadro® GP100 16GB Graphics

Form Factor

Dual Slot (4.4" Height x 10.5" Length)
Weight: 989 grams +72 grams extender

Graphics Controller

NVIDIA® QUADRO® GP100
GPU: 3584 NVIDIA CUDA® Parallel Processing Cores
Power: 235 Watts
Cooling: Active

Memory

16GB HBM2
Memory Bandwidth: Up to 717 GB/s
Memory Width: 4096-bit
ECC Memory (disabled by default)

Connectors

DP (x4) with HDR support
DL-DVI(D)
3-pin mini-DIN connector via optional bracket
4-pin header for stereo signal
Quadro Sync connector SYNC for Quadro® Sync II
One 8-pin auxiliary power connector
(2x) NVLink connectors

Factory configured option: 8-pin power adapter included with card.
After market option Kit: 8-pin power adapter included with card.

DVI to VGA, DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories.

Maximum Resolution

5K support @ 60Hz
1x single-cable 5K monitor, or 2x dual-cable 5K monitors

Image Quality Features

HDR support over DisplayPort™ 1.4 (SMPTE 2084/2086, BT. 2020) (4K @ 60 Hz 10b/12b HEVC Decode, 4K @ 60 Hz 10b HEVC Encode)
HDCP 2.2 support over DisplayPort™, DVI, and HDMI connectors
NVIDIA 3D Vision™ technology
NVIDIA Mosaic and nView Desktop Management

Technical Specifications – Graphics

Display Outputs	<p>4x DP1.4 MST & HDR2 outputs (up to 5120 x 2880 @ 60Hz) 1x Dual-link DVI-D output (up to 2560 x 1600 @ 60 Hz) 1x Single-link DVI-D output (up to 1920 x 1200 @ 60 Hz) HDMI™ 2.0b (up to 5120 x 2880 @ 60Hz)*</p> <p>*requires DP to HDMI adapter</p>
GPU Architecture	NVIDIA GP
Supported Graphics APIs	<p>DirectX® 12, OpenGL® 4.5, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran</p>
Available Graphics Drivers	<p>Windows® 10 Windows® 7 Professional 64-bit Linux®</p> <p>HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html</p>

NVIDIA® Quadro® Sync II	Part number	1WT20AA
	Dimensions (HxD)	6.0 inches × 4.2 inches
	Devices Supported	<p>NVIDIA® Quadro® P4000 NVIDIA® Quadro® P5000 NVIDIA® Quadro® P6000</p>
	Bus Type	Requires one free mechanical PCIe bus slot. 6-pin PCI or SATA power connector
	PCI Form Factor	Full Height, half length, single slot
	Ports	2 RJ45 connectors for carrying frame lock signals over CAT5 cables. BNC Connector for external house synchronization.
	Internal Connectors	<p>6 NVIDIA SLI® style edge fingers for connection to compatible GPUs</p> <ul style="list-style-type: none"> • Included with the board are 4 12-Inch Short Sync Cables to connect to GPU's • Included with the board are 2 24-Inch Long Sync Cables to connect to GPU's
	System Requirements	<p>Requires one free mechanical PCIe bus slot. 6-pin PCI or SATA power connector Must be used with NVIDIA Quadro P4000, P5000 or P6000 graphics cards. Requires Quadro driver version R375 or later.</p>
	Temperature - Operating	0° to 55° C
	Temperature - Storage	-40° to 60° C
	Relative Humidity - Operating	10% to 80%
	Power Requirements	Board power dissipation: <15W

Technical Specifications – Graphics

Operating Systems Supported

Windows 10 64-bit
Windows 7 64-bit
Linux 64-bit

Kit Contents

Contains:

- Quadro Sync II Card
 - 4 x 12-Inch Short Sync Cables
 - 2 x 24-Inch Long Sync Cables (Two)
 - Quick Start Guide
-

Technical Specifications - Optical and Removable Storage

OPTICAL AND REMOVABLE STORAGE

HP 9.5mm Slim DVD Writer	Description	9.5mm height, tray-load	
	Mounting Orientation	Either horizontal or vertical	
	Interface Type	SATA/ATAPI	
	Dimensions (WxHxD)	128 x 9.5 x 127mm	
	Supported Media Types	DVD+R DVD+RW DVD+R DL DVD-R DL DVD-R DVD-RW CD-R CD-RW	
	Disc Capacity	DVD-ROM Full Stroke DVD Full Stroke CD	8.5 GB DL or 4.7 GB standard < 200 ms (seek) < 200 ms (seek)
	Maximum Data Transfer Rates	CD ROM Read DVD ROM Read	CD-ROM, CD-R Up to 24X CD-RW Up to 24X DVD+RW Up to 8X DVD-RW Up to 8X DVD+R DL Up to 8X DVD-R DL Up to 8X DVD-ROM Up to 8X DVD-ROM DL Up to 8X DVD+R Up to 8X DVD-R Up to 8X
	Power	Source DC Power Requirements DC Current	SATA DC power receptacle 5 VDC ± 5%-100 mV ripple p-p 5 VDC -< 800 mA typical, <1600 mA maximum
	Operating Environmental (all conditions non-condensing)	Temperature Relative Humidity Maximum Wet Bulb Temperature	41° to 122° F (5° to 50° C) 10% to 80% 84° F (29° C)
	Operating Systems Supported	Windows 10, Windows 7 Professional 32-bit and 64-bit, Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*. Red Hat Enterprise Linux(RHEL) WS4**, 5, 6 Desktop/Workstation SUSE Linux Enterprise Desktop 10 & 11	
Kit Contents	9.5mm Slim DVD Writer, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide		

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

Technical Specifications - Optical and Removable Storage

HP 9.5mm Slim DVD-ROM Drive	Description	9.5mm height, tray-load	
	Mounting Orientation	Either horizontal or vertical	
	Interface Type	SATA / ATAPI	
	Dimensions (WxHxD)	128 x 9.5 x 127mm	
	Disc Capacity	DVD-ROM	Single layer: Up to 4.7 GB
			Double layer: Up to 8.5 GB
	Access Times	DVD-ROM Single Layer	< 110 ms (typical)
		CD-ROM Mode 1	< 110 ms (typical)
		Full Stroke DVD	< 230 ms (typical)
		Full Stroke CD	< 220 ms (typical)
	Power	Source	SATA DC power receptacle
		DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p
		DC Current	5 VDC – <800mA typical, < 1600 mA maximum
Operating Environmental (all conditions non-condensing)	Temperature	41° to 122° F (5° to 50° C)	
	Relative Humidity	10% to 80%	
	Maximum Wet Bulb Temperature	84° F (29° C)	
Operating Systems Supported	Windows 10, Windows 7 Professional 32-bit and 64-bit, Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*. Red Hat Enterprise Linux(RHEL) WS4**, 5, 6 Desktop/Workstation SUSE Linux Enterprise Desktop 10 & 11		
	* No driver is required for this device. Native support is provided by the operating system.		
Kit Contents	9.5mm Slim DVD-ROM Drive, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide		

HP 9.5mm Slim BDXL Blu-Ray Writer	Description	9.5mm height, tray-load
	Mounting Orientation	Either horizontal or vertical
	Interface Type	SATA/ATAPI
	Dimensions (WxHxD)	128 x 9.5 x 127mm
	Supported Media Types	BD-ROM
		BD-R
		BD-RE
	DVD-RAM	
	DVD+R	
	DVD+RW	
	DVD+R DL	
	DVD-R DL	
	DVD-R	
	DVD-RW	
	CD-R	
	CD-RW	

Technical Specifications - Optical and Removable Storage

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 / 28S
		BD-R (SL/DL) 25S / 28S
		BD-RE (SL/DL) 25S / 28S
		DVD-ROM (SL/DL) 18S / 18S
		DVD-R (SL/DL) 25S / 25S
		DVD-RW 25S
	DVD+R (SL/DL) 25S / 25S	
	DVD+RW 25S	
	DVD-RAM 45S	
	CD-ROM 15S	
Maximum Data Transfer Rates	CD ROM Read	CD-ROM, CD-R Up to 24X
		CD-RW Up to 24X
	DVD ROM Read	DVD-RAM Up to 8X
		DVD+RW Up to 8X
		DVD-RW Up to 8X
		DVD+R DL Up to 8X
		DVD-R DL Up to 8X
		DVD-ROM Up to 8X
		DVD-ROM DL Up to 8X
		DVD+R Up to 8X
	DVD-R Up to 8X	
	Blu-ray	BD-ROM Up to 6X
BD-ROM DL Up to 6X		
BD-R Up to 6X		
BD-R DL Up to 6X		
	BD-R Up to 6X	
	BD-RE SL/DL Up to 6X	
Power	Source	SATA DC power receptacle
	DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p
	DC Current	5 VDC -900 mA typical, 2000mA maximum
Operating Environmental (all conditions non-condensing)	Temperature	41° to 122° F (5° to 50° C)
	Relative Humidity	10% to 80%
	Maximum Wet Bulb Temperature	84° F (29° C)
Operating Systems Supported	Windows 8.1, Windows 8 32-bit and 64-bit, Windows 7 Professional 32-bit and 64-bit, Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*.	
	Red Hat Enterprise Linux(RHEL) WS4**, 5, 6 Desktop/Workstation	

Technical Specifications - Optical and Removable Storage

SUSE Linux Enterprise Desktop 10 & 11

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

Kit Contents

9.5mm Slim 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 DX115 Removable Drive Enclosure

Interface Type

Compatible with SAS or SATA controllers. Offers 6Gb/s performance when used with 6Gb/s HDDs.

Dimensions (WxHxD)

147.6 x 41.1 x 205 mm (5.81 x 1.62 x 8.08 in)

Weight

Frame and Carrier: 1.73 kg (3.8 lbs.)
Carrier: 0.45 kg (1 lbs.)

Technical Specifications - Optical and Removable Storage

HP 15-in-1 Media Card Reader	Description	<p>Supports hardware ECC (Error Correction Code) function</p> <p>Supports hardware CRC (Cyclic Redundancy Check) function</p> <p>Supports MS 4-bit parallel transfer mode</p> <p>Supports MS-PRO 4-bit parallel transfer mode</p> <p>Supports MS PRO-HG Duo 4-bit parallel transfer mode</p> <p>Supports SD 4-bit parallel transfer mode</p> <p>Supports UHS-104 SD 4-bit card (version 3.0)</p> <p>Supports CF v6.0 with PIO mode 6 and Ultra DMA 7 mode</p>
	Interface Type	<p>USB 3.0 High-speed interface</p> <p>NOTE: If there is a USB2 connection, USB2 transfer speeds are supported.</p>
	Dimensions (WxHxD)	<p>4.9 x 4 x 1 in (124.5 x 101.6 x 25.4 mm) Fits conveniently in the 5.25" drive bay.</p>
	Supported Media Types	<p>CompactFlash Type I</p> <p>CompactFlash Type II</p> <p>Microdrive</p> <p>Secure Digital Card (SD)</p> <p>Secure Digital High Capacity (SDHC)</p> <p>SD Extended Capacity Memory Card (SDXC)</p> <p>SD Ultra High Speed II(SD UHSII)</p> <p>Memory Stick</p> <p>Memory Stick Select</p> <p>Memory Stick Duo (MS Duo)</p> <p>Memory Stick PRO (MS PRO)</p> <p>Memory Stick PRO Duo (MS PRO Duo)</p> <p>Memory Stick PRO-HG Duo</p> <p>MagicGate Memory Stick (MG)</p> <p>MagicGate Memory Stick Duo</p> <p>These additional media types are supported with a card adapter.</p> <p>Memory Stick Micro (M2)</p> <p>miniSD</p> <p>miniSD High Capacity</p> <p>Micro SD Memory Card (MicroSD)</p> <p>Micro SD High Capacity Memory Card (MicroSDHC)</p>
	Operating Systems Supported	<p>Test Parameters/Conditions - Power applied, unit operating on system ±5%</p> <p>Windows 8 Pro (64-bit)*</p> <p>Windows 8.1 (64-bit)*</p> <p>Windows 8 (64-bit)*</p> <p>Windows 7 Professional (32-bit)**</p> <p>Windows 7 Professional (64-bit)**</p> <p>Windows Vista Business 64</p> <p>Windows Vista Business 32</p> <p>Windows Vista Home Basic 32</p> <p>Windows XP Professional</p> <p>Windows XP Home 32</p> <p>No driver is required for this device. Native support is provided by the operating system.</p> <p>Not all features are available in all editions of Windows 8. Systems may require upgraded and/or separately purchased hardware, drivers and/or</p>

Technical Specifications - Optical and Removable Storage

	<p>software to take full advantage of Windows 8 functionality. See http://www.microsoft.com.</p> <p>Not all features are available in all editions of Windows 7. This system may require upgraded and/or separately purchased hardware to take full advantage of Windows 7 functionality.</p> <p>See http://www.microsoft.com/windows/windows-7/ for details.</p>
Kit Contents	Media card reader, 5.25" bracket/rails/bezel, Install Guide, IO & Security Software and Documentation CD
Approvals	USB-IF, WHQL, Compliant with USB Mass Storage Class Bulk only Transport Specification Rev. 1.0, Compliant Intel Front Panel I/O Connectivity Design Guide V. 1.3, FCC, CE, BSMI, C-Tick, VCCI, MIC, cUL, TUVT
Weight	0.35 lbs. (0.16 kg)

Technical Specifications - Controller Cards

CONTROLLER CARDS

HP IEEE 1394b FireWire PCIe Card	Data Transfer Rate	Supports up to 800 Mb/s
	Devices Supported	IEEE-1394 compliant devices
	Bus Type	PCIe card full height PCIe slots
	Ports	Two IEEE-1394b external 9-Pin connectors (Rear)
	Internal Connectors	One 10-Pin header connector
	System Requirements	Windows 8.1 64-bit, Windows 7 Professional 32-bit and 64-bit, SLED 11 and RHEL 6. Intel i5 series or higher processor, min 2GB of RAM, 20GB Hard Drive, CD-ROM drive, built in sound system, Available PCIe slot.
	Temperature – Operating	50° to 131° F (10° to 55° C)
	Temperature – Storage	-22° to 140° F (-30° to 60° C)
	Relative Humidity – Operating	20% to 80%
	Compliances	FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC
	Operating Systems Supported	Windows 8.1 64-bit, Windows 7 Professional 32-bit and 64-bit
HP Thunderbolt-2 PCIe 1-port I/O Card	Data Transfer Rate	Supports up to 20 Gb/s (20,000 Mb/s)
	Devices Supported	Thunderbolt™ certified devices
	Bus Type	PCIe card, full or half height PCIe slots
	Ports	One Thunderbolt™ 2 external 20-Pin output connectors (Rear) One full size DisplayPort input connector (Rear)
	Internal Connectors	One 5-Pin header connector
	System Requirements	Genuine Windows 7 Professional 64-bit, Genuine Windows 8.1 64-bit, Intel i5 series or higher processor, 4-GB RAM, 20-GB Hard Drive, available PCIe slot.
	Temperature - Operating	50° to 131° F (10° to 55° C)
	Temperature - Storage	-22° to 140° F (-30° to 60° C)
	Relative Humidity - Operating	20% to 80%
	Compliances	FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC
	Operating Systems Supported	Genuine Windows 7 Professional 64-bit, Genuine Windows 8.1 64-bit.
Kit Contents	HP Thunderbolt™ 2 PCIe 1-port I/O Card, full height and half height bracket, DisplayPort to DisplayPort cable, internal header cables (2), user documentation and warranty card.	

Technical Specifications - Networking and Communications

NETWORKING AND COMMUNICATIONS

HP X520 10GbE Dual Port Adapter **Hardware Certifications** FCC B, UL, CE, VCCI, BSMI, CTICK, KCC

HP 10GbE SFP+ SR Transceiver

Operating Temperature 0C to 45C (32F to 113F)

Operating Humidity 0% to 85%, noncondensing

Dimensions (H x W x D) 0.47(h) x 0.54(w) x 2.19(d)inches (1.19 x 1.38 x 5.57 cm)

Intel 7260 802.11 a/b/g/n PCIe WLAN NIC

Operating Humidity Operating 10% to 90% (non-condensing)
Non-operating 5% to 95% (non-condensing)

Dimensions (H x W x D) Native HMC: 26.8 x 30.0 x 2.4 mm
Carrier Card Assembly 3.3 x 4.7 in (84 x 119 mm)

Kit Contents PCIe x1 card with full height bracket, rf antenna, antenna cable, separate low profile bracket, software CD and warranty.

NOTES:

1. WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows XP. WLAN may also be compatible with certain third-party software supplicants. WLAN supplier IHV extensions required for Cisco Compatible Extensions support for Microsoft Windows Vista.
2. Check latest software/driver release for updates on supported security features.
3. Maximum output power may vary by country according to local regulations.
4. In Power Save Polling mode and on battery power.
5. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CCK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).
6. 802.11a/g (OFDM modulation).

Integrated Intel I210AT PCIe GbE Controller

Connector RJ-45 (motherboard integration)

Controller Intel I210 GbE platform LAN connect networking controller

Memory Programmable FIFO packet buffer memory
Tx 24KB default
Rx up to 16KB

Data Rates Supported 10/100/1000 Mbps

Compliance 802.1as, 802.1q, 802.1Q, 802.3, 802.3ab, 802.3ap, 802.3az, 802.3u, 802.3x, 802.3z

Bus Architecture PCI Express 2.1 (x1) and SMBus

Data Transfer Mode PCIe-based interface for active state operation (S0 state) and SMBus for host and management traffic (Sx low power state)

Power Requirement Requires 3.3V only (integrated regulators)

Boot ROM Support Yes

Network Transfer Mode Full-duplex; Half-duplex (not supported for the 1000BASE-T transceiver)

Network Transfer Rate 10BASE-T (half-duplex) 10 Mbps
10BASE-T (full-duplex) 20 Mbps
100BASE-TX (half-duplex) 100 Mbps

Technical Specifications - Networking and Communications

		100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps
	Management Capabilities	WOL, auto MDI crossover, PXE, Multi-port teaming, RSS, Advanced cable diagnostics
Integrated Intel I218LM PCIe GbE Controller	Connector	RJ-45 (motherboard integration)
	Controller	Intel I218LM GbE platform LAN connect networking controller
	Memory	3 KB FIFO packet buffer memory (both Tx and Rx)
	Data Rates Supported	10/100/1000 Mbps
	Compliance	802.1as, 802.1p, 802.1Q, 802.3, 802.3ab, 802.3az, 802.3i, 802.3u, 802.3x, 802.3z
	Bus Architecture	PCI Express 1.1 (x1) and SMBus
	Data Transfer Mode	PCIe-based interface for active state operation (S0 state) and SMBus for host and management traffic (Sx low power state)
	Power Requirement	Requires 3.3V only (integrated regulators)
	Boot ROM Support	Yes
	Network Transfer Mode	Full-duplex; Half-duplex (not supported for the 1000BASE-T transceiver)
	Network Transfer Rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps
	Management Capabilities	WOL, auto MDI crossover, PXE, Multi-port teaming, RSS, Advanced cable diagnostics AMT 9.1 support, vPro compliant
HP 361T PCIe Dual Port Gigabit NIC	Connector	Two RJ-45
	Controller	Intel® Ethernet I350 Controller
	Data Rates Supported	10/100/1000 Mbps, Half- and full-duplex
	Compliance	802.3, 802.3u, 802.3x, 802.3ab, 802.3ad, 802.1p, 802.1Q, 802.3az, IEEE 1588 PCIe v2.0 standard RoHS (6 of 6) FCC (U.S. only) Class B DOC (Canada) Class B CE EN 55024, EN55022 Class B VCCI Class II UL 1950 CSA 950 EN 60950 CE ACPI 1.1a Microsoft WHQL (Windows Hardware Quality Labs)
	Data Path Width	Four lane (x4) PCI Express compatible with x4, x8, and x16 PCI Express slots
	Power Requirement	4.1W idle without EEE link partner 3.2W idle with EEE link partner 4.2W maximum
	Network Transfer Rate	10BASE-T (half-duplex) 10 Mb/s

Technical Specifications - Networking and Communications

		10BASE-T (full-duplex) 20 Mb/s 100BASE-TX (half-duplex) 100 Mb/s 100BASE-TX (full-duplex) 200 Mb/s 1000BASE-T (full-duplex) 2000 Mb/s
Operating Temperature		32° to 131° F (0° to 55° C)
Operating Humidity		10% to 95% non-condensing
Dimensions (H x W x D)		5.3 x 2.5 in (13.50cm x 6.4 cm) (without brackets)
Operating System Driver Support		Windows 7 Professional 32-bit and 64-bit. Red Hat Enterprise Linux(RHEL) WS4, 5, 6 Desktop/Workstation Novell SLED 10 & SLED 11
Kit Contents		HP 361T PCIe Dual Port Gigabit NIC PCA with a standard height bracket attached to it (the low profile bracket is included in the clamshell that the PCA ships in) Product Warranty statement and the Quick Install Card (QIC).
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Intel Ethernet I350-T4 4-port 1Gb NIC	Connector	Four RJ-45
	Controller	Intel® Ethernet I350 Controller
	Data Rates Supported	10/100/1000 Mbps, Half- and full-duplex
	Compliance	802.3, 802.3u, 802.3x, 802.3ab, 802.3ad, 802.1p, 802.1Q, 802.3az, IEEE 1588 PCIe v2.1 standard RoHS (6 of 6) FCC (U.S. only) Class B DOC (Canada) Class B CE EN 55024, EN55022 Class B VCCI Class II UL 1950 CSA 950 EN 60950 CE ACPI 1.1a Microsoft WHQL (Windows Hardware Quality Labs)
	Data Path Width	Four lane (x4) PCI Express compatible with x4, x8, and x16 PCI Express slots
	Power Requirement	5.0W (typical)
	Network Transfer Rate	10BASE-T (half-duplex) 10 Mb/s 10BASE-T (full-duplex) 20 Mb/s 100BASE-TX (half-duplex) 100 Mb/s 100BASE-TX (full-duplex) 200 Mb/s 1000BASE-T (full-duplex) 2000 Mb/s
	Operating Temperature	32° to 131° F (0° to 55° C)
	Operating Humidity	10% to 95% non-condensing
	Dimensions (H x W x D)	5.3 x 2.5 in (13.50cm x 6.4 cm) (without brackets)
	Operating System Driver Support	Windows 7 32-bit and 64-bit; Windows 10 32-bit and 64-bit; Red Hat Enterprise Linux(RHEL) WS4, 5, 6 Desktop/Workstation Novell SLED 10 & SLED 11

Technical Specifications - Networking and Communications

Kit Contents

Intel I350-T4 PCIe Quad Port Gigabit NIC PCA with a standard height bracket attached to it (the low profile bracket is included in the clamshell that the PCA ships in)
Product Warranty statement and the Installation Guide.

Intel X540-T2 10GbE Dual Port Adapter**Operating Temperature**

32° to 131° F (0° to 55° C)

Operating Humidity

5% to 95% non-condensing

Dimensions (H x W x D)

Standard PCIe with full height bracket installed, half height bracket included.
0.7 x 2.7 x 6.0 in

Operating System Driver Support

The HP driver drop is a unified package that includes the X540-T2 driver. It is the same driver as is used for the 561T. Currently, it includes drivers for Win7-32, Win7-x64, Win8-x64, and Win81-x64.

Kit Contents

Intel X540 10Gb Ethernet Dual port adapter, Installation guide, Warranty card.

Windows Server 2012 R2, Windows Server 2012, Windows 8, Windows Server 2008 R2, Windows 7, Windows Server 2008 SP2, Windows Vista SP2, Windows Server 2003 R2, Windows Server 2003 SP2, Linux Stable Kernel version 3.x, 2.6.x, Red Hat Enterprise Linux 5, 6, SUSE Linux Enterprise Server 10, 11, FreeBSD 9, VMware ESX/ESXi. Note: Not all OS's supported on all HP Z Workstations.

Summary of Changes

SUMMARY OF CHANGES

Date of change:	Version History:		Description of change:
August 21, 2014	v1	Added	Style and technical specifications
October 24, 2014	From v1 to v2	Added	note to supported components: memory, Foxit PhantomPDF Express and Cyberlink Power2Go: software, Optical drives: DVD, BD-XL specs
November 1, 2014	From v2 to v3	Added	Note for Internal USB connector conversion, Overview,
		Changed	Internal USB statement in Overview and System Board sections
December 1, 2014	From v3 to v4	Added	Intel X540-T2 10GbE Dual Port Adapter, HP 4-in-1 SFF (2.5in) HDD Carrier
January 1, 2015	From v4 to v5	Added	RHEL for Preinstalled OS, AMD FirePro W7100, Tesla K40 to GPU and High Performance Computing; Ubuntu 14.04 for Supported Components
		Changed	Memory Load Order, High Performance Computing for K40
February 1, 2015	From v5 to v6	Added	Windows 8.1 Pro 64-bit OS, Red Hat Enterprise Linux (RHEL), HP DX115 Removable HDD Carrier, and notes, 4-Bay SAS-SATA and notes, HP 4-Bay SAS-SATA 2.5in High Density Storage Kit
		Changed	Overview OS, Processors table Power Supply table, Hard Drives Notes, Optical and Removable Storage order, Power Consumption and Chassis Fan
		Removed	Windows 7 Professional 64-bit (National Academic)
March 1, 2015	From v6 to v7	Added	Overview: RAID support. Supported Components, Hard Drives: New SAS SFF 15 HDD line and notes, 4TB SATA HDD
		Changed	SAS, and SATAHDD Description Notes. System Board: Memory section.
April 1, 2015	From v7 to v8	Added	NVIDIA® Quadro® M6000 12GB Graphics, Memory notes
		Changed	Memory from Supported Components, Memory Speed Supported from System Board, ACPI version updated in BIOS section.
May 1, 2015	From v8 to v9	Added	Integrated RAID for PCIe SSDs, Declared Noise Emissions (Entry and high end configs), ISO 7779-9296
		Changed	Form factor from Minitower to Tower
May 6, 2015	From v9 to v10	Changed	NVIDIA GPU front and back specs reorder.
June 1, 2015	From v10 to v11	Added	1TB SATA 7200 rpm 8GB 3.5" SSHD (hybrid), 3Dconnexion CADMouse
		Changed	Reordered SAS Hard Drives in Supported and Technical Specifications
		Removed	600GB SAS 15K rpm
July 1, 2015	From v11 to v12	Added	Z Turbo G2 256 and 512GB drives
August 1, 2015	From v12 to v13	Added	Windows 10 64-bit to Supported OS; NVIDIA NVS 310 1GB Graphics, NVIDIA® Quadro® K420 2GB Graphics Professional 2D and Entry 3D
		Changed	SUSE Linux Enterprise Desktop 11 SP3, 12, LSI iBBU09 Battery Backup Unit changed to AMO; System Board Memory Notes; System Configurations.
		Removed	Windows 8.1 Emerging Market in Overview OS and Supported Components
September 1, 2015	From v12 to v13	Removed	Intel Pro 1500 180GB SATA SSD from Storage SATA SSDs

Summary of Changes

November 1, 2015	From v14 to v15	Added	HP Z Turbo Drive Quad Pro, 256GB, and 512GB SSD modules, NVIDIA® Quadro® M4000 8GB Graphics, NVIDIA® Quadro® M5000 8GB Graphics, Z480 HP Z Cooler
		Removed	300 and 600GB SAS 15K SFF HDD from SAS Hard Drives section.
December 3, 2015	From v15 to v16	Added	64 ECC LR Memory in supported components section and Maximum Memory under Technical Specifications section
December 8	From v16 to v17	Added	HP PS/2 Business Slim Keyboard, HP USB Business Slim Keyboard, HP Wireless Business Slim Keyboard, Windows 10 Home versions to Supported components, Operative systems, Overview
January 1, 2015	From v17 to v18	Added	240/480GB Enterprise Class SSDs, NVIDIA® Quadro® K1200 4GB Graphics
		Removed	NVIDIA® Quadro® K6000 12GB Graphics
February 1, 2015	From v18 to v19	Changed	HP 4-Bay SAS-SATA 2.5in High Density Storage Kit installation guide link
		Removed	Samsung Enterprise 240GB SATA SSD, Samsung Enterprise 480GB SATA SSD
March 1, 2016	From v19 to v20	Added	AMD FirePro W4300 4GB Graphics in Mid-Range 3D Category,
		Removed	Ubuntu 14.04, Supported Components OS; NVIDIA NVS 310 512MB Graphics, NVIDIA® Quadro® K420 1GB Graphics in Graphics
March 31, 2016	From v20 to v21	Added	Intel Xeon E5-2600 v4 Series CPU, Preinstalled Windows 10 Pro 64 bit; HP Z Turbo Drive G2 1TB SSD; DDR4-2400 ECC Registered DIMMs
		Changed	Processor disclaimers and notes; Hard Drives, PCIe notes; Supported components OS notes.
May 1, 2016	From v21 to v22	Added	M2000 and M6000 24GB graphics
		Removed	ZCooler availability note, K4200 and K5200 graphics
May 5, 2016	From v22 to v23	Changed	Pgs. 24, 25, 32: Modified TPM info to: Trusted Platform Module (TPM) 1.2 (Infineon SLB9660). Common Criteria EAL4+ Certified. Upgradable to TPM 2.0. Convertible to FIPS 140-2 Certified mode. (TPM 2.0 is not available for Win 7 32-bit.)
May 12, 2016	From v23 to v24	Changed	Integrated TPM extended specs in pgs 25,26, and 37
June 7, 2016	From v24 to v25	Added	Hardened Mouse HDD, (Enterprise Class) to 4TB SATA HDD
		Removed	EOL Win8.1 Downgrade to Win7
July 1, 2016	From v25 to v26	Added	Number of Aux power connections under the power supply section of the Overview
		Changed	Corrected RAID notes
August 1, 2016	From v26 to v27	Added	HP Keyed Cable Lock 10mm to Racking and Physical Security
September 1, 2016	From v27 to v28	Added	ZTurbo SED 256/512 drives
		Removed	NVIDIA® Quadro® M6000/12GB
November 1, 2016	From v28 to v29	Added	1TB SATA 7200 rpm HDD (Enterprise Class), HP Z Turbo Drive G2 TLC SSDs, HP Z Turbo Drive Quad Pro SSDs module, Intel 750 Series AIC SSDs
		Changed	Intel Xeon E5-2600 Series CPU and notes
		Removed	Intel Xeon E5-2600 v3 Series CPU and notes, 4, 32, and 64GB DDR4-2133 RAM DIMMs
January 1, 2016	From v29 to v30	Added	Radeon Pro WX 7100 8GB graphics, HP Z Turbo Drive G2 256GB TLC, HP Z Turbo Drive G2 512GB TLC, HP Z Turbo Drive G2 1TB TLC, 2TB SATA SSD, 9.5mm Slim DVD-Writer.

Summary of Changes

		Removed	HP Z Turbo Drive 256GB, HP Z Turbo Drive 512GB, HP USB Optical 3-Button Mouse
February 1, 2016	From v30 to v31	Changed	HP 9.5mm Slim SuperMulti DVD Writer, HP Slim DVD-Writer Drive OS Support
March 1, 2017	From v31 to v32	Added	NVIDIA® Quadro® P5000 16GB Graphics and NVIDIA® Quadro® P6000 24GB Graphics
May 1, 2017	From v32 to v33	Added	The NVIDIA® Quadro® P2000 5GB Graphics to Mid-range 3D Graphics
		Changed	Changed The HP 9.5mm Slim SuperMulti DVD Writer for The HP 9.5mm Slim DVD Writer
June 5, 2017	From v33 to v34	Added	The AMD Radeon Pro WX 4100 4 GB Graphics to Mid-range 3D Graphics, added NVIDIA Quadro P600 to Entry 3D Graphics section, added NVIDIA Quadro Sync II, added NVIDIA Quadro P4000 to High-end 3D section
		Changed	HP 9.5mm Slim DVD Writer Option Kit Part Number under Optical and Removable Storage section
		Removed	DVD-RAM as a supported format under the DVD writer section
July 6, 2017	From v34 to v35	Added	NVIDIA Quadro GP100 16GB Graphics to Ultra 3D Graphics, added Intel Ethernet I350-T4 4-port 1Gb NIC to Networking and Communications section
		Changed	The Note 2 for NVIDIA Quadro P600, changed the Operating Systems supported section for the NVIDIA Quadro Sync II and changed the info for the NVIDIA Quadro P4000 8GB Graphics
		Removed	The Tesla K40 as High Performance GPU Computing and removed Slim DVDRW SATA 1st & 2nd ODD from the Stable & Consistent Offerings section

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