

### Overview

### HP Z840 Workstation



1. Slimline Optical Drive Bay
2. 2 External 5.25" Bays
3. Power Button

4. HDD Activity LED
5. Front I/O: 4 USB 3.0 (Top Port has Charging Capability), 1 Headset, 1 Microphone

### 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 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 Ports, 1 USB 3.0 Port

### Overview

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### Form Factor Operating Systems

Rackable Minitower

Preinstalled:

- Windows 7 Professional 64-bit (National Academic)
- Windows 8.1 Pro 64-bit downgrade to Windows 7 Professional 64-bit \*\*
- Windows 8.1 Pro 64-bit OS \*
- 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 (RHEL) Workstation - Paper License (1yr) \*\*\*

#### NOTES:

For detailed OS/hardware support information for Linux, see:  
[http://www.hp.com/support/linux\\_hardware\\_matrix](http://www.hp.com/support/linux_hardware_matrix)

Notes: \* Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows functionality. See <http://www.microsoft.com>.

Notes: \*\* This system is preinstalled with Windows® 7 Pro software and also comes with a license and media for Windows 8.1 Pro software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.

Notes: \*\*\* This second OS must be ordered with the HP Linux Installer Kit as the first OS.

### Available Processors

Name	Clock Speed (GHz)	Cores	Cache (MB)	Memory Speed (MHz)	QPI Speed (GT/s)	Hyper Threading	Featuring Intel® vPro™ Technology	Intel® Turbo Boost Technology <sup>1</sup>	TDP (W)
INTEL® XEON® E5-2699 v3 processor	2.3	18	45	2133	9.6	YES	YES	5/13	145
INTEL® XEON® E5-2697 v3 processor	2.6	14	35	2133	9.6	YES	YES	5/10	145
INTEL® XEON® E5-2695 v3 processor	2.3	14	35	2133	9.6	YES	YES	5/10	120
INTEL® XEON® E5-2687W v3 processor	3.1	10	25	2133	9.6	YES	YES	1/4	160
INTEL® XEON® E5-2690 v3 processor	2.6	12	30	2133	9.6	YES	YES	5/9	135
INTEL® XEON® E5-2667 v3 processor	3.2	8	20	2133	9.6	YES	YES	2/4	135
INTEL® XEON® E5-2683 v3 processor	2.0	14	35	2133	9.6	YES	YES	5/10	120
INTEL® XEON® E5-2680 v3 processor	2.5	12	30	2133	9.6	YES	YES	4/8	120
INTEL® XEON® E5-2670 v3 processor	2.3	12	30	2133	9.6	YES	YES	3/8	120
INTEL® XEON® E5-2643 v3 processor	3.4	6	20	2133	9.6	YES	YES	2/3	135

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INTEL® XEON® E5-2660 v3 processor	2.6	10	25	2133	9.6	YES	YES	3/7	105
INTEL® XEON® E5-2650 v3 processor	2.3	10	25	2133	9.6	YES	YES	3/7	105
INTEL® XEON® E5-2637 v3 processor	3.5	4	15	2133	9.6	YES	YES	1/2	135
INTEL® XEON® E5-2640 v3 processor	2.6	8	20	1866	8.0	YES	YES	2/8	90
INTEL® XEON® E5-2630 v3 processor	2.4	8	20	1866	8.0	YES	YES	2/8	85
INTEL® XEON® E5-2623 v3 processor	3.0	4	10	1866	8.0	YES	YES	3/5	105
INTEL® XEON® E5-2620 v3 processor	2.4	6	15	1866	8.0	YES	YES	2/8	85
INTEL® XEON® E5-2609 v3 processor	1.9	6	15	1600	6.4	NO	YES	N/A	85
INTEL® XEON® E5-2603 v3 processor	1.6	6	15	1600	6.4	NO	YES	N/A	85

<sup>1</sup>The 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.

### 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/](http://www.intel.com/products/processor_number/) for details.

Quad-Core, Six-Core, Eight-Core, 10-Core, 12-Core, 14-Core, 16-Core and 18-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 E5-2637v3, E5-2643v3, E5-2670v3, E5-2680v3, E5-2683v3, E5-2667v3, E5-2687Wv3, E5-2690v3, E5-2695v3, E5-2697v3 and E5-2699v3 REQUIRE the 1125W Power Supply Option.

### Form Factor

Rackable Minitower

### 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

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Slot 7: PCIe Gen 2x1

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

### 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

- Top bay device depth limit: 206mm
- Bottom bay device depth limit: 206mm

### Front I/O

- 4 USB 3.0
- 1 Combo Headset
- 1 Microphone

### Rear I/O

- 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

- 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)

44.4 x 20.3 x 52.5 cm (17.5 x 8.0 x 20.7 in)

### System Weight

Exact weights depend upon configuration.

- Minimum config: 21.1kg (46.7lbs.)
- Typical config: 22.8kg (50.4lbs.)
- Maximum config: 29.2kg (64.3lbs.)

### Temperature

Operating: 5° to 35°C (40° to 95°F)  
Non-operating: -40° to 70°C (-40° to 158°F)

### Humidity

Operating: 8% to 85%  
Non-operating: 8% to 90%

### 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

**NOTES:** The 1125W 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

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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.

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

850W - [http://www.plugloadsolutions.com/psu\\_reports/HEWLETT%20PACKARD\\_623195-001\\_ECOS%202620%201\\_850W\\_Report%20\(2\).pdf](http://www.plugloadsolutions.com/psu_reports/HEWLETT%20PACKARD_623195-001_ECOS%202620%201_850W_Report%20(2).pdf)

1125W - [http://www.plugloadsolutions.com/psu\\_reports/HEWLETT%20PACKARD\\_623196-001\\_ECOS%202921\\_1125W\\_Report\(1275w\).pdf](http://www.plugloadsolutions.com/psu_reports/HEWLETT%20PACKARD_623196-001_ECOS%202921_1125W_Report(1275w).pdf)

Contact an HP representative for special support approval for high power configurations.

### 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
- 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
<b>Z840 Intel Xeon E5-2600 v3 Series CPU</b>				
Xeon E5-2603 v3 1.6 1600 6C CPU	Y	Y	J9V77AA	
Xeon E5-2609 v3 1.9 1600 6C CPU	Y	Y	J9V76AA	
Xeon E5-2620 v3 2.4 1866 6C CPU	Y	Y	J9V75AA	
Xeon E5-2623 v3 3.0 1866 4C CPU	Y	Y	J9Q18AA	
Xeon E5-2630 v3 2.4 1866 8C CPU	Y	Y	J9Q17AA	
Xeon E5-2637 v3 3.5 2133 4C CPU	Y	Y	J9Q15AA	
Xeon E5-2640 v3 2.6 1866 8C CPU	Y	Y	J9Q16AA	
Xeon E5-2643 v3 3.4 2133 6C CPU	Y	Y	J9Q12AA	
Xeon E5-2650 v3 2.3 2133 10C CPU	Y	Y	J9Q14AA	
Xeon E5-2660 v3 2.6 2133 10C CPU	Y	Y	J9Q13AA	
Xeon E5-2667 v3 3.2 2133 8C CPU	Y	Y	J9Q08AA	
Xeon E5-2670 v3 2.3 2133 12C CPU	Y	Y	J9Q11AA	
Xeon E5-2680 v3 2.5 2133 12C CPU	Y	Y	J9Q10AA	
Xeon E5-2683 v3 2.0 2133 14C CPU	Y	Y	J9Q09AA	
Xeon E5-2687Wv3 3.1 2133 10C CPU	Y	Y	J9Q06AA	
Xeon E5-2690 v3 2.6 2133 12C CPU	Y	Y	J9Q07AA	
Xeon E5-2695 v3 2.3 2133 14C CPU	Y	Y	J9Q05AA	
Xeon E5-2697 v3 2.6 2133 14C CPU	Y	Y	J9Q04AA	
Xeon E5-2699 v3 2.3 2133 18C CPU	Y	Y	J9Q03AA	

Intel® Xeon® processors E5-2637v3, E5-2643v3, E5-2670v3, E5-2680v3, E5-2683v3, E5-2667v3, E5-2687Wv3, E5-2690v3, E5-2695v3, E5-2697v3 and E5-2699v3 REQUIRE the 1125W 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	
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	



### Supported Components

#### 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
600GB* SAS 15K rpm 6Gb/s 3.5" HDD	Y	Y	VM647AA	
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	

**NOTE:**

\*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.

Up to 5 SATA drives, 5 SAS, drives, or 6 SATA 2.5", Small Form Factor (SFF) drives 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
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	
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)	

**NOTES:**

\*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.

Up to 5 SATA drives, 5 SAS, drives, or 6 SATA 2.5", Small Form Factor (SFF) drives

##### 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	
Samsung Enterprise 240GB* SATA SSD	Y	Y	F0W94AA	
Samsung Enterprise 480GB* SATA SSD	Y	Y	F0W95AA	
Intel Pro 1500 180GB* SATA SSD	Y	Y	F5Z70AA	



### Supported Components

HP 256GB\* SATA 6Gb/s SED Opal 1 SSD Y Y G7U67AA Note 1

**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

\*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.

### PCIe Solid State Drives

#### PCIe SSDs for HP Workstations

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Z Turbo Drive 512GB* SSD	Y	Y	G3G89AA	
HP Z Turbo Drive 256GB* SSD	Y	Y	G3G88AA	

\*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.

### 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		
<i>Must have 4 or fewer SAS hard drives to configure this option</i>				
HP SAS Back Panel Bulkhead Connector Kit	Y	Y		
<i>HP SAS Back Panel Connector kit required. Internal SAS HD drives are not supported</i>				
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		

**NOTE 1:** Minimum of 2 hard drives needed. All hard drives must be identical (size/speed/type/bus/functional capabilities). Must have 2, 3 or 4 HD 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 SATA or 2 SAS hard drives required. All hard drives must be identical (size/speed/type/bus/functional capabilities).

**NOTE 4:** Minimum of 3 SATA hard drives needed. All SATA hard drives must be identical (size/speed/type/bus/functional capabilities). Must have 3 or 4 HD Drives. 5 HD Drives not allowed.

### Supported Components

**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](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](http://www.hp.com/support/linux_hardware_matrix) for details

### Graphics

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes	Supported # of cards	Mixed?
<b>Professional 2D</b>						
NVIDIA NVS 310 512MB Graphics	Y	Y	A7U59AA	Note 1	4	
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	
<b>Entry 3D</b>						
NVIDIA Quadro K420 1GB Graphics	Y	Y	J3G86AA		2	
NVIDIA Quadro K620 2GB Graphics	Y	Y	J3G87AA		2	
AMD FirePro W2100 2GB Graphics	Y	Y	J3G91AA		2	
<b>Mid-range 3D</b>						
AMD FirePro W5100 4GB Graphics	Y	Y	J3G92AA		2	
NVIDIA Quadro K2200 4GB Graphics	Y	Y	J3G88AA		2	
<b>High End 3D</b>						
NVIDIA Quadro K4200 4GB Graphics	Y	Y	J3G89AA		2	
NVIDIA Quadro K5200 8GB Graphics	Y	Y	J3G90AA		2	
NVIDIA Quadro K6000 12GB Graphics	Y	Y	C2J96AA		2	

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.

### Memory

	DDR4-2133 ECC Registered DIMMs	Option Kit Part Number	Support Notes
<b>CTO</b>	4GB DDR4-2133 ECC Registered RAM	J9P81AA	
	8GB DDR4-2133 ECC Registered RAM	J9P82AA	
	16GB DDR4-2133 ECC Registered RAM	J9P83AA	
	32GB DDR4-2133 ECC Load Reduced (LR) RAM	J9P84AA	

**NOTES:**

Identical memory components are used to build the CTO configurations as are available as After Market

### Supported Components

Options (AMO). The AMO Option Kit Part # are shown alongside the memory DIMMs

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 1600MHz capable CPU is used in the system, the maximum speed the memory will run at is 1600MHz regardless of the specified speed of the memory.

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

Maximum memory capacities assume Windows 64-bit operating systems or Linux. With Windows 32-bit operating systems, memory above 3 GB may not all be available due to system resources.

### 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
<b>HP SlimTray Optical Drives</b>				
HP 9.5mm Slim SuperMulti DVD Writer	Y	Y	K3R64AA	
HP 9.5mm Slim DVD-ROM Drive	Y	Y	K3R63AA	Note 1
HP 9.5mm Slim BDXL Blu-Ray Writer	Y	Y	K3R65AA	Note 2
<b>HP 15-in-1 Media Card Reader</b>				
HP DX115 Removable HDD Frame/Carrier	N	Y	FZ576AA	
<b>HP DX115 Removable Drive Enclosure</b>				
HP 15-in-1 Media Card Reader	Y	Y	F4N90AA	

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 single-layer DVD drives and players.

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

**NOTE 1:** Not supported as a 2nd drive option.

**NOTE 2:** Cannot be ordered in combination with another Blu-ray Writer.

### Supported Components

#### 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	
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

**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	

#### 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 USB Optical 3-Button 2.9M OEM Mouse	N	Y	ET424AA	
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	

#### Other Hardware

	Factory	Option Kit	Option Kit Part	Support
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### Supported Components

	Configured		Number	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		

**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

### 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](http://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

Windows 8.1 Pro 64-bit\*

Windows 7 Professional 64-bit (available through downgrade rights from Windows 8.1 64-bit)\*\*

Windows 7 Professional (MSNA) 64-Bit\*

HP Linux Installer Kit

Red Hat Enterprise Linux (RHEL) Workstation - Paper License (1yr)<sup>1</sup>

\* Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows functionality. See <http://www.microsoft.com>.

\*\* This system is preinstalled with Windows® 7 Pro software and also comes with a license and media for Windows 8.1 Pro software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.

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

### System Technical Specifications

#### System Board

<b>System Board Form Factor</b>	Custom Form Factor, 13" x 14.25" (330.20mm x 361.95mm)
<b>Processor Socket</b>	Dual LGA2011-3
<b>CPU Bus Speed</b>	QPI: Up to 9.6GT/sec, dual link implementation
<b>Chipset</b>	Intel® C612 Chipset
<b>Super I/O Controller</b>	Nuvoton NPCD379H
<b>Memory Expansion Slots</b>	16 slots (8 slots per CPU)
<b>Memory Type Supported</b>	DDR4 R-DIMM (Registered), ECC: 4GB, 8GB, and 16GB DDR4 LR-DIMM (Load Reduced), ECC: 32GB (64GB and 128GB added after initial release)
<b>Memory Modes</b>	NUMA (Non-Uniform Memory Architecture), Memory Node Interleave
<b>Memory Speed Supported</b>	1600MHz, 1866MHz, and 2133MHz

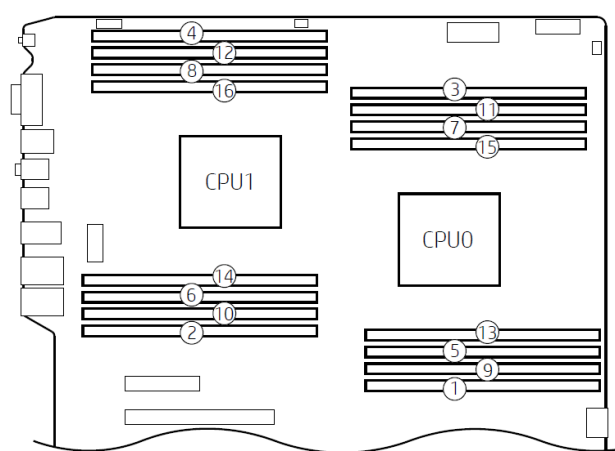
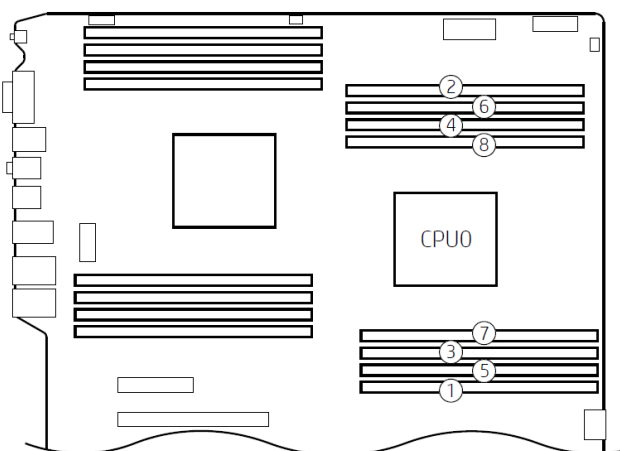
#### Single Processor CPU0

Capacity	Notes	DIMM1	DIMM2	DIMM3	DIMM4	DIMM5	DIMM6	DIMM7	DIMM8	Rating
4GB	*	4GB								Fair
8GB		4GB 8GB							4GB	Good Fair
12GB		4GB		4GB					4GB	Better
16GB		4GB 8GB		4GB			4GB		4GB 8GB	Best Good
32GB		4GB 8GB 16GB	4GB	4GB 8GB	4GB	4GB	4GB 8GB	4GB	4GB 8GB 16GB	Best Best Good
48GB	~	8GB	4GB	8GB	4GB	4GB	8GB	4GB	8GB	Best
64GB		8GB 16GB	8GB	8GB 16GB	8GB	8GB	8GB 16GB	8GB	8GB 16GB	Best Best
96GB	~	16GB	8GB	16GB	8GB	8GB	16GB	8GB	16GB	Best
128GB		16GB 32GB	16GB	16GB 32GB	16GB	16GB	16GB 32GB	16GB	16GB 32GB	Best Best
256GB	~	32GB 64GB	32GB	32GB 64GB	32GB	32GB	32GB 64GB	32GB	32GB 64GB	Best Best
512GB	~ ~	64GB 128GB	64GB	64GB 128GB	64GB	64GB	64GB 128GB	64GB	64GB 128GB	Best Best
1TB	~	128GB	128GB	128GB	128GB	128GB	128GB	128GB	128GB	Best

### System Technical Specifications

		Dual Processor																
		CPU0								CPU1								
Capacity (GB)	Notes	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	Rating
8GB		4GB								4GB								Fair
16GB		4GB 8GB							4GB	4GB 8GB							4GB	Good Fair
32GB		4GB 8GB 16GB		4GB			4GB		4GB 8GB	4GB 8GB 16GB		4GB			4GB		4GB 8GB	Best Good Fair
64GB	~	4GB 8GB	4GB	4GB 8GB	4GB	4GB	4GB 8GB	4GB	4GB 8GB	4GB 8GB	4GB	4GB 8GB	4GB	4GB	4GB 8GB	4GB	4GB 8GB	Best Best
96GB		8GB	4GB	8GB	4GB	4GB	8GB	4GB	8GB	8GB	4GB	8GB	4GB	4GB	8GB	4GB	8GB	Best
128GB	~	8GB 16GB 32GB	8GB	8GB 16GB	8GB	8GB	8GB 16GB	8GB	8GB 16GB 32GB	8GB 16GB 32GB	8GB	8GB 16GB	8GB	8GB	8GB 16GB	8GB	8GB 16GB 32GB	Best Best Good
192GB		16GB 16GB	8GB 16GB	16GB 16GB	8GB	8GB	16GB 16GB	8GB 16GB	16GB 16GB	16GB 16GB	8GB 16GB	16GB 16GB	8GB	8GB	16GB 16GB	8GB 16GB	16GB 16GB	Best Better
256GB	~	16GB 32GB	16GB	16GB 32GB	16GB	16GB	16GB 32GB	16GB	16GB 32GB	16GB 32GB	16GB	16GB 32GB	16GB	16GB	16GB 32GB	16GB	16GB 32GB	Best Best
512GB	~	32GB 64GB	32GB	32GB 64GB	32GB	32GB	32GB 64GB	32GB	32GB 64GB	32GB 64GB	32GB	32GB 64GB	32GB	32GB	32GB 64GB	32GB	32GB 64GB	Best Best
1TB	~	64GB 128GB	64GB	64GB 128GB	64GB	64GB	64GB 128GB	64GB	64GB 128GB	64GB 128GB	64GB	64GB 128GB	64GB	64GB	64GB 128GB	64GB	64GB 128GB	Best Best
2TB		128GB	128GB	128GB	128GB	128GB	128GB	128GB	128GB	128GB	128GB	128GB	128GB	128GB	128GB	128GB	128GB	Best
<b>Slot Load Order</b>		<b>1</b>	<b>9</b>	<b>5</b>	<b>13</b>	<b>15</b>	<b>7</b>	<b>11</b>	<b>3</b>	<b>2</b>	<b>10</b>	<b>6</b>	<b>14</b>	<b>16</b>	<b>8</b>	<b>12</b>	<b>4</b>	

#### Memory Loading Order:



#### Maximum Memory

Supports up to 256GB using RDIMMs  
 Supports up to 1024GB using LRDIMMs  
 Supports up to 2048GB 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



### System Technical Specifications

	<p>memory installed in the system must be either RDIMM or LR DIMM.</p> <ul style="list-style-type: none"> <li>Do not install memory modules into memory slots if corresponding processor is not installed.</li> <li>Dual processor configurations with memory modules installed for only one processor is not supported.</li> <li>The Z840 will support up to 512GB at initial release.</li> <li>The Z840 will support up to 1024GB when 64GB DIMM support is added following initial Z840 release.</li> <li>The Z840 will support up to 2048GB when 128GB DIMM support is added following initial Z840 release.</li> </ul>
<b>PCI Express Connectors</b>	<p>Two PCIe Gen3 x16 with latch One PCIe Gen3 x16 with latch.</p> <ul style="list-style-type: none"> <li>Enabled only with optional 2nd CPU is installed.</li> </ul> <p>One PCIe Gen3 x8 open-ended connector.</p> <ul style="list-style-type: none"> <li>Enabled only with optional 2nd CPU is installed.</li> </ul> <p>One PCIe x8 open-ended connector.</p> <ul style="list-style-type: none"> <li>Enabled for One PCIe Gen2 x4 slot with 1 CPU</li> <li>Enabled for One PCIe Gen3 x8 with optional 2nd CPU installed</li> </ul> <p>One PCIe Gen3 x4 open-ended connector. One PCIe Gen2 x1 open-ended connector</p>
<b>Supported Drive Interfaces</b>	
	<p><b>SATA</b></p> <p>sSATA @6Gb/s, Supports RAID 0,1,5,10 and NCQ. Factory integrated RAID is Microsoft Windows only.</p> <p>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</p> <p>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</p>
	<p><b>Serial Attached SCSI</b></p> <p>Integrated 8-channel SAS 6.0Gb/sec controller with HW RAID 0, 1, 10</p>
	<p><b>Integrated RAID</b></p> <p>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)</p>
	<p><b>Integrated Graphics</b></p> <p>None</p>
	<p><b>Network Controller</b></p> <p>Integrated Intel I218LM</p> <p>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:</p>

### System Technical Specifications

		<p>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</p> <p>AMT 9.1 support, vPro compliant</p> <p>Integrated I210AT</p> <p>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</p> <p>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</p>
	<b>PCI-X Connectors</b>	None
	<b>PCI Card Guide</b>	Yes
	<b>Wake on LAN</b>	Yes, both ports
	<b>Integrated Trusted Platform Module</b>	Infineon TPM 1.2 Certified (TPM2.0 Certified, Hardware Enabled; Not Available at Initial Release)
<b>IEEE 1394 Connector(s)</b>	<b>Front</b>	None
	<b>Rear</b>	None
	<b>Internal</b>	None
<b>USB Connector(s)</b>	<b>Front</b>	4 USB 3.0
	<b>Rear</b>	4 USB 3.0 2 USB 2.0
	<b>Internal</b>	<p>1 USB 3.0 available with a single 20-pin shrouded connector. This header supports a USB Media Card reader.</p> <p>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.</p> <p>Third party adapters are also available.</p>
<b>HD Integrated Audio</b>	Realtek ALC221	
<b>Flash ROM</b>	Yes	
<b>CPU Fan Header</b>	One header (blind mate) for CPU fans and memory fans	

### System Technical Specifications

<b>Chassis Fan Header</b>	One Chassis Fan Header			
<b>Front PCI Fan Header</b>	2 Front PCI Fan Headers			
<b>Front Control Panel/Speaker Header</b>	Yes			
<b>CMOS Battery Holder - Lithium</b>	Yes			
<b>Power Supply Headers</b>	Yes			
<b>Power Switch, Power LED &amp; Hard Drive LED Header</b>	Front power switch, front power and hard drive LED. Rear power switch and rear power LED. Drive LED header on system board.			
<b>Clear Password Jumper</b>	Yes			
<b>Serial Port</b>	Yes, on rear panel			
<b>Parallel Port</b>	No			
<b>Keyboard/Mouse</b>	Yes			
<b>Power Supply</b>	850W 88% Efficient, Custom PSU (Wide-Ranging, Active PFC)		1125W/1275W*/1450W* 90% Efficient, Custom PSU (Wide-Ranging, Active PFC)	
<b>Operating Voltage Range</b>	90-269 VAC		90-269 VAC	
<b>Rated Voltage Range</b>	100-127 VAC 200-240 VAC	118 VAC	100 VAC 115-127 VAC 200-240 VAC	118 VAC
<b>Rated Line Frequency</b>	50-60 Hz	400 Hz	50-60 Hz	400 Hz
<b>Operating Line Frequency Range</b>	47-66 Hz	393-407 Hz	47-66 Hz	393-407 Hz
<b>Rated Input Current</b>	11A @ 100-127 VAC 5.5A @ 200-240 VAC	11A @ 118 VAC	12A @ 100 VAC 12A @ 115-127 VAC 10A @ 200-240 VAC	12A @ 118 VAC
<b>Heat Dissipation (Configuration and software dependent)</b>	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)	
<b>Power Supply Fan</b>	(2) 80x25 mm variable speed		(2) 80x25 mm variable speed	
<b>ENERGY STAR Qualified (Configuration dependent)</b>	Yes		Yes	
<b>Power Supply Efficiency</b>	88% Efficient  The Z840 850W power supply efficiency report can be found at this link: <a href="#">TBD</a>		90% Efficient  The Z840 1125W power supply efficiency report can be found at this link: <a href="#">TBD</a>	
<b>FEMP Standby Power Compliant @115V (&lt;2W in S5 - Power Off)</b>	Yes		Yes	
<b>EuP Compliant @ 230V (&lt;0.5 W in S5 - Power Off)</b>	Yes		Yes	
<b>CECP Compliant @ 220V (&lt;4W in S3 - Suspend to RAM)</b>	Yes; Configuration dependent		Yes; Configuration dependent	
<b>Power Consumption in sleep mode (as defined by ENERGY STAR) - Suspend to RAM (S3) (Instantly Available PC)</b>	<15W		<35W	
<b>Built-in Self-Test LED</b>	Yes		Yes	

### System Technical Specifications

<b>Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)</b>	Yes	Yes
		*Input voltage restriction
	<p><b>NOTE:</b> The 1125W 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.</p> <p>The 1125W Power Supply can also supply 1450W of output power when the input voltage is greater than 180V under all conditions.</p>	
<b>AUX IN (audio)</b>	No	
<b>Clear CMOS Button</b>	Yes	
<b>Multibay Header</b>	No	
<b>Integrated Gigabit Ethernet</b>	Yes, dual port.	
<b>Access Panel Solenoid Lock Header</b>	No	
<b>Access Panel Intrusion Sensor Header</b>	Yes, as part of Front UI (Control Panel) cable header	
<b>Memory Fan Connector</b>	Yes, blind-mate	

### SYSTEM CONFIGURATION

<b>Example Configuration #1</b>	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 7200/1x DVD-ROM SATA					
	Power Supply	850W 88% Custom PSU					
	Other	-					
<b>Energy Consumption</b>		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	
<b>Heat Dissipation** (Btu/hr)</b>		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	

<b>Example Configuration</b>	Processor Info	2x Intel Xeon E5-2640v3 (Eight-Core) 90W
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### System Technical Specifications

<b>#2</b> <b>(ENERGY STAR QUALIFIED)</b>	Memory Info	<u>32GB DDR4-2133 (8x4GB) 2CPU RegRAM</u>					
	Graphics Info	1x NVIDIA Quadro K2200					
	Disks/Optical/Floppy	3x 500GB SATA 7200/1x DVD-ROM SATA					
	Power Supply	1125W 90% Custom PSU					
	Other	-					
<b>Energy Consumption</b>		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	1242.17 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	
<b>Heat Dissipation**</b> <b>(Btu/hr)</b>		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	

<b>Example Configuration</b> <b>#3</b>	Processor Info	2x Intel Xeon E5-2680v3 (12-Core) 120W					
	Memory Info	64GB DDR4-2133 (8x8GB) 2CPU RegRAM					
	Graphics Info	1x NVIDIA Quadro K4200					
	Disks/Optical/Floppy	2x 300GB SAS 15K/1x SuperMulti DVDRW SATA					
	Power Supply	1125W 90% Custom PSU					
	Other	-					
	<b>Energy Consumption</b>		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	
<b>Heat Dissipation**</b> <b>(Btu/hr)</b>		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	

### System Technical Specifications

	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	

<b>Example Configuration #4</b>	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 SuperMulti DVDRW SATA					
	Power Supply	1125W 90% Custom PSU					
	Other	-					

<b>Energy Consumption</b>		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	

<b>Heat Dissipation** (Btu/hr)</b>		115 VAC		230 VAC		100 VAC	
		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
	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	

<b>Example Configuration #5 (ENERGY STAR QUALIFIED)</b>	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 SuperMulti DVDRW SATA					
	Power Supply	1125W 90% Custom PSU					
	Other	-					

<b>Energy Consumption</b>		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 <sub>MAX</sub> 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"	1.047 W	0.997 W	1.144 W	1.047 W	0.997 W	1.144 W

### System Technical Specifications

	(Off) (S5)						
<b>Heat Dissipation** (Btu/hr)</b>		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 <sub>MAX</sub> 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)

<b>System Configuration (Entry level)</b>	<b>Processor Info</b>	-
	<b>Memory Info</b>	-
	<b>Graphics Info</b>	-
	<b>Disks/Optical/Floppy</b>	-

<b>Declared Noise Emissions</b> (in accordance with ISO 7779 and ISO 9296)		<b>Sound Power (LWAd, bels)</b>	<b>Deskside Sound Pressure (LpAm, decibels)</b>
	<b>Idle</b>	-	-
	<b>Hard drive Operating</b> (random reads)	-	-
	<b>DVD-ROM Operating</b> (sequential reads)	-	-

<b>System Configuration (High-end)</b>	<b>Processor Info</b>	-
	<b>Memory Info</b>	-
	<b>Graphics Info</b>	-
	<b>Disks/Optical/Floppy</b>	-

<b>Declared Noise Emissions</b> (in accordance with ISO 7779 and ISO 9296)		<b>Sound Power (LWAd, bels)</b>	<b>Deskside Sound Pressure (LpAm, decibels)</b>
	<b>Idle</b>	-	-
	<b>Hard drive Operating</b> (random reads)	-	-
	<b>DVD-ROM Operating</b> (sequential reads)	-	-

### ENVIRONMENTAL DATA

<b>Environmental Requirements</b>	<b>Temperature</b>	Operating: 5° to 35° C (40° to 95° F) Non-operating: -40° to 60° C (-40° to 140° F)
	<b>Humidity</b>	Operating: 8% to 85% RH, non-condensing Non-operating: 8% to 90% RH, non-condensing



### System Technical Specifications

	<b>Maximum Altitude</b>	Operating: 3,000 m (10,000 feet) Non-operating: 9,100 m (30,000 feet)
	<b>Dynamic (new)</b>	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 <b>NOTE:</b> 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 <sup>2</sup> /Hz Non-operating random: 2.0g (rms), 5-500 Hz, up to 0.0150 g <sup>2</sup> /Hz <b>NOTE:</b> Values do not indicate continuous vibration.
	<b>Cooling</b>	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

### PHYSICAL SECURITY AND SERVICEABILITY

<b>Access Panel</b>	Tool-less Includes system board and memory information
<b>Optical Drive</b>	Tool-less, no carrier or rails required
<b>Hard Drives</b>	Tool-less
<b>Expansion Cards</b>	Tool-less
<b>Processor Socket</b>	Tool-less
<b>Green User Touch Points</b>	Yes, on tool-free internal chassis components
<b>Color-coordinated Cables and Connectors</b>	Yes
<b>Memory</b>	Tool-less
<b>System Board</b>	Tool-less, retained by Front PCI Card Guide
<b>Dual Color Power and HD LED on Front of Computer</b>	Yes
<b>Configuration Record SW</b>	Yes
<b>Over-Temp Warning on Screen</b>	Yes
<b>Restore CD/DVD Set</b>	Restores the computer to its original factory shipping image - Can be obtained via HP Support
<b>Dual Function Front Power Switch</b>	Yes, causes a fail-safe power off when held for 4 seconds
<b>Padlock Support</b>	No
<b>Cable Lock Support</b>	Yes, Kensington Cable Lock (optional): Prevents entire system theft only. 3mm x 7mm slot at rear of system
<b>Universal Chassis Clamp Lock Support</b>	No
<b>Solenoid Lock and Hood Sensor</b>	No
<b>Rear Port Control Cover</b>	No
<b>Serial, Parallel, USB, Audio, Network,</b>	Yes

### System Technical Specifications

<b>Enable/Disable Port Control</b>	
<b>Removable Media Write/Boot Control</b>	Yes, prevents ability to boot from removable media on supported devices (and can disable writes to media)
<b>Power-On Password</b>	Yes, prevents an unauthorized person from booting up the workstation
<b>Setup Password</b>	Yes, prevents an unauthorized person from changing the workstation configuration
<b>3.3V Aux Power LED on System PCA</b>	No
<b>NIC LEDs (integrated) (Green &amp; Amber)</b>	Yes
<b>CPUs and Heatsinks</b>	A torx driver (T15) is needed to remove the CPU heatsink(s) before the CPU can be removed. CPU removal is tool-less
<b>Power Supply Diagnostic LED</b>	Yes
<b>Front Power Button</b>	Yes
<b>Front Power LED</b>	Yes, white (normal), red (fault)
<b>Front Hard Drive Activity LED</b>	Yes, white
<b>Front ODD Activity LED</b>	Yes
<b>Internal Speaker</b>	Yes
<b>System/Emergency ROM Flash Recovery</b>	Recovers corrupted system BIOS
<b>Cooling Solutions</b>	Air cooled forced convection
<b>Power Supply Fans</b>	2x - 80mm x 25mm
<b>CPU Heatsink Fan</b>	92 x 25mm 5-wire PWM for each CPU
<b>Chassis Fan</b>	Rear: 2x - 92mm x 25mm Front (850W config): 1x - 92mm x 25mm (upper position) Front (1125W config): 2x - 92mm x 25mm
<b>Memory Heatsink Fan</b>	3x - 75 x 90 x 35mm memory blowers 80 x 25 mm 4-wire PW fan
<b>HP Vision Diagnostics Offline Edition</b>	<p>HP Vision Diagnostics Offline Edition</p> <p>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:</p> <ul style="list-style-type: none"> <li>• Run diagnostics</li> <li>• View the hardware configuration of the system</li> </ul> <p>Key features and benefits</p> <p>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:</p> <ul style="list-style-type: none"> <li>• Testing and diagnosing apparent hardware failures</li> <li>• Documenting system configurations for upgrade planning, standardization, inventory tracking, disaster recovery, and maintenance</li> </ul>

### System Technical Specifications

	<ul style="list-style-type: none"> <li>• Sending configuration information to another location for more in-depth analysis</li> </ul>
<b>Access Panel Key Lock</b>	Yes, prevents removal of the access panel and all internal components including optical and floppy drives
<b>ACPI-Ready Hardware</b>	Advanced Configuration and Power Management Interface (ACPI). <ul style="list-style-type: none"> <li>• Allows the system to wake from a low power mode.</li> <li>• 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</li> </ul>
<b>Trusted Platform Module Chip</b>	Yes
<b>Integrated Chassis Handles</b>	Yes, front and rear
<b>Power Supply</b>	Tool-less, direct-connect (blind-mate)
<b>PCIe Card Retention</b>	Yes, rear (all), middle (full-height cards), front (full-length with extender cards)
<b>Flash ROM</b>	Yes. SPI ROM
<b>Diagnostic Power Switch LED on board</b>	Yes
<b>Clear Password Jumper</b>	Yes
<b>Clear CMOS Button</b>	Yes
<b>CMOS Battery Holder</b>	Yes
<b>DIMM Connectors</b>	Yes

### BIOS

<b>BIOS 32-bit Services</b>	Standard BIOS 32-Bit Service Directory Proposal v0.4. BIOS supports 32 and 64-bit Operating systems.
<b>PCI 3.0 Support</b>	Full BIOS support for PCI Express through industry standard interfaces.
<b>ATAPI</b>	ATAPI Removable Media Device BIOS Specification Version 1.0.
<b>BBS</b>	BIOS Boot Specification v1.01
<b>WMI Support</b>	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.
<b>BIOS Boot Spec 1.01+</b>	Provides more control over how and from what devices the workstation will boot.
<b>BIOS Power On</b>	Users can define a specific date and time for the system to power on.
<b>ROM Based Computer Setup Utility (F10)</b>	Review and customize system settings controlled by the BIOS.
<b>System/Emergency ROM Flash Recovery with Video</b>	Recovers system BIOS in corrupted Flash ROM.
<b>Replicated Setup</b>	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).
<b>SMBIOS</b>	System Management BIOS 2.7, for system management information
<b>Boot Control</b>	Disables the ability to boot from removable media on supported devices.

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<b>Memory Change Alert</b>	Alerts management console if memory is removed or changed.
<b>Thermal Alert</b>	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.
<b>Remote ROM Flash</b>	Provides secure, fail-safe ROM image management from a central network console.
<b>ACPI (Advanced Configuration and Power Management Interface)</b>	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 2.0 for full compatibility with 64-Bit operating systems.
<b>Ownership Tag</b>	A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen.
<b>Remote Wakeup/Remote Shutdown</b>	System administrators can power on, restart, and power off a client computer from a remote location.
<b>Instantly Available PC (Suspend to RAM - ACPI sleep state S3)</b>	Allows for very low power consumption with quick resume time.
<b>Remote System Installation via F12 (PXE 2.1) (Remote Boot from Server)</b>	Allows a new or existing system to boot over the network and download software, including the operating system.
<b>ROM revision levels</b>	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.
<b>System board revision level</b>	Allows management SW to read the revision level of the system board Revision level is digitally encoded into the HW and cannot be modified.
<b>Start-up Diagnostics (Power-on Self-Test)</b>	Assesses system health at boot time with selectable levels of testing.
<b>Auto Setup when new hardware installed</b>	System automatically detects addition of new hardware.
<b>Keyboard-less Operation</b>	The system can be booted without a keyboard.
<b>Localized ROM Setup</b>	Common BIOS image supports System Configuration Utility (F10 Setup) menus in 12 languages with local keyboard mappings.
<b>Asset Tag</b>	Allows the user or MIS to set a unique tag string in non-volatile memory.
<b>Per-slot Control</b>	Allows I/O slot parameters (option ROM enable/disable, bus latency) to be configured individually.
<b>Adaptive Cooling</b>	Fan control parameters are set according to detected hardware configuration for optimal acoustics.
<b>Pre-boot Diagnostics</b>	Early (pre-video) critical errors are reported via beeps and blinks on the power LED.
<b>Industry Standard Specification Support</b>	
<b>Industry Standard</b>	Revision Supported by the BIOS
<b>UEFI Specification Revision</b>	2.3.1
<b>ACPI</b>	Advanced Configuration and Power Management Interface, Version 2.0c
<b>ATA (IDE)</b>	AT Attachment 6 with Packet Interface (ATA/ATAPI-6), Revision 3b

### System Technical Specifications

<b>CD Boot</b>	"El Torito" Bootable CD-ROM Format Specification Version 1.0
<b>EDD</b>	- Enhanced Disk Drive Specification Version 1.1 - BIOS Enhanced Disk Drive Specification Version 3.0
<b>EHCI</b>	Enhanced Host Controller Interface for Universal Serial Bus, Revision 1.0
<b>PCI</b>	- PCI Local Bus Specification, Revision 2.3 - PCI Power Management Specification, Revision 1.1 - PCI Firmware Specification, Revision 3.0, Draft .7
<b>PCI Express</b>	PCI Express Base Specification, Revision 2.0 PCI Express Base Specification, Revision 3.0
<b>PMM</b>	POST Memory Manager Specification, Version 1.01
<b>SATA</b>	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
<b>SPD</b>	PC SDRAM Serial Presence Detect (SPD) Specification, Revision 1.2B
<b>TPM</b>	Trusted Computing Group TPM Specification Version 1.2
<b>UHCI</b>	Universal Host Controller Interface Design Guide, Revision 1.1
<b>USB</b>	Universal Serial Bus Revision 1.1 Specification  Universal Serial Bus Revision 2.0 Specification  Universal Serial Bus Revision 3.0 Specification
<b>SMBIOS</b>	System Management BIOS Reference Specification, Version 2.7
	<a href="http://h20464.www2.hp.com/index.html">External BIOS Simulator found at: http://h20464.www2.hp.com/index.html</a>

External BIOS Simulator found at: <http://h20464.www2.hp.com/index.html>

### Social and Environmental Responsibility

<b>Eco-Label Certifications &amp; Declarations</b>	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: <ul style="list-style-type: none"> <li>ENERGY STAR® (energy-saving features available on selected configurations-Windows only)</li> <li>US Federal Energy Management Program (FEMP)</li> <li>China Energy Conservation Program</li> <li><i>The ECO Declaration (TED)</i></li> </ul>
<b>Batteries</b>	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: <ul style="list-style-type: none"> <li>Mercury greater than 5ppm by weight</li> <li>Cadmium greater than 10ppm by weight</li> <li>Lead greater than 40ppm by weight</li> </ul>
<b>Restricted Material Usage</b>	This product meets the material restrictions specified in HP's General Specification for the Environment. <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/gse.pdf">http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/gse.pdf</a>  Hewlett-Packard 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

### System Technical Specifications

	exceed compliance obligations by meeting the requirements of the RoHS Directive on a worldwide basis.
<b>Low Halogen Statement</b>	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.
<b>End-of-Life Management and Recycling</b>	Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: <a href="http://www.hp.com/recycle">http://www.hp.com/recycle</a> 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.
<b>Hewlett-Packard Corporate Environmental Information</b>	For more information about HP's commitment to the environment: Global Citizenship Report <a href="http://www.hp.com/hpinfo/globalcitizenship/qcreport/index.html">http://www.hp.com/hpinfo/globalcitizenship/qcreport/index.html</a>  Eco-label certifications <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html">http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html</a>  ISO 14001 certificates: <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html">http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html</a>
<b>Additional Information</b>	<ul style="list-style-type: none"> <li>• This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.</li> <li>• Plastic parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.</li> <li>• This product is &gt;90% recycle-able when properly disposed of at end of life.</li> </ul> <p>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 <a href="http://ww2.epeat.net/CompanyDetail.aspx?CompanyID=24">http://ww2.epeat.net/CompanyDetail.aspx?CompanyID=24</a> for registration status in your country.</p>
<b>Packaging</b>	<p>HP Workstation product packaging meets the HP General Specification for the Environment at <a href="http://www.hp.com/hpinfo/globalcitizenship/society/gen_specifications.html">http://www.hp.com/hpinfo/globalcitizenship/society/gen_specifications.html</a></p> <ul style="list-style-type: none"> <li>• Does not contain restricted substances listed in HP Standard 011-1 General Specification for the Environment</li> <li>• Does not contain ozone-depleting substances (ODS)</li> <li>• Does not contain heavy metals (lead, mercury, cadmium or hexavalent chromium) in excess of 100 ppm sum total for all heavy metals listed</li> <li>• Maximizes the use of post-consumer recycled content materials in packaging materials</li> <li>• All packaging material is recyclable</li> <li>• All packaging material is designed for ease of disassembly</li> <li>• Reduced size and weight of packages to improve transportation fuel efficiency</li> <li>• Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards formatting</li> </ul>
<b>Packaging Materials</b>	
<b>Internal</b>	Cushions and plastic bags made of low density polyethylene (LDPE).
<b>External</b>	Outer carton, accessories carton, and insert made of corrugated paper board.

### MANAGEABILITY

<b>Industry Standard Specifications</b>	This product meets the following industry standard specifications for manageability functionality:
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### System Technical Specifications

	<ul style="list-style-type: none"> <li>DASH 1.1 (via Intel LAN on motherboard)</li> </ul>
<b>Intel Active Management Technology (AMT)</b>	<p>Intel® Active Management Technology (AMT) 9.1</p> <p>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:</p> <ul style="list-style-type: none"> <li>Power Management (on, off, reset, graceful shutdown, sleep and hibernate)</li> <li>Support in Max Power Savings (Shutdown and Hibernate Modes)</li> <li>Hardware Inventory (includes BIOS and firmware revisions)</li> <li>Hardware Alerting</li> <li>Agent Presence</li> <li>System Defense Filters</li> <li>Serial Over LAN (SOL)</li> <li>IDE Redirect</li> <li>ME Wake-on-LAN (WOL)</li> <li>DASH 1.1 compliance</li> <li>IPv6 Support</li> <li>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</li> <li>Remote Scheduled Maintenance - pre-schedule when the system connects to the IT or service provider console for maintenance.</li> <li>Remote Alerts - automatically alert IT or service provider if issues arise</li> <li>Access Monitor - Provides oversight into Intel® AMT actions to support security requirements</li> <li>PC Alarm Clock</li> <li>Microsoft NAP Support</li> <li>Host Base set-up and configuration</li> <li>Management Engine (ME) firmware roll back</li> <li>Local Time Sync to UTC Remote Memory Dump Command – Creates memory dump for debug</li> </ul>
<b>Intel® vPro™ Technology</b>	<p>The HP Z840 Workstation supports Intel vPro technology when configured as outlined below:</p> <ul style="list-style-type: none"> <li>Intel® Xeon® processor E5-1600 v3 product family or E5-2600 v3 product family featuring Intel® vPro™ Technology</li> <li>Intel® C610 chipset</li> <li>Intel® I218LM GbE LAN</li> </ul>
<b>Remote Manageability Software Solutions</b>	<p>The HP Z840 Workstation is supported on the following remote manageability software consoles:</p> <ul style="list-style-type: none"> <li>LANDesk Management Suite (HP recommended solution)</li> <li>Microsoft System Center Configuration Manager</li> <li>HP Client Automation Enterprise</li> </ul> <p>For questions or support for manageability needs, please visit <a href="http://www.hp.com/go/easydeploy">http://www.hp.com/go/easydeploy</a></p>
<b>System Software Manager</b>	<p>For questions or support for SSM, please visit: <a href="http://www.hp.com/go/ssm">http://www.hp.com/go/ssm</a></p>
<b>Service, Support, and Warranty</b>	<p>On-site Warranty and Service (<a href="#">Note 1</a>): Three-years, limited warranty and service offering delivers on-site, next business-day (<a href="#">Note 2</a>) service for parts and labor and includes free telephone support (<a href="#">Note 3</a>) 8am - 5pm. Global coverage (<a href="#">Note 2</a>) ensures that any product purchased in one country and transferred to another, non-restricted country will remain fully covered under the original warranty and</p>



### System Technical Specifications

	<p>service offering.</p> <p><b>NOTE 1:</b> Terms and conditions may vary by country. Certain restrictions and exclusions apply.</p> <p><b>NOTE 2:</b> 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.</p> <p><b>NOTE 3:</b> 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.</p> <p>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: <a href="http://www.hp.com/go/lookuptool">http://www.hp.com/go/lookuptool</a>. Additional HP Care Pack Services information by product is available at: <a href="http://www.hp.com/hps/carepack">http://www.hp.com/hps/carepack</a>. 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.</p>
<p><b>Product Change Notification</b></p>	<ul style="list-style-type: none"> <li>• Program to proactively communicate Product Change Notifications (PCNs) and Customer Advisories by email to customers, based on a user-defined profile.</li> <li>• PCNs provide advance notification of hardware and software changes to be implemented in the factory providing time to plan for transition.</li> <li>• Customer Advisories provide concise, effective problem resolution, greatly reducing the need to call technical support.</li> </ul>

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
J3K79AV	256GB SATA 1st SSD
J3K92AV	500GB 7200 RPM SATA 2nd HDD

### Stable & Consistent Offerings

J3K93AV	1TB 7200 RPM SATA 2nd HDD
J3L00AV	256GB SATA 2nd SSD
J3L13AV	500GB 7200 RPM SATA 3rd HDD
J3L14AV	1TB 7200 RPM SATA 3rd HDD
J3L20AV	256GB SATA 3rd SSD
J3L36AV	500GB 7200 RPM SATA 4th HDD
J3L37AV	1TB 7200 RPM SATA 4th HDD
J3L43AV	256GB SATA 4th SSD
J3L54AV	500GB 7200 RPM SATA 5th HDD
J3L55AV	1TB 7200 RPM SATA 5th HDD
J3L61AV	256GB SATA 5th SSD
J3L69AV	256GB SATA 6th SSD
J3L75AV	256GB SATA 7th SSD

### Graphics

Product #	Offering
F5G75AV	NVIDIA NVS 310 512MB 1st GFX
J1Q20AV	NVIDIA Quadro K2200 4GB 1st GFX
J1Q21AV	NVIDIA Quadro K4200 4GB 1st GFX
J1Q24AV	AMD FirePro W2100 2GB 1st GFX
J1Q27AV	NVIDIA NVS 310 512MB 2nd GFX
J1Q31AV	NVIDIA Quadro K2200 4GB 2nd GFX
J1Q32AV	NVIDIA Quadro K4200 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
G8X74AV	32GB DDR4-2133 (4x8GB) 2CPU RegRAM
G8X64AV	64GB DDR4-2133 (8x8GB) 1CPU RegRAM
G8X77AV	64GB DDR4-2133 (8x8GB) 2CPU RegRAM
G8X65AV	64GB DDR4-2133 (4x16GB) 1CPU RegRAM
G8X78AV	128GB DDR4-2133 (16x8GB) 2CPU RegRAM
G8X66AV	128GB DDR4-2133 (8x16GB) 1CPU RegRAM
G8X79AV	128GB DDR4-2133 (8x16GB) 2CPU RegRAM
G8X80AV	256GB DDR4-2133 (16x16GB) 2CPU RegRAM

### Optical and Removable Storage

Product #	Offering
F5G79AV	Slim SuperMulti DVDRW SATA 1st ODD
G8U90AV	Slim SuperMulti DVDRW SATA 2nd ODD

### 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

<b>HP SAS (Serial Attached SCSI) Hard Drives for HP Workstations</b>	<b>600GB SAS 15K rpm 6Gb/s 3.5" HDD</b>	<b>Capacity</b>	600GB		
		<b>Height</b>	1 in; 2.54 cm		
		<b>Width</b>		<b>Media Diameter</b>	3.5 in; 8.9 cm
				<b>Physical Size</b>	4 in; 10.17 cm
		<b>Interface</b>	SAS		
		<b>Synchronous Transfer Rate (Maximum)</b>	6.0 Gb/s		
		<b>Buffer</b>	16 MB		
		<b>Seek Time (typical reads, includes controller overhead, including settling)</b>		<b>Single Track</b>	0.2 ms
				<b>Average</b>	3.4 ms
				<b>Full Stroke</b>	6.6 ms
		<b>Rotational Speed</b>	15,000 rpm		
		<b>Logical Blocks</b>	1,172,123,568 - 512 byte blocks		
		<b>Operating Temperature</b>	50° to 95° F (10° to 35° C)		
	<b>300GB SAS 15K rpm 6Gb/s 3.5" HDD</b>	<b>Capacity</b>	300GB		
		<b>Height</b>	1 in; 2.54 cm		
		<b>Width</b>		<b>Media Diameter</b>	3.5 in; 8.9 cm
				<b>Physical Size</b>	4 in; 10.17 cm
		<b>Interface</b>	SAS		
		<b>Synchronous Transfer Rate (Maximum)</b>	6Gb/s		
		<b>Buffer</b>	16MB		
		<b>Seek Time (typical reads, includes controller overhead, including settling)</b>		<b>Single Track</b>	0.2 ms
				<b>Average</b>	3.4 ms
				<b>Full Stroke</b>	6.6 ms
		<b>Rotational Speed</b>	15,000 rpm		
		<b>Operating Temperature</b>	50° to 95° F (10° to 35° C)		
			<b>HP 300GB SAS 10K SFF HDD</b>	<b>Capacity</b>	300GB
<b>Height</b>	0.6 in; 1.53 cm				
<b>Width</b>				<b>Media Diameter</b>	2.5 in; 6.36 cm
				<b>Physical Size</b>	2.75 in; 6.99 cm
<b>Interface</b>	SAS 6Gb/s				
<b>Synchronous Transfer Rate (Maximum)</b>	Up to 600MB/s				
<b>Buffer</b>	64MB				
<b>Cache</b>	multi-segmentable cache buffer				
<b>Seek Time (typical reads, includes controller overhead, including settling)</b>				<b>Single Track</b>	0.4 ms (max)
				<b>Average</b>	3.6 ms
				<b>Full Stroke</b>	7.3 ms

### Technical Specifications – Storage Hard Drives

	<b>Rotational Speed</b>	10,000 rpm	
	<b>Logical Blocks</b>	585,937,500	
	<b>Operating Temperature</b>	41° to 131° F (5° to 55° C)	
<b>HP 600GB SAS 10K SFF HDD</b>	<b>Capacity</b>	600GB	
	<b>Height</b>	0.6 in; 1.53 cm	
	<b>Width</b>		<b>Media Diameter</b> 2.5 in; 6.36 cm
			<b>Physical Size</b> 2.75 in; 6.99 cm
	<b>Interface</b>	SAS 6Gb/s	
	<b>Synchronous Transfer Rate (Maximum)</b>	Up to 600MB/s	
	<b>Buffer</b>	64MB	
	<b>Cache</b>	multi-segmentable cache buffer	
	<b>Seek Time</b> (typical reads, includes controller overhead, including settling)		<b>Single Track</b> 0.4 ms (max)
			<b>Average</b> 3.6 ms
			<b>Full Stroke</b> 7.3 ms
	<b>Rotational Speed</b>	10,000 rpm	
	<b>Logical Blocks</b>	1,172,123,568	
	<b>Operating Temperature</b>	41° to 131° F (5° to 55° C)	
<b>HP 1.2TB SAS 10K SFF HDD</b>	<b>Capacity</b>	1.2TB	
	<b>Height</b>	0.6 in; 1.53 cm	
	<b>Width</b>		<b>Media Diameter</b> 2.5 in; 6.36 cm
			<b>Physical Size</b> 2.75 in; 6.99 cm
	<b>Interface</b>	SAS 6Gb/s	
	<b>Synchronous Transfer Rate (Maximum)</b>	Up to 600MB/s	
	<b>Buffer</b>	64MB	
	<b>Seek Time</b> (typical reads, includes controller overhead, including settling)		<b>Single Track</b> 0.18ms (max)
			<b>Average</b> 3.5ms
			<b>Full Stroke</b> 7.17ms
	<b>Rotational Speed</b>	10,000 rpm	
	<b>Logical Blocks</b>	2,344,225,968	
	<b>Operating Temperature</b>	41° to 131° F (5° to 55° C)	

<b>SATA Hard Drives for HP Workstations</b>	<b>500GB SATA 10K rpm SFF HDD</b>	<b>Capacity</b>	500GB	
		<b>Height</b>	0.6 in; 1.53 cm	
		<b>Width</b>		<b>Media Diameter</b> 2.5 in; 6.36 cm
				<b>Physical Size</b> 2.75 in; 6.99 cm
		<b>Interface</b>	Serial ATA (6Gb/s)	
		<b>Synchronous Transfer Rate (Maximum)</b>	Up to 600MB/s	
		<b>Buffer</b>	64MB	
		<b>Cache</b>	Adaptive	

### Technical Specifications – Storage Hard Drives

	<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b>	1.2ms (typical)
		<b>Average</b>	3.6ms
		<b>Full Stroke</b>	9.0ms (typical)
	<b>Rotational Speed</b>		10K rpm
	<b>Operating Temperature</b>		41° to 131° F (5° to 55° C)
<b>1TB SATA 7200 rpm 6Gb/s 3.5" HDD</b>	<b>Capacity</b>		1TB
	<b>Height</b>		1 in; 2.54 cm
	<b>Width</b>	<b>Media Diameter</b>	3.5 in; 8.9 cm
		<b>Physical Size</b>	4 in; 10.17 cm
	<b>Interface</b>		Serial ATA (6Gb/s)
	<b>Synchronous Transfer Rate</b> (Maximum)		Up to 600 MB/s
	<b>Buffer</b>		64MB
	<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b>	1.2ms (typical)
		<b>Average</b>	11ms
		<b>Full Stroke</b>	21ms (typical)
	<b>Rotational Speed</b>		7,200 rpm
	<b>Logical Blocks</b>		1,953,525,168
	<b>Operating Temperature</b>		41° to 131° F (5° to 55° C)
<b>2.0TB SATA 7200 rpm 6Gb/s 3.5" HDD</b>	<b>Capacity</b>		2.0TB
	<b>Height</b>		1 in; 2.54 cm
	<b>Width</b>	<b>Media Diameter</b>	3.5 in; 8.9 cm
		<b>Physical Size</b>	4 in; 10.17 cm
	<b>Interface</b>		Serial ATA (6.0 Gb/s), NCQ Enabled
	<b>Synchronous Transfer Rate</b> (Maximum)		Up to 600 MB/s
	<b>Buffer</b>		64MB
	<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b>	1.0 ms
		<b>Average</b>	11 ms
		<b>Full Stroke</b>	18 ms
	<b>Rotational Speed</b>		7,200 rpm
	<b>Logical Blocks</b>		3,907,029,168
	<b>Operating Temperature</b>		41° to 131° F (5° to 55° C)
<b>3.0TB SATA 7200 rpm 6Gb/s 3.5" HDD</b>	<b>Capacity</b>		3.0TB
	<b>Height</b>		1 in; 2.54 cm
	<b>Width</b>	<b>Media Diameter</b>	3.5 in; 8.9 cm
		<b>Physical Size</b>	4.0 in; 10.17 cm
	<b>Interface</b>		Serial ATA (6.0Gb/s), NCQ enabled
	<b>Synchronous Transfer Rate</b> (Maximum)		Up to 6.0 Gb/s
	<b>Buffer</b>		64MB

### Technical Specifications – Storage Hard Drives

		<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b>	0.6 ms
			<b>Average</b>	11 ms
			<b>Full Stroke</b>	Not Specified
		<b>Rotational Speed</b>		7,200 rpm
		<b>Operating Temperature</b>		41° to 140° F (5° to 60° C)
	<b>500GB SATA 7.2K SED SFF HDD</b>	<b>Capacity</b>		500GB
		<b>Height</b>		0.275 in; 0.7 cm
		<b>Width</b>		
			<b>Media Diameter</b>	2.5 in; 6.36 cm
			<b>Physical Size</b>	2.75 in; 6.99 cm
		<b>Interface</b>		Serial ATA (6Gb/s)
		<b>Synchronous Transfer Rate</b> (Maximum)		Up to 600MB/s
		<b>Buffer</b>		32MB
		<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b>	1 ms
			<b>Average</b>	4.2ms
			<b>Full Stroke</b>	25ms (typical)
		<b>Rotational Speed</b>		7,200 rpm
		<b>Operating Temperature</b>		32° to 140° F (0° to 60° C)
<b>HP Solid State Drives (SSDs) for Workstations</b>	<b>HP 128GB SATA 6Gb/s SSD</b>	<b>Capacity</b>		128GB
		<b>Height</b>		0.28 in; 0.7 cm
		<b>Width</b>		
			<b>Physical Size</b>	2.5 in; 6.36 cm
		<b>Interface</b>		SATA 6Gb/s
		<b>Synchronous Transfer Rate</b> (Maximum)		Up to 500MB/s (Sequential Read)
		<b>Operating Temperature</b>		32° to 158° F (0° to 70° C)
	<b>HP 256GB SATA 6Gb/s SSD</b>	<b>Capacity</b>		256GB
		<b>Height</b>		0.28 in; 0.7 cm
		<b>Interface</b>		SATA 6Gb/s
		<b>Synchronous Transfer Rate</b> (Maximum)		Up to 500MB/s (Sequential Read)
		<b>Operating Temperature</b>		32° to 158° F (0° to 70° C)
	<b>HP 256GB SATA 6Gb/s SED Opal 1SSD</b>	<b>Capacity</b>		256GB
		<b>Height</b>		0.28 in; 0.7 cm
		<b>Width</b>		
			<b>Physical Size</b>	2.5 in; 6.36 cm
		<b>Interface</b>		6Gb/s SATA
		<b>Synchronous Transfer Rate</b> (Maximum)		Up to 500MB/s (Sequential Read)
		<b>Operating Temperature</b>		32° to 158° F (0° to 70° C)
	<b>HP 512GB SATA 6Gb/s</b>	<b>Capacity</b>		512GB

### Technical Specifications – Storage Hard Drives

<b>SSD</b>	<b>Height</b>	0.28 in; 0.7 cm
	<b>Width</b>	<b>Physical Size</b> 2.5 in; 6.36 cm
	<b>Interface</b>	6Gb/s SATA
	<b>Synchronous Transfer Rate (Maximum)</b>	Up to 500MB/s (Sequential Read)
	<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)

<b>HP 1TB SATA 6Gb/s SSD</b>	<b>Capacity</b>	1TB
	<b>Height</b>	0.28 in; 0.7 cm
	<b>Width</b>	<b>Physical Size</b> 2.5 in; 6.36 cm
	<b>Interface</b>	6Gb/s SATA
	<b>Synchronous Transfer Rate (Maximum)</b>	Up to 550MB/s (Sequential Read)
<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)	

<b>Samsung Enterprise 240GB SATA SSD</b>	<b>Capacity</b>	240GB
	<b>Width</b>	<b>Physical Size</b> 2.5 in; 6.36 cm
	<b>Interface</b>	SATA 6Gb/s
	<b>Synchronous Transfer Rate (Maximum)</b>	600 Mb/s

<b>Samsung Enterprise 480GB SATA SSD</b>	<b>Capacity</b>	480GB
	<b>Width</b>	<b>Physical Size</b> 2.5 in; 6.36 cm
	<b>Interface</b>	SATA 6Gb/s
	<b>Synchronous Transfer Rate (Maximum)</b>	600 Mb/s

<b>Intel Pro 1500 180GB SATA SSD</b>	<b>Capacity</b>	180GB
	<b>Width</b>	<b>Physical Size</b> 2.5 in; 6.36 cm
	<b>Interface</b>	6Gb/s SATA
	<b>Synchronous Transfer Rate (Maximum)</b>	600 Mb/s
	<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)

#### PCIe SSDs for HP Workstations

<b>HP Z Turbo Drive 256GB SSD</b>	<b>Capacity</b>	256GB
	<b>Interface</b>	PCI Express 2.0 x4 electrical x4 physical
	<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)

<b>HP Z Turbo Drive 512GB SSD</b>	<b>Capacity</b>	512GB
	<b>Interface</b>	PCI Express 2.0 x4 electrical x4 physical
	<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)



### Technical Specifications - Hard Drive Controllers

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

### Technical Specifications – Graphics

#### GRAPHICS

##### NVIDIA NVS 310 512MB Graphics

<b>Form Factor</b>	Low Profile: 2.7 inches (H) x 5.7 inches (L), Half-Height
<b>Weight:</b>	~142 grams
<b>Graphics Controller</b>	NVIDIA NVS 310 GPU: GF119-825
<b>Bus Type</b>	PCI Express x16, 2.0 compliant
<b>Memory</b>	Size: 512MB DDR3 Clock: 875MHz Memory Bandwidth: 14GB/s
<b>Connectors</b>	2 x DisplayPort
<b>Maximum Resolution</b>	Up to 2560 x 1600 (digital display) per display.

<b>Image Quality Features</b>	The following video formats are supported: <ul style="list-style-type: none"><li>- MPEG2</li><li>- MPEG4 Part 2 Advanced Simple Profile</li><li>- H.264 SVC codec support</li><li>- Support for 3D Blu Ray</li><li>- VC1</li><li>- DivX version 3.11 and later</li><li>- MVC</li></ul>
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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.

<b>Display Output</b>	Up to 2 displays in the following configurations:
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##### DisplayPort output:

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

##### HDMI output:

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

### Technical Specifications – Graphics

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  
 Genuine 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 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 adaptors.

#### 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:

### Technical Specifications – Graphics

- 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:

- 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 adaptor.

DVI-D output:

- 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

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).

### Technical Specifications – Graphics

<b>NVIDIA NVS 510 2GB Graphics</b>	<b>Form Factor</b>	Low Profile, 2.713 inches × 6.3 inches, single slot
	<b>Graphics Controller</b>	NVS 510 GPU Core Clock: 797 MHz Memory Clock: 891 MHz CUDA Cores: 192
	<b>Bus Type</b>	PCI Express x16, Generation 2.0
	<b>Memory</b>	2GB DDR3
	<b>Connectors</b>	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)
	<b>Maximum Resolution</b>	Mini-DisplayPort connectors support ultra-high-resolution panels (up to 3840 x 2160 @ 60Hz)
	<b>Image Quality Features</b>	10-bit internal display processing, including hardware support for 10-bit scan-out
	<b>Display Output</b>	DisplayPort with Multi-Stream Technology (MST) and High Bit Rate 2 (HBR2) support.  Digital Display Support  1. DisplayPort Output <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> </ul> 2. DVI-D Output <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> </ul> HDMI Output <ul style="list-style-type: none"> <li>• 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.</li> </ul> Analog Display Support  1. VGA display output <ul style="list-style-type: none"> <li>• Drives four analog displays at resolutions up to 1920 × 1200 at 60 Hz using DisplayPort to VGA cable adaptors.</li> </ul>

### Technical Specifications – Graphics

**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 Adapters

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.

#### NVIDIA Quadro K620 2GB Form Factor Graphics

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

Additional DVI-to-VGA, 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  
- supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST)

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

Single Link-DVI(I) output:

### Technical Specifications – Graphics

<b>Image Quality Features</b>	- up to 1920 x 1200 x 32 bpp @ 60Hz 10-bit internal display processing pipeline 10-bit scan-out support
<b>Display Output</b>	1 Dual-link DVI-I connector 1 Display Port connector
<b>Shading Architecture</b>	Full Microsoft DirectX 11.1 Shader Model 5.0
<b>Supported Graphics APIs</b>	OpenGL 4.4 DirectX 11.1 API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran
<b>Available Graphics Drivers</b>	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.

<b>NVIDIA Quadro K420 1GB Graphics</b>	<b>Form Factor</b>	Low Profile: 2.713 inches × 6.3 inches, single slot
	<b>Graphics Controller</b>	NVIDIA Quadro K420 GPU: GK107
	<b>Bus Type</b>	PCI Express x16, 2.0 compliant
	<b>Memory</b>	Size: 1GB DDR3 Clock: 891MHz Memory Bandwidth: 29GB/s
	<b>Connectors</b>	One dual-link DVI-I connector One DisplayPort connector
	<b>Maximum Resolution</b>	VGA (via adapter cable): <ul style="list-style-type: none"> <li>• 2048 × 1536 × 32 bpp at 85 Hz</li> </ul> Dual-link DVI <ul style="list-style-type: none"> <li>• 2560 × 1600 × 32 bpp at 60 Hz (reduced blanking)</li> </ul> Single-link DVI <ul style="list-style-type: none"> <li>• 920 × 1200 × 32 bpp at 60 Hz (reduced blanking)</li> </ul> DisplayPort 1.2 <ul style="list-style-type: none"> <li>• 3840 × 2160 × 30 bpp at 60 Hz</li> </ul>
	<b>RAMDAC</b>	400 MHz integrated RAMDAC
	<b>Display Output</b>	Maximum number of displays supported: 2
	<b>Shading Architecture</b>	Shader Model 5.0
	<b>Supported Graphics APIs</b>	DX11, OpenGL 4.4 Programming support for CUDA C, CUDA C++, DirectCompute 5.0, OpenCL,

### Technical Specifications – Graphics

Python, and Fortran

#### Available Graphics Drivers

Microsoft Windows 8.1  
Microsoft Windows 8  
Microsoft Windows 7  
Linux

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.

#### NVIDIA Quadro K2200 2GB Graphics

#### Form Factor

4.38" H x 7.97" L  
Single Slot, Full Height

#### Weight:

240 grams

#### Graphics Controller

NVIDIA Quadro K2200 Graphics Card  
GM107 GPU  
640 CUDA cores  
Max Power: 67.7 Watts

#### Bus Type

PCI Express 2.0 x16

#### Memory

4 GB GDDR5, 2500 MHz  
128-bit memory I/O path  
80 GB/s memory bandwidth

#### Connectors

1 DL-DVI(I) output, 2 DisplayPort outputs  
Factory Configured Option: No video cable adapter included  
Option Kit: One DP-to-DVI adapter included with card

#### Maximum Resolution

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

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 scan-out 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)



### Technical Specifications – Graphics

and/or HBR2):  
 - 4 1920x1200  
 - 4 2560x1600  
 - 2 4096x2160

Maximum number of monitors across all available Quadro K2200 outputs is 4.

<b>Shading Architecture</b>	Full Microsoft DirectX 11.1 Shader Model 5.0
<b>Supported Graphics APIs</b>	OpenGL 4.4 DirectX 11.1 API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran
<b>Available Graphics Drivers</b>	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. 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 or a DisplayPort 1.2 hub device.
4. A DisplayPort hub device may be used to connect multiple DisplayPort monitors to a single Quadro K2200 DisplayPort output.

### NVIDIA Quadro K4200 4GB Form Factor Graphics

	4.376" H x 9.5" L Single Slot, Full Height Weight: ~461 grams (without extender)
<b>Graphics Controller</b>	NVIDIA Quadro K4200 Graphics Card Kepler GK104 GPU 1344 CUDA cores Max Power: 108 Watts
<b>Bus Type</b>	PCI Express 2.0 x16
<b>Memory</b>	4 GB GDDR5, 2700 MHz 256-bit memory I/O path 173 GB/s memory bandwidth
<b>Connectors</b>	1 DL-DVI(I) 2 DisplayPort 1.2a CTO: No video cable adapter included AMO: One DP-to-DVI adapter included with card

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

### Technical Specifications – Graphics

<b>Maximum Resolution</b>	<p>DisplayPort:</p> <ul style="list-style-type: none"><li>- up to 3840 x 2160 x 30 bpp @ 60Hz</li><li>- supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST)</li></ul> <p>DL-DVI(I) output:</p> <ul style="list-style-type: none"><li>- up to 2560 x 1600 x 32 bpp @ 60Hz</li></ul> <p>Single Link-DVI(I) output:</p> <ul style="list-style-type: none"><li>- up to 1920 x 1200 x 32 bpp @ 60Hz</li></ul> <p>VGA (via adapter cable):</p> <ul style="list-style-type: none"><li>- 2048 x 1536 x 32 bpp at 85 Hz</li></ul>
<b>Image Quality Features</b>	<p>10-bit internal display processing (hardware support for 10-bit scanout for both windowed desktop and full screen, only available on Windows with Aero disabled and Linux)</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>
<b>Display Output</b>	<p>Maximum number of displays</p> <ul style="list-style-type: none"><li>- 3 direct attached monitors</li><li>- 4 using DP 1.2a with MST and HBR2 enabled monitors</li></ul> <p>Maximum number of DisplayPort displays possible (may require MST and/or HBR2):</p> <ul style="list-style-type: none"><li>- 4 1920x1200</li><li>- 4 2560x1600</li><li>- 2 3840x2160</li></ul> <p>Maximum number of monitors across all available Quadro K4200 outputs is 4.</p>
<b>Shading Architecture</b>	Shader Model 5.0
<b>Supported Graphics APIs</b>	OpenGL 4.4 DirectX 11.1 API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran
<b>Available Graphics Drivers</b>	Microsoft Windows 8.1 Microsoft Windows 8 Microsoft Windows 7 Linux
	<p>HP qualified drivers may be preloaded or available from the HP support Web site:</p> <p><a href="http://welcome.hp.com/country/us/en/support.html">http://welcome.hp.com/country/us/en/support.html</a></p>

#### NOTES:

### Technical Specifications – Graphics

Quadro K4200 offered as CTO does not include a video cable adapter. Video cable adapters must be ordered separately.  
 Quadro K4200 offered as AMO includes one DP-to-DVI video cable adapter. Additional cables must be ordered separately.  
 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 or a DisplayPort 1.2 hub device.  
 A DisplayPort hub device may be used to connect multiple DisplayPort monitors to a single Quadro K4200 DisplayPort output.

<b>NVIDIA Quadro K5200 8GB Graphics</b>	4.376" H x 10.5" L Dual Slot
<b>Weight:</b>	~880 grams (without extender)
<b>Graphics Controller</b>	NVIDIA Quadro K5200 GPU: GK110-850-B1 with 2304 CUDA cores Power: 150 Watts
<b>Bus Type</b>	PCI Express 3.0 x16
<b>Memory</b>	Size: 8GB GDDR5 Memory bandwidth: 192GB/s Memory Width: 256-bit
<b>Connectors</b>	DVI-I (1), DVI-D (1), DP (2), Optional 3D Stereo bracket with 3-pin mini-DIN 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.
<b>Maximum Resolution</b>	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
<b>Image Quality Features</b>	10-bit internal display processing (hardware support for 10-bit scanout for both windowed desktop and full screen, only available on Windows with Aero disabled and Linux).  NVIDIA® 3D Vision™ technology, 3D DLP, Interleaved, and other 3D stereo format support.  Full OpenGL quad buffered stereo support.  Support for NVIDIA® Quadro® Mosaic, NVIDIA® nView® multi-display

### Technical Specifications – Graphics

technology, NVIDIA® Enterprise Management Tools.

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 (may require MST and/or HBR2):  
 - 4 1920x1200  
 - 4 2560x1600  
 - 2 4096x2160

Maximum number of monitors across all available Quadro K5200 outputs is 4.

#### Shading Architecture

Shader Model 5.0

#### Supported Graphics APIs

OpenGL 4.4  
 DirectX 11

API support for NVIDIA's CUDA™ C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, Fortran

#### Available Graphics Drivers

Windows 8.1  
 Windows 8  
 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. Factory configured Quadro K5200 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).

#### NVIDIA Quadro K6000 12GB Graphics

#### Form Factor

4.376" H x 10.5" L  
 Dual Slot  
 Power: 234 Watts

#### Weight:

~880 grams

#### Graphics Controller

NVIDIA Quadro K6000 Graphics Card based on the GK180 GPU  
 Core Count: 2880  
 Base Clock: 797 MHz  
 Boost Clock: 902 MHz

### Technical Specifications – Graphics

<b>Bus Type</b>	PCI Express 3.0 x16
<b>Memory</b>	12GB GDDR5 384-bit memory I/O path 288 GB/s memory bandwidth ECC Memory
<b>Connectors</b>	DVI-I (1), DVI-D (1), DP (2), Optional 3D Stereo bracket with 3-pin mini-DIN 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.
<b>Image Quality Features</b>	<ul style="list-style-type: none"> <li>• DisplayPort with Multi-Stream Technology (MST) and High Bit Rate 2 (HBR2), HDMI 1.4, and HDCP support</li> <li>• NVIDIA 3D Vision™ technology</li> <li>• NVIDIA Premium Mosaic and nView</li> </ul>
<b>Display Output</b>	<p>400 MHz integrated RAMDAC</p> <ul style="list-style-type: none"> <li>• Maximum resolution over VGA (through DVI to VGA cable): 2048 × 1536 × 32 bpp at 85 Hz</li> </ul> <p>Dual-link internal TMDS (DVI 1.0)</p> <ul style="list-style-type: none"> <li>• Maximum resolution over digital port (single GPU and SLI mode): 2560 × 1600 × 32 bpp at 60 Hz (reduced blanking)</li> </ul> <p>Single-link internal TMDS (DVI 1.0)</p> <ul style="list-style-type: none"> <li>• Maximum resolution over digital port (single GPU and SLI mode): 1920 × 1200 × 32 bpp at 60 Hz (reduced blanking)</li> </ul> <p>DisplayPort with MST and HBR2.</p> <ul style="list-style-type: none"> <li>• Maximum resolution: 3840 × 2160 × 36 bpp at 60Hz</li> </ul> <p>HDMI</p> <ul style="list-style-type: none"> <li>• Maximum resolution: 1920 × 1080 × 32 bpp at 60Hz</li> </ul>
<b>Shading Architecture</b>	Shader Model 5.0 Full IEEE 764-2008 32-bit and 64-bit precision
<b>Supported Graphics APIs</b>	Full OpenGL 4.3 Full DirectX 11 CUDA API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran
<b>Available Graphics Drivers</b>	Windows 8 Windows 7 Professional (64-bit and 32-bit) Red Hat Enterprise Linux (RHEL) 6 Desktop/Workstation SUSE Linux Enterprise Desktop 11 (64-bit and 32-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>

Novell SUSE Linux Enterprise drivers may also be obtained from:

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

#### NOTES:

NVIDIA GRID VGX Pass Through feature supported on NVIDIA Quadro K6000 to enable direct mapping of GPU to Virtual Machine.

No display output adapter included.

<b>AMD FirePro W2100 2GB Graphics</b>	<b>Form Factor</b>	Low Profile, half length (full-height bracket included)
	<b>Graphics Controller</b>	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
	<b>Bus Type</b>	PCI Express® x8, Generation 3.0
	<b>Memory</b>	2GB DDR3 memory Memory Bandwidth: 28.8 GB/s Memory Width:128bit
	<b>Connectors</b>	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.
	<b>Maximum Resolution</b>	DisplayPort 1.2: up to 4096x2160 x 30 bpp @ 60Hz  Dual Link DVI(I) (requires adapter cable): 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
	<b>Image Quality Features</b>	Advanced support for 8-bit, 10-bit, and 16-bit per RGB color component. High bandwidth scaler for high quality up and downscaling.
	<b>Display Output</b>	2 x DisplayPort® 1.2 Maximum number of displays: 2
<b>Shading Architecture</b>	Shader Model 5.0	
<b>Supported Graphics APIs</b>	OpenCL™ 2.0, DirectX® 11.2/12 and OpenGL 4.4	
<b>Available Graphics</b>	Windows 8.1 (64-bit and 32-bit)	

### Technical Specifications – Graphics

**Drivers** 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

<b>AMD FirePro W5100 4GB Graphics</b>	<b>Form Factor</b>	Full height, full length, single slot (6.75" X 3.75")
	<b>Graphics Controller</b>	AMD FirePro W5100 graphics based on the "Bonaire" GPU GPU Frequency: 1000MHz GPU: 768 Stream Processors organized into 12 Compute Units Power: <75 Watts Cooling: Active
	<b>Bus Type</b>	PCI Express® x16, Generation 3.0
	<b>Memory</b>	4GB GDDR5 memory Memory Bandwidth: 96 GB/s Memory Width: 128bit
	<b>Connectors</b>	4x Display Port 1.2 connectors with HBR2 and MST support.  Factory Configured: No video cable adapter included After market option kit: One DP-to-DVI adapter included with card
	<b>Maximum Resolution</b>	Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories. DisplayPort: - 4096x2160 @24bpp 60Hz  Dual Link DVI: - 2560x1600 (requires DP to DL-DVI adapter)  Single Link DVI: - 1920x1200 (requires DP to DVI adapter)
	<b>Image Quality Features</b>	VGA: - 1920x1200 (requires DP to VGA adapter) Advanced support for 8-bit, 10-bit, and 16-bit per RGB color component. High bandwidth scaler for high quality up and downscaling
	<b>Display Output</b>	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
	<b>Shading Architecture</b>	Shader Model 5.0
	<b>Supported Graphics APIs</b>	OpenGL 4.4v

### Technical Specifications – Graphics

**Available Graphics Drivers**

OpenCL 2.0vi  
DirectX 11.2 / 12  
AMD Mantle  
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>

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### Technical Specifications - Optical and Removable Storage

#### OPTICAL AND REMOVABLE STORAGE

##### HP 9.5mm Slim SuperMulti DVD Writer

<b>Description</b>	9.5mm height, tray-load	
<b>Mounting Orientation</b>	Either horizontal or vertical	
<b>Interface Type</b>	SATA/ATAPI	
<b>Dimensions (WxHxD)</b>	128 x 9.5 x 127mm	
<b>Supported Media Types</b>	DVD-RAM DVD+R DVD+RW DVD+R DL DVD-R DL DVD-R DVD-RW CD-R CD-RW	
<b>Disc Capacity</b>	DVD-ROM	8.5 GB DL or 4.7 GB standard
	Full Stroke DVD	< 200 ms (seek)
	Full Stroke CD	< 200 ms (seek)
<b>Maximum Data Transfer Rates</b>	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
<b>Power</b>	Source	SATA DC power receptacle
	DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p
	DC Current	5 VDC -< 800 mA typical, <1600 mA maximum
<b>Operating Environmental (all conditions non-condensing)</b>	Temperature	41° to 122° F (5° to 50° C)
	Relative Humidity	10% to 80%
	Maximum Wet Bulb Temperature	84° F (29° C)
<b>Operating Systems Supported</b>	Windows 8.1, Windows 8 32-bit and 64-bit, Windows 7 Professional 32-bit and 64-bit, Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*. Red Hat Enterprise Linux(RHEL) WS4**, 5, 6 Desktop/Workstation SUSE Linux Enterprise Desktop 10 & 11	

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

### Technical Specifications - Optical and Removable Storage

<b>Kit Contents</b>	9.5mm Slim SuperMulti DVD Writer, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide
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<b>HP 9.5mm Slim DVD-ROM Drive</b>	<b>Description</b>	9.5mm height, tray-load	
	<b>Mounting Orientation</b>	Either horizontal or vertical	
	<b>Interface Type</b>	SATA / ATAPI	
	<b>Dimensions (WxHxD)</b>	128 x 9.5 x 127mm	
	<b>Disc Capacity</b>	DVD-ROM	Single layer: Up to 4.7 GB Double layer: Up to 8.5 GB
	<b>Access Times</b>	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)
	<b>Power</b>	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
	<b>Operating Environmental (all conditions non-condensing)</b>	Temperature	41° to 122° F (5° to 50° C)
Relative Humidity		10% to 80%	
Maximum Wet Bulb Temperature		84° F (29° C)	
<b>Operating Systems Supported</b>	Windows 8.1, Windows 8 32-bit and 64-bit, Windows 7 Professional 32-bit and 64-bit, Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*. Red Hat Enterprise Linux(RHEL) WS4**, 5, 6 Desktop/Workstation SUSE Linux Enterprise Desktop 10 & 11		
	No driver is required for this device. Native support is provided by the operating system.		
<b>Kit Contents</b>	9.5mm Slim DVD-ROM Drive, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide		

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

### Technical Specifications - Optical and Removable Storage

	DVD-R DVD-RW CD-R CD-RW	
<b>Disc Capacity</b>	DVD-ROM Blu-ray	8.5 GB DL or 4.7 GB standard 25 GB (single-layer) 50 GB (dual-layer) 100/128 GB (BDXL)
	Full Stroke DVD Full Stroke CD Blu-ray Startup Time	< 230 ms (seek) < 220 ms (seek) < 230 ms (seek) (Full Stroke Blu-ray) (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
<b>Maximum Data Transfer Rates</b>	CD ROM Read  DVD ROM Read  Blu-ray	CD-ROM, CD-R Up to 24X CD-RW Up to 24X  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  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
<b>Power</b>	Source DC Power Requirements DC Current	SATA DC power receptacle 5 VDC $\pm$ 5%-100 mV ripple p-p 5 VDC -900 mA typical, 2000mA maximum
<b>Operating Environmental (all conditions non-condensing)</b>	Temperature Relative Humidity Maximum Wet Bulb Temperature	41° to 122° F (5° to 50° C) 10% to 80% 84° F (29° C)
<b>Operating Systems</b>	Windows 8.1, Windows 8 32-bit and 64-bit, Windows 7 Professional 32-bit	

### Technical Specifications - Optical and Removable Storage

**Supported** 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 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.)

**HP 15-in-1 Media Card Reader**

**Description** Supports hardware ECC (Error Correction Code) function  
Supports hardware CRC (Cyclic Redundancy Check) function  
Supports MS 4-bit parallel transfer mode  
Supports MS-PRO 4-bit parallel transfer mode  
Supports MS PRO-HG Duo 4-bit parallel transfer mode  
Supports SD 4-bit parallel transfer mode  
Supports UHS-104 SD 4-bit card (version 3.0)  
Supports CF v6.0 with PIO mode 6 and Ultra DMA 7 mode

**Interface Type** USB 3.0 High-speed interface  
**NOTE:** If there is a USB2 connection, USB2 transfer speeds are supported.

**Dimensions (WxHxD)** 4.9 x 4 x 1 in (124.5 x 101.6 x 25.4 mm) Fits conveniently in the 5.25" drive bay.

**Supported Media Types** CompactFlash Type I  
CompactFlash Type II  
Microdrive  
Secure Digital Card (SD)  
Secure Digital High Capacity (SDHC)  
SD Extended Capacity Memory Card (SDXC)  
SD Ultra High Speed II(SD UHSII)  
Memory Stick  
Memory Stick Select  
Memory Stick Duo (MS Duo)  
Memory Stick PRO (MS PRO)  
Memory Stick PRO Duo (MS PRO Duo)  
Memory Stick PRO-HG Duo  
MagicGate Memory Stick (MG)

### Technical Specifications - Optical and Removable Storage

#### MagicGate Memory Stick Duo

These additional media types are supported with a card adapter.

Memory Stick Micro (M2)

miniSD

miniSD High Capacity

Micro SD Memory Card (MicroSD)

Micro SD High Capacity Memory Card (MicroSDHC)

Test Parameters/Conditions - Power applied, unit operating on system  
±5%

#### Operating Systems Supported

Windows 8 Pro (64-bit)\*

Windows 8.1 (64-bit)\*

Windows 8 (64-bit)\*

Windows 7 Professional (32-bit)\*\*

Windows 7 Professional (64-bit)\*\*

Windows Vista Business 64

Windows Vista Business 32

Windows Vista Home Basic 32

Windows XP Professional

Windows XP Home 32

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

Not all features are available in all editions of Windows 8. Systems may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows 8 functionality. See <http://www.microsoft.com>.

<http://www.microsoft.com>.

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.

See <http://www.microsoft.com/windows/windows-7/> for details.

#### 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

<b>HP IEEE 1394b FireWire PCIe Card</b>	<b>Data Transfer Rate</b>	Supports up to 800 Mb/s	
	<b>Devices Supported</b>	IEEE-1394 compliant devices	
	<b>Bus Type</b>	PCIe card full height PCIe slots	
	<b>Ports</b>	Two IEEE-1394b external 9-Pin connectors (Rear)	
	<b>Internal Connectors</b>	One 10-Pin header connector	
	<b>System Requirements</b>	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.	
	<b>Temperature – Operating</b>	50° to 131° F (10° to 55° C)	
	<b>Temperature – Storage</b>	-22° to 140° F (-30° to 60° C)	
	<b>Relative Humidity – Operating</b>	20% to 80%	
	<b>Compliances</b>	FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC	
	<b>Operating Systems Supported</b>	Windows 8.1 64-bit, Windows 7 Professional 32-bit and 64-bit	
	<b>HP Thunderbolt-2 PCIe 1-port I/O Card</b>	<b>Data Transfer Rate</b>	Supports up to 20 Gb/s (20,000 Mb/s)
		<b>Devices Supported</b>	Thunderbolt™ certified devices
<b>Bus Type</b>		PCIe card, full or half height PCIe slots	
<b>Ports</b>		One Thunderbolt™ 2 external 20-Pin output connectors (Rear) One full size DisplayPort input connector (Rear)	
<b>Internal Connectors</b>		One 5-Pin header connector	
<b>System Requirements</b>		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.	
<b>Temperature - Operating</b>		50° to 131° F (10° to 55° C)	
<b>Temperature - Storage</b>		-22° to 140° F (-30° to 60° C)	
<b>Relative Humidity - Operating</b>		20% to 80%	
<b>Compliances</b>		FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC	
<b>Operating Systems Supported</b>		Genuine Windows 7 Professional 64-bit, Genuine Windows 8.1 64-bit.	
<b>Kit Contents</b>		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  
100BASE-TX (full-duplex) 200 Mbps

### Technical Specifications - Networking and Communications

		1000BASE-T (full-duplex) 2000 Mbps
	<b>Management Capabilities</b>	WOL, auto MDI crossover, PXE, Multi-port teaming, RSS, Advanced cable diagnostics
<b>Integrated Intel I218LM PCIe GbE Controller</b>	<b>Connector</b>	RJ-45 (motherboard integration)
	<b>Controller</b>	Intel I218LM GbE platform LAN connect networking controller
	<b>Memory</b>	3 KB FIFO packet buffer memory (both Tx and Rx)
	<b>Data Rates Supported</b>	10/100/1000 Mbps
	<b>Compliance</b>	802.1as, 802.1p, 802.1Q, 802.3, 802.3ab, 802.3az, 802.3i, 802.3u, 802.3x, 802.3z
	<b>Bus Architecture</b>	PCI Express 1.1 (x1) and SMBus
	<b>Data Transfer Mode</b>	PCIe-based interface for active state operation (S0 state) and SMBus for host and management traffic (Sx low power state)
	<b>Power Requirement</b>	Requires 3.3V only (integrated regulators)
	<b>Boot ROM Support</b>	Yes
	<b>Network Transfer Mode</b>	Full-duplex; Half-duplex (not supported for the 1000BASE-T transceiver)
	<b>Network Transfer Rate</b>	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
	<b>Management Capabilities</b>	WOL, auto MDI crossover, PXE, Multi-port teaming, RSS, Advanced cable diagnostics AMT 9.1 support, vPro compliant
<b>HP 361T PCIe Dual Port Gigabit NIC</b>	<b>Connector</b>	Two RJ-45
	<b>Controller</b>	Intel® Ethernet I350 Controller
	<b>Data Rates Supported</b>	10/100/1000 Mbps, Half- and full-duplex
	<b>Compliance</b>	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)
	<b>Data Path Width</b>	Four lane (x4) PCI Express compatible with x4, x8, and x16 PCI Express slots
	<b>Power Requirement</b>	4.1W idle without EEE link partner 3.2W idle with EEE link partner 4.2W maximum
	<b>Network Transfer Rate</b>	10BASE-T (half-duplex) 10 Mb/s 10BASE-T (full-duplex) 20 Mb/s 100BASE-TX (half-duplex) 100 Mb/s



### Technical Specifications - Networking and Communications

100BASE-TX (full-duplex) 200 Mb/s  
1000BASE-T (full-duplex) 2000 Mb/s

<b>Operating Temperature</b>	32° to 131° F (0° to 55° C )
<b>Operating Humidity</b>	10% to 95% non-condensing
<b>Dimensions (H x W x D)</b>	5.3 x 2.5 in (13.50cm x 6.4 cm) (without brackets)
<b>Operating System Driver Support</b>	Windows 7 Professional 32-bit and 64-bit. Red Hat Enterprise Linux(RHEL) WS4, 5, 6 Desktop/Workstation Novell SLED 10 & SLED 11
<b>Kit Contents</b>	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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### Summary of Changes

#### SUMMARY OF CHANGES

<b>Date of change:</b>	<b>Version History:</b>		<b>Description of change:</b>
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	Changed Internal USB statement in Overview and System Board sections

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