Overview

1. 2 External 5.25” Bays (shown with optional slot-load optical drive)
2. Power Button
3. HDD Activity LED
4. Front I/O: 1 USB 2.0, 2 USB 3.0, 1 Headphone, 1 Microphone, 1 1394a

Overview

5. 2 External 5.25" Bays
6. 3 Internal 3.5" Bays
7. 12 DIMM Slots for DDR3 ECC Memory
8. 800W, 90% Efficient Power Supply
9. Rear I/O: Rear Power Button & LED, PS/2 Ports, 1 1394a, 4 USB 2.0, 2 USB 3.0, 2 RJ-45 to Integrated GbE, 1 Audio Line In, 1 Audio Line Out, 1 Microphone
10. Intel Xeon Processors E5-1600 family or E5-2600 family
11. 2nd CPU & Memory Module
12. 2 PCIe x16 Gen3 Slots
13. 1 PCIe x8 Gen3, 1 PCIe x8(x4) Gen2, 1 PCIe x4(x1) Gen2, 1 PCI Slot
14. 6 Internal USB 2.0 Ports
15. 10 SATA Ports

Form Factor	Minitower
Operating Systems	Preinstalled: • Windows 7 Professional 32/64-bit • Windows 8.1 Pro 64-bit • Windows 8.1 Simplified Chinese Edition 64-bit • Windows 8.1 Pro Downgrade to Windows 7 Professional 32/64 • HP Installer Kit for Linux (includes drivers for 64-bit OS versions of RHEL 6 & 7 and SUSE Linux Enterprise Desktop 11) • Red Hat Enterprise Linux Desktop (Preinstall NOT available; 1 year paper license only)

Overview

	Supported: • Windows 8/8.1 Enterprise 64-bit • Windows 7 Enterprise 32/64 • Windows®XP Professional 32/64 (on select configurations)* • SUSE Linux Enterprise Desktop 11 • Red Hat Enterprise Linux Desktop/Workstation 5, 6, 7 Notes: *See the "Windows XP Support Matrix for Z Workstations" at: http://www.hp.com/workstations/xp_hardware_matrix Notes: For detailed OS/hardware support information for Linux, see: http://www.hp.com/support/linux_hardware_matrix
Available Processors	

Name	Cores	Clock Speed (GHz)	Cache (MB)	Memory Speed (MHz)	QPI Speed (GT/s)	Hyper-Threading	Featuring Intel® vPro™ Technology	Intel®Turbo Boost Technology[1]	TDP (W)
Intel Xeon E5-2643 processor	4	3.3	10	1600	8.0	Y	Y	1, 2	130
Intel Xeon E5-2620 processor	6	2.0	15	1333	7.2	Y	Y	3, 5	95
Intel Xeon E5-2697 v2 processor	12	2.7	30	1866	8.0	Y	Y	3, 8	130
Intel Xeon E5-2695 v2 processor	12	2.4	30	1866	8.0	Y	Y	4, 8	115
Intel Xeon E5-2690 v2 processor	10	3.0	25	1866	8.0	Y	Y	3, 6	130
Intel Xeon E5-2680 v2 processor	10	2.8	25	1866	8.0	Y	Y	3, 8	115
Intel Xeon E5-2670 v2 processor	10	2.5	25	1866	8.0	Y	Y	4, 8	115
Intel Xeon E5-2667 v2 processor	8	3.3	25	1866	8.0	Y	Y	3, 7	130
Intel Xeon E5-2660 v2 processor	10	2.2	25	1866	8.0	Y	Y	4, 8	95
Intel Xeon E5-2650 v2 processor	8	2.6	20	1866	8.0	Y	Y	4, 8	95
Intel Xeon E5-2643 v2 processor	6	3.5	25	1866	8.0	Y	Y	1, 3	130
Intel Xeon E5-2640 v2 processor	8	2.0	20	1600	7.2	Y	Y	3, 5	95
Intel Xeon E5-2637 v2 processor	4	3.5	15	1866	8.0	Y	Y	1, 3	130

Intel Xeon E5-2630 v2 processor	**6**	**2.6**	**15**	**1600**	**7.2**	**Y**	**Y**	**3, 5**	**80**
Intel Xeon E5-2620 v2 processor	**6**	**2.1**	**15**	**1600**	**7.2**	**Y**	**Y**	**3, 5**	**80**
Intel Xeon E5-2609 v2 processor	**4**	**2.5**	**10**	**1333**	**6.4**	**N**	**Y**	**N/A**	**80**
Intel Xeon E5-2603 v2 processor	**4**	**1.8**	**10**	**1333**	**6.4**	**N**	**Y**	**N/A**	**80**
Intel®Xeon® E5-1660 processor	**6**	**3.3**	**15**	**1600**	**-**	**Y**	**Y**	**3, 6**	**130**
Intel Xeon E5-1650 processor	**6**	**3.2**	**12**	**1600**	**-**	**Y**	**Y**	**3, 6**	**130**
Intel Xeon E5-1620 processor	**4**	**3.6**	**10**	**1600**	**-**	**Y**	**Y**	**2, 3**	**130**
Intel Xeon E5-1607 processor	**4**	**3.0**	**10**	**1066**	**-**	**N**	**Y**	**N/A**	**130**
Intel Xeon E5-1603 processor	**4**	**2.8**	**10**	**1066**	**-**	**N**	**Y**	**N/A**	**130**
Intel Xeon E5-1680 v2 processor	**8**	**3.0**	**25**	**1866**	**-**	**Y**	**Y**	**4, 9**	**130**
Intel Xeon E5-1660 v2 processor	**6**	**3.7**	**15**	**1866**	**-**	**Y**	**Y**	**2, 3**	**130**
Intel Xeon E5-1650 v2 processor	**6**	**3.5**	**12**	**1866**	**-**	**Y**	**Y**	**1, 4**	**130**
Intel Xeon E5-1620 v2 processor	**4**	**3.7**	**10**	**1866**	**-**	**Y**	**Y**	**0, 2**	**130**
Intel Xeon E5-1607 v2 processor	**4**	**3.0**	**10**	**1600**	**-**	**N**	**Y**	**N/A**	**130**

	[1]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. **NOTE:** Z620 systems configured with E5-1600 series processors may not add a 2nd processor. To support two processors, E5-2600 series processor must be chosen.
Available Processor Disclaimers	When ordering two processors, the second processor must be the same as the first. Intel processor numbers are not a measurement of higher performance. Processor numbers differentiate features within each processor family, not across different processor families. See: http://www.intel.com/products/processor_number/ for details Multi-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. Processor 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.
Additional Details	• Intel®Sandy Bridge Architecture • Intel®C602 Chipset Intel®Xeon®processor E5-2600 product family Intel®Xeon®processor E5-2600 v2 product family Intel®Xeon®processor E5-1600 product family Intel®Xeon®processor E5-1600 v2 product family (Sandy Bridge, Socket R) • Up to 8.0GT/s QPI support with two QPI links between processors • 4-channel per processor 1066/1333/1600/1866 MHz DDR3 memory* subsystem • Up to 192 GB Memory capacity with 12 DIMM slots and 16 GB DIMMs (with two processors installed) • PCI Express I/O and dual PCIe x16 Gen3 graphics support • Dual Integrated Intel Gigabit LAN on Motherboard (LOM) • 2 channels of Serial ATA (SATA) 6.0 Gb/s and 4 channels of SATA 3.0 Gb/s natively supported internally • SATA RAID 0, 1, and 10 support standard on motherboard • SAS RAID 0, 1, and 10 supported using the LSI 9217-4i4e 6Gb/s controller • SATA optical drives • High Definition integrated audio with internal speaker • 800W 90% efficient power supply • ENERGY STAR®qualification and energy-saving features available on selected configurations (Not supported by Linux) • Protected by HP Services, including a 3 years parts, 3 years labor, and 3 years onsite service (3/3/3) standard warranty. Terms and conditions vary by country. Certain restrictions and exclusions apply. *Each processor supports up to 4 channels of DDR3 memory. To realize full performance at least 1 DIMM must be inserted into each channel. To get full 8 channel support, 2 processors MUST be installed.
Form Factor	4U Rackable Minitower
Color	Brushed aluminum & black
I/O Expansion Slots	Slot 1 (top): PCI Express Gen2 x4(1)* Full-height, Half-length (not available when 2nd CPU/Memory Module is installed) Slot 2: PCI Express Gen3 x16 Full-height, Full-length (with extender) Slot 3: PCI Express Gen2 x8(4)* with open-ended connector** Full-height, Full-length (with extender) Slot 4: PCI Express Gen3 x8 with open-ended connector** Full-height, Full-length (with extender) Slot 5: PCI Express Gen3 x16 Full-height, Full-length (with extender)

	Slot 6: PCI 32bit/33MHz Full-height, Full-length (with extender) * x<number> = number of lanes or size of the physical/mechanical connector. (number) = number of lanes supported electrically. Typically communicated as x# mechanical, x(#)electrical. ** open-ended connector allow a greater bandwidth (e.g. x16) card to be installed physically into a lower bandwidth connector/slot.	
Mass Storage Bays (see Storage section for more details)	Total bays = 5	
Internal Bays	3 internal 3.5" bays (with acoustic dampening rail assemblies pre-installed)	
External Bays	2 external 5.25" bays (4th HDD occupies one external bay)	
Front I/O	2 USB 3.0, 1 USB 2.0, 1 Headphone, 1 Microphone, 1 IEEE 1394a	
Rear I/O	2 USB 3.0, 4 USB 2.0, 2 RJ-45 integrated Gigabit LAN, 2 PS/2, 1 Audio Line-In, 1 Audio Line-Out, 1 Microphone Serial supported with optional connector on PCI bracket cabled to system board connector	
Internal USB	6 USB 2.0 ports available by three separate 2x5 headers. Each 2x5 header supports either one HP Internal USB Port Kit (EM165AA) or one Media Card Reader.	
Chassis Dimensions (H x W x D)	44.45 x 17.15 x 46.48 cm (17.5 x 6.75 x 18.3 in) Rack utilization: 4U	
System Weight	Actual weight depends upon configuration Minimum config: 15.5 kg (34.2 lb) Typical config: 17.9 kg (39.4 lb) Maximum config: 22.6 kg (49.9 lb)	
Temperature	Operating:	5° to 35° C (40° to 95° F)
	Non-operating	-40° to 60° C (-40° to 140° F)
Humidity	Operating:	8% to 85% relative humidity, non-condensing
	Non-operating	8% to 90% relative humidity, non-condensing
Maximum Altitude (non-pressurized)	Operating:	3,048m (10,000ft)
	Non-operating	9,144m (30,000ft)
Power Supply	Tool-free 800W 90% Efficient wide-ranging, active Power Factor Correction The Power Supply Efficiency Report for this product may be found at this link: TBD	
Interfaces Supported	6-channel SATA Interface (2 @ 6.0 Gb/s and 4 @ 3.0 Gb/s). All channels are eSATA configurable for use with eSATA CTO/AMO Kit. No hot plug / hot swap supported.	
Hard Drive Controllers Supported	SATA and SAS controllers	
Backup Devices	For a complete listing of compatible DAT tape drives, LTO tape drives and RDX Removable Disk Backup System offerings, please visit http://www.hp.com/go/connect	
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
Intel Xeon E5-2600 Series - CTO				
Intel®Xeon®Processor E5-2620 6C 2.00GHz	Y	N		
Intel®Xeon®Processor E5-2643 4C 3.30GHz	Y	N		
Intel Xeon E5-1600 Series				
Intel®Xeon®Processor E5-1620 4C 3.60GHz	Y	N		
Intel®Xeon®Processor E5-1603 4C 2.80GHz	Y	N		
Intel Xeon E5-2600 Series - Z620 AMO				
Z620 Xeon E5-2620 6C 2.00 15MB 1333 CPU2	N	Y	A6S74AA	
Z620 Xeon E5-2643 4C 3.30 10MB 1600 CPU2	N	Y	A6S77AA	
Intel Xeon E5-2600 v2 Series - CTO				
Intel®Xeon®Processor E5-2667 v2 8C 3.30GHz	Y	N		
Intel®Xeon®Processor E5-2650 v2 8C 2.60GHz	Y	N		
Intel®Xeon®Processor E5-2643 v2 6C 3.50GHz	Y	N		
Intel®Xeon®Processor E5-2695 v2 12C 2.40GHz	Y	N		
Intel®Xeon®Processor E5-2690 v2 10C 3.00GHz	Y	N		
Intel®Xeon®Processor E5-2637 v2 4C 3.50GHz	Y	N		
Intel®Xeon®Processor E5-2620 v2 6C 2.10GHz	Y	N		
Intel®Xeon®Processor E5-2603 v2 4C 1.80GHz	Y	N		
Intel®Xeon®Processor E5-2660 v2 10C 2.20GHz	Y	N		
Intel®Xeon®Processor E5-2630 v2 6C 2.60GHz	Y	N		
Intel®Xeon®Processor E5-2609 v2 4C 2.50GHz	Y	N		
Intel®Xeon®Processor E5-2640 v2 8C 2.00GHz	Y	N		
Intel®Xeon®Processor E5-2670 v2 10C 2.50GHz	Y	N		
Intel®Xeon®Processor E5-2697 v2 12C 2.70GHz	Y	N		
Intel®Xeon®Processor E5-2680 v2 10C 2.80GHz	Y	N		
Intel Xeon E5-1600 v2 Series				
Intel®Xeon®Processor E5-1607 v2 4C 3.00GHz	Y	N		
Intel®Xeon®Processor E5-1620 v2 4C 3.70GHz	Y	N		
Intel®Xeon®Processor E5-1680 v2 8C 3.00GHz	Y	N		
Intel®Xeon®Processor E5-1660 v2 6C 3.70GHz	Y	N		
Intel®Xeon®Processor E5-1650 v2 6C 3.50GHz	Y	N		
Intel Xeon E5-2600 v2 Series - Z620 AMO				
Z620 Xeon E5-2640 v2 8C 2.00 20MB 1600 CPU2	N	Y	E3E09AA	
Z620 Xeon E5-2667 v2 8C 3.30 25MB 1866 CPU2	N	Y	E3E13AA	
Z620 Xeon E5-2630 v2 6C 2.60 15MB 1600 CPU2	N	Y	E3E07AA	
Z620 Xeon E5-2650 v2 8C 2.60 20MB 1866 CPU2	N	Y	E3E11AA	
Z620 Xeon E5-2620 v2 6C 2.10 15MB 1600 CPU2	N	Y	E3E06AA	
Z620 Xeon E5-2603 v2 4C 1.80 10MB 1333 CPU2	N	Y	E3E04AA	
Z620 Xeon E5-2690 v2 10C 3.00 25MB 1866 CPU2	N	Y	E3E16AA	
Z620 Xeon E5-2637 v2 4C 3.50 15MB 1866 CPU2	N	Y	E3E08AA	
Z620 Xeon E5-2697 v2 12C 2.70 30MB 1866 CPU2	N	Y	E3E18AA	
Z620 Xeon E5-2609 v2 4C 2.50 10MB 1333 CPU2	N	Y	E3E05AA	
Z620 Xeon E5-2670 v2 10C 2.50 25MB 1866 CPU2	N	Y	E3E14AA	

Z620 Xeon E5-2660 v2 10C 2.20 25MB 1866 CPU2	N	Y	E3E12AA
Z620 Xeon E5-2695 v2 12C 2.40 30MB 1866 CPU2	N	Y	E3E17AA
Z620 Xeon E5-2643 v2 6C 3.50 25MB 1866 CPU2	N	Y	E3E10AA
Z620 Xeon E5-2680 v2 10C 2.80 25MB 1866 CPU2	N	Y	E3E15AA

NOTE 1: When ordering two processors, the second processor must be the same as the first. Intel processor numbers are not a measurement of higher performance. Processor numbers differentiate features within each processor family, not across different processor families. See: http://www.intel.com/products/processor_number/ for details.

Multi-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. Processor 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's numbering is not a measurement of higher performance.
Z620 processor AMO kits include:
- 2nd CPU/Memory Module (riser)
- processor
- heat sink

		Factory Configured	Option Kit	Option Kit Part Number	Support Notes
SAS Hard Drives	**HP SAS (Serial Attached SCSI) Hard Drives for HP Workstations**				
	HP 300GB SAS 10K SFF HDD	Y	Y	A2Z20AA	
	HP 600GB SAS 10K SFF HDD	Y	Y	A2Z21AA	
	HP 900GB SAS 10K SFF HDD	Y	Y	E2P03AA	
	300GB SAS 15K rpm 6Gb/s 3.5" HDD	Y	Y	LU967AA	
	450GB SAS 15K rpm 6Gb/s 3.5" HDD	Y	Y	LU968AA	
	600GB SAS 15K rpm 6Gb/s 3.5" HDD	Y	Y	VM647AA	
	HP 900GB SAS 10K SFF HDD	Y	Y	E2P03AA	
	HP 1.2TB SAS 10K SFF HDD	Y	Y	E2P04AA	
	Sub-Section Description/Notes				
	NOTE: SAS Controller add-in card required				
SATA Hard Drives	**SATA (Serial ATA) Hard Drives for HP Workstations**				
	500GB SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	LQ036AA	
	500GB SATA 7.2K SED SFF HDD	Y	Y	D8N29AA	
	1TB SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	LQ037AA	
	2.0TB SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	QB576AA	
	3.0TB SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	QF298AA	
SATA Solid State Drives	**HP Solid State Drives (SSDs) for Workstations**				
	HP 128GB SATA 6Gb/s SSD	Y	Y	A3D25AA	
	HP 256GB SATA 6Gb/s SSD	Y	Y	A3D26AA	
	HP 256GB SATA 6Gb/s SED SSD	Y	Y	D8N28AA	

Supported Components

	HP 512GB SATA 6Gb/s SSD	Y	N	D8F30AA
	Intel Pro 1500 180GB SATA SSD	Y	Y	F5Z70AA
	Samsung SM843T 240GB SATA SSD	Y	Y	F0W94AA
	Samsung SM843T 480GB SATA SSD	Y	Y	F0W95AA
PCIe SSDs	**PCIe SSDs for HP Workstations**			
	HP Z Turbo Drive 256GB SSD*	Y	Y	G3G88AA
	HP Z Turbo Drive 512GB SSD*	Y	Y	G3G89AA
	Fusion ioFX 410GB PCIe Accelerator	Y	Y	E4W49AA

* Each drive requires a PCIe x4 (minimum) slot to be available. Full performance is obtained only when using PCIe slots connected to the CPU. Non-CPU PCIe slots may see a decrease of up to 10%. Please see slot configuration recommendations at www.hp.com/go/zturbo. Note that graphics cards, Thunderbolt™, and other devices will require PCIe slots.
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).
Up to 4 drives are allowed. The 4th drive will occupy one of the external 5.25" bays.

Hard Drive Controllers

		Factory Configured	Option Kit	Option Kit Part Number	Support Notes
	Integrated SATA 6.0 Gb/s Controller				
	Integrated SATA 6.0 Gb/s Controller	Y	N		Two ports
	Integrated SATA 3.0 Gb/s Controller				
	Integrated SATA 3.0 Gb/s Controller	Y	N		Eight ports
	Factory integrated RAID on motherboard for SATA drives				
	RAID 0 Configuration - Striped Array	Y	N		See note 1
	RAID 1 Configuration - Mirrored Array	Y	N		See note 1
	RAID 10 Configuration - Striped/Mirrored Array	Y	N		See note 1
	RAID 0 Data Configuration -- Boot/OS Drive + 2 Drive Striped Array	Y	N		See note 1
	LSI 9217-4i4e 8-port SAS 6Gb/s RAID Card				
	LSI 9217-4i4e 8-port SAS 6Gb/s RAID Card	Y	Y	E0X20AA	
	LSI 9270-8i SAS 6Gb/s ROC RAID Card	Y	Y		
	LSI 9270-8i SAS 6Gb/s ROC RAID Card	Y	Y	E0X21AA	

RAID arrays greater than 2 TB are fully supported.
NOTE 1: Requires 2 identical hard drives (speeds, capacity, interface). RAID 1 does not support a 3rd HDD.
NOTE: Specific user-configured hardware SAS RAID configurations are supported on this system with Linux. For details, please visit: http://www.hp.com/support/linux_hardware_matrix
SATA hardware RAID is supported on Linux systems that have support for the Intel RSTe technology. The Linux kernel, with built-in software RAID, provides excellent functionality and performance. It is a good alternative to hardware-based RAID. Please visit http://www.hp.com/support/linux_hardware_matrix for RAID capabilities with Linux.

NOTE: Specific user-configured hardware SAS RAID configurations are supported on this Linux system. IS: Striping of 2 or more HDDs into a single logical volume

Supported Components

IM: Mirroring of 2 HDDs into a single logical volume
IME: Mirroring of 3 or more HDDs into a single logical volume
For details, please visit: http://www.hp.com/support/linux_hardware_matrix

Graphics

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes	Supported # of cards	Supported Mixed?
Professional 2D						
NVIDIA NVS 310 512MB Graphics	Y	Y	A7U59AA		4	Yes
NVIDIA NVS 315 1GB Graphics	Y	Y	E1U66AA		4	No
NVIDIA NVS 510 2GB Graphics	Y	Y	C2J98AA	Note 1	2	Yes

Graphics Cable Adapters

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes	Supported # of cards	Supported Mixed?
HP DisplayPort To DVI-D Adapter (4-Pack)	Y	N			1	
HP DisplayPort To VGA Adapter 2nd	Y	N			1	
HP DisplayPort To DVI-D Adapter (6-Pack)	Y	N			1	
HP DisplayPort To DVI-D Adapter (2-Pack)	Y	N			1	
HP DisplayPort to Dual Link DVI Adapter	Y	Y	NR078AA		1	
HP DisplayPort To VGA Adapter	Y	Y	AS615AA		1	
HP DisplayPort To DVI-D Adapter	Y	Y	FH973AA		1	

Entry 3D						
NVIDIA Quadro 410 512MB Graphics	Y	Y	A7U60AA		2	No
NVIDIA Quadro K600 1GB Graphics	Y	Y	C2J92AA		2	No
AMD FirePro V3900 1GB Graphics	Y	Y	A6R69AA		2	No
Mid-range 3D						
NVIDIA Quadro K2000 2GB Graphics	Y	Y	C2J93AA		2	No
High End 3D						
NVIDIA Quadro K4000 3GB Graphics	Y	Y	C2J94AA		2	No
NVIDIA Quadro K5000 4GB Graphics	Y	Y	C2J95AA		2	No
AMD FirePro W7000 4GB Graphics	Y	Y	C2K00AA		2	No
NVIDIA Quadro K6000 12GB Graphics	Y	Y	C2J96AA		1	No

NOTE 1: If 1st card is NVS 510, 2nd card must be NVS 510 or NVS 310.

Supported Components

High Performance GPU Computing

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
NVIDIA Tesla K20c Compute Processor	Y	Y	C2J97AA	See note2
NVIDIA Tesla K40 Compute Processor	Y	Y	F4A88AA	See note 1

NOTE 1: Tesla K40 is supported with QK5000, QK600 or QK2000.
Not supported with 2 graphics cards.
Not supported with OS WIN32.
Not supported with OS WIN8.0.
NOTE 2: Tesla K20 is supported in combination with NVIDIA Quadro K600/K2000/K4000 1st graphics. Not supported with Win7 32-bit OS.

Memory

CTO	Option Kit Part Number	Support Notes
DDR3-1866 ECC Unbuffered DIMMs - CTO		
2GB DDR3-1866 ECC Unbuffered RAM		
4GB DDR3-1866 ECC Unbuffered RAM		
8GB DDR3-1866 ECC Unbuffered RAM		
DDR3-1866 ECC Registered DIMMs - CTO		
4GB DDR3-1866 ECC Registered RAM		
8GB DDR3-1866 ECC Registered RAM		
16GB DDR3-1866 ECC Registered RAM		

Sub-Section Description/Notes

The Z620 has a four-channel memory architecture. Four channels are associated with each processor. For optimal performance, populate a DIMM in each channel.
With single-processor configurations, 8 DIMM slots are available. Four additional DIMM slots are available with the 2nd CPU & Memory Module.

AMO	Option Kit Part Number	Support Notes
DDR3-1600 ECC Registered DIMMs - AMO		
4GB DDR3-1600 ECC Registered RAM	A2Z49AA	
8GB DDR3-1600 ECC Registered RAM	A2Z51AA	
16GB DDR3-1600 ECC Registered RAM	A2Z52AA	
DDR3-1600 ECC Unbuffered DIMMs - AMO		
HP 2GB (1x2GB) DDR3-1600 ECC RAM	A2Z47AA	
HP 4GB (1x4GB) DDR3-1600 ECC RAM	A2Z48AA	
DDR3-1866 ECC Unbuffered DIMMs - AMO		
HP 2GB (1x2GB) DDR3-1866 ECC RAM	E2Q90AA	
HP 4GB (1x4GB) DDR3-1866 ECC RAM	E2Q91AA	
DDR3-1866 ECC Registered DIMMs - AMO		
HP 4GB (1x4GB) DDR3-1866 ECC Reg RAM	E2Q92AA	
HP 8GB (1x8GB) DDR3-1866 ECC Reg RAM	E2Q94AA	
HP 16GB (1x16GB) DDR3-1866 ECC Reg RAM	E2Q95AA	

NOTE: Although all of these memory selections incorporate 1600MT/s or 1866MT/s memory modules, the speed at which they operate is dependent upon the processor.

Supported Components

Multimedia and Audio Devices	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Integrated Intel/Realtek HD ALC262 Audio	Y	N		
HP Thin USB Powered Speakers	Y	Y	KK912AA	

Optical and Removable Storage	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP 16X DVD-ROM SATA Drive (non-Lightscribe version)	Y	Y	AR629AA	See note 1
HP 16X DVD+/-RW SuperMulti SATA Drive (non-Lightscribe)	Y	Y	QS208AA	
HP Blu-ray Writer	Y	Y	AR482AA	See note 2
HP DX115 Removable Drive Enclosure				
HP DX115 Carrier with 160GB SATA HDD	N	Y	FZ577AA	
HP DX115 Removable HDD Frame/Carrier	N	Y	FZ576AA	
HP DX115 Removable HDD Carrier	N	Y	NB792AA	
HP 15-in-1 Media Card Reader				
HP 15-in-1 Media Card Reader	Y	Y	G1S79AA	

Actual speeds may vary. Does not permit copying of commercially available DVD movies or other copyright protected materials. Intended for creation and storage of your original material and other lawful uses. Double Layer discs can store more data than single layer discs. However, double-layer discs burned with this drive may not be compatible with many existing single-layer DVD drives and players.

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

NOTE 1: Not supported as a 2nd Optical Drive.
NOTE 2: Cannot be ordered in combination with another Blu-ray Writer.

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	

Supported Components

Networking and Communications

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Integrated Intel 82579LM PCIe GbE Controller	Y	N		See note 2
Broadcom NetXtreme Gigabit Ethernet Plus NIC (PCIe)	Y	Y	FS215AA	See notes 1 and 2
Intel Gigabit CT Desktop NIC	N	Y	FH969AA	See note 2
HP X520 10GbE Dual Port Adapter	Y	Y	C3N52AA	See note 2
HP 10GbE SFP+ SR Transceiver	Y	Y	C3N53AA	See note 2
HP 361T PCIe Dual Port Gigabit NIC	N	Y	C3N37AA	See note 2
Intel Ethernet I210-T1 PCIe NIC	Y	Y	E0X95AA	See note 2

NOTE 1: This is a PCI Express card based on the Broadcom 5761 chip. This card does not support DASH 1.1 manageability on this platform.
NOTE 2: "Gigabit" 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.

Racking and Physical Security

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Security Cable with Kensington Lock	N	Y	PC766A	
HP (CMT) Solenoid Lock	N	Y	DE618A	
HP Solenoid Hood Lock & Hood Sensor	Y	N		
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 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	
HP Wireless Keyboard and Mouse	N	Y	QY449AA	
HP USB Smart Card Keyboard	N	Y	E6D77AA	
HP USB Optical 3-Button 2.9M OEM Mouse	N	Y	ET424AA	
HP SpaceMouse Pro USB 3D Input Device	N	Y	B4A20AA	
HP SpacePilot Pro 3D USB Intelligent Controller	N	Y	WH343AA	

Product numbers QY774AA-QY778AA represent the new 2012 products with the updated product design. The previous models will be phased out over time.

Supported Components

Other Hardware

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Workstation Mouse Pad	Y	N		Japan only.
HP Power Cord Kit	N	Y	DM293A	
HP eSATA PCI Cable Kit	N	Y	GM110AA	No hot plug / hot swap supported.
HP Serial Port Adapter	N	Y	PA716A	
HP Internal USB Port Kit	N	Y	EM165AA	Note 1
HP Optical Bay HDD Mounting Bracket	Y	Y	NQ099AA	For 3.5" HDDs
HP Energy Star Enabled Configuration	Y	N		

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

Software

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Performance Advisor	Y	Y		See note 1
HP Remote Graphics Software (RGS) 6.0	Y	N		See note 2
HP ProtectTools Security	Y	N		See note 3
HP Power Assistant	Y	N		Win7 only
PDF Complete - Trial Edition	Y	N		
Cyberlink Media Suite & PowerDVD	Y	N		Media playback and authoring software
MS Office Home & Business 2013	Y	N		See note 3

NOTE 1: Available as a free download here: www.hp.com/go/performanceadvisor
NOTE 2: Supports both 32 and 64 bit versions of Windows 7 Professional and Enterprise, Windows XP Professional and Enterprise, and RHEL V6
NOTE 3: Must select as a Configure to Order option. Delivered as a "Drop in the Box" CD. Not Supported with Windows 7 Ultimate. Not Supported with Linux.

Supported Components

Operating Systems	Support Notes
Genuine Windows®7 Ultimate 64-bit	See note 1
Genuine Windows®7 Professional 64-bit	See note 1
Genuine Windows®7 Professional 32-bit	See note 1
HP Linux Installer Kit	
Red Hat Enterprise Linux (RHEL) Workstation - Paper License (1yr)	See note 2
Windows 8.1 Pro 64-bit	
Windows 8.1 Simplified Chinese Edition 64-bit	
Windows 8.1 Pro Downgrade to Windows 7 Professional 64-bit	
Windows 8.1 Pro Downgrade to Windows 7 Professional 64-bit (National Academic)	
Windows 8.1 Pro Downgrade to Windows 7 Professional 32-bit	
Windows 8.1 Pro Downgrade to Windows 7 Professional 32-bit (National Academic)	

NOTE 1: See http://www.microsoft.com/windows/windows-7/ for support details.
NOTE 2: This second OS must be ordered with the HP Linux Intaller Kit as the first OS.

System Technical Specifications

System Board

System Board	
System Board Form Factor	Main System Board: 24 x 31 cm 9.6 x 12.2 inches 2nd CPU/Memory Board (optional): 14.9 x 29.2 cm 5.85 x 11.50 inches
Processor Socket	LGA2011 1st CPU on system board 2nd CPU on optional 2nd CPU/Memory Module
CPU Bus Speed	QPI: Up to 8.0GT/second, depending on processor
Chipset	Intel C602 Chipset
Super I/O Controller	Nuvoton NPCD379H (SIO-12)
Memory Expansion Slots	8 on system board(CPU0) + 4 on optional 2nd CPU/Memory Module (CPU1)
Memory Type Supported	DDR3, UDIMM (Unbuffered), ECC: 2GB and 4GB DDR3, RDIMM (Registered), ECC: 4GB, 8GB, and 16GB
Memory Modes	NUMA (Non-Uniform Memory Architecture), Memory Node Interleave
Memory Speed Supported	1066, 1333, & 1600MT/s

		Single Processor							
		CPU0 Front Slots				CPU0 Rear Slots			
Capacity (GB)	Type	DIMM 1	DIMM 2	DIMM 3	DIMM 4	DIMM 5	DIMM 6	DIMM 7	DIMM 8
4	UDIMM	4GB	°	°	°	°	°	°	°
8	UDIMM	4GB	°	°	°	°	°	°	4GB
12	UDIMM	4GB	°	4GB	°	°	°	°	4GB
16	UDIMM	4GB	°	4GB	°	°	4GB	°	4GB
24	UDIMM	4GB	4GB	4GB	°	°	4GB	4GB	4GB
32	UDIMM	4GB	4GB	4GB	4GB	4GB	4GB	4GB	4GB
32	UDIMM	8GB	°	8GB	°	°	8GB	°	8GB
32	RDIMM	8GB	°	8GB	°	°	8GB	°	8GB
48	UDIMM	8GB	4GB	8GB	4GB	4GB	8GB	4GB	8GB
64	UDIMM	8GB	8GB	8GB	8GB	8GB	8GB	8GB	8GB
64	RDIMM	8GB	8GB	8GB	8GB	8GB	8GB	8GB	8GB
64	RDIMM	16GB	°	16GB	°	°	16GB	°	16GB
96	RDIMM	16GB	8GB	16GB	8GB	8GB	16GB	8GB	16GB
128	RDIMM	16GB	16GB	16GB	16GB	16GB	16GB	16GB	16GB
Slot Load Order		1	5	3	7	8	4	6	2

		Dual Processor											
		CPU0 Front Slots				CPU0 Rear Slots				CPU1 Front Slots		CPU1 Rear Slots	
Capacity (GB)	Type	DIMM 1	DIMM 2	DIMM 3	DIMM 4	DIMM 5	DIMM 6	DIMM 7	DIMM 8	DIMM 1	DIMM 2	DIMM 3	DIMM 4
8	UDIMM	4GB	0	0	0	0	0	0	0	4GB	0	0	0
16	UDIMM	4GB	0	0	0	0	0	0	4GB	4GB	0	0	4GB
24	UDIMM	4GB	0	4GB	0	0	0	0	4GB	4GB	4GB	0	4GB
32	UDIMM	4GB	0	4GB	0	0	4GB	0	4GB	4GB	4GB	4GB	4GB
40	UDIMM	4GB	4GB	4GB	0	0	4GB	4GB	4GB	4GB	4GB	4GB	4GB
48	UDIMM	4GB	4GB	4GB	4GB	4GB	4GB	4GB	4GB	4GB	4GB	4GB	4GB
64	UDIMM	8GB	0	8GB	0	0	8GB	0	8GB	8GB	8GB	8GB	8GB
64	RDIMM	8GB	0	8GB	0	0	8GB	0	8GB	8GB	8GB	8GB	8GB
96	UDIMM	8GB	8GB	8GB	8GB	8GB	8GB	8GB	8GB	8GB	8GB	8GB	8GB
96	RDIMM	16GB	0	8GB	0	0	8GB	0	16GB	16GB	8GB	8GB	16GB
128	RDIMM	16GB	0	16GB	0	0	16GB	0	16GB	16GB	16GB	16GB	16GB
160	RDIMM	16GB	8GB	16GB	8GB	8GB	16GB	8GB	16GB	16GB	16GB	16GB	16GB
192	RDIMM	16GB	16GB	16GB	16GB	16GB	16GB	16GB	16GB	16GB	16GB	16GB	16GB
Slot Load Order		1	9	5	11	12	7	10	3	2	6	8	4

NOTE: CPU0 is located on the main system board. CPU1 (optional) is located on an add-in riser card.

Maximum Memory	Supports up to 192GB with two processors and (12) 16 GB DIMMs
Memory Configuration (Supported)	• Not all memory configurations possible are represented above. • Only ECC DIMMs are supported. • Do not install memory modules into memory slots if corresponding processor is not installed. • Dual processor configurations with memory modules installed for only one processor is not supported. • UDIMM (Unbuffered) and RDIMM (Registered) memory cannot be mixed. All memory installed in the system must be either UDIMM or RDIMM.
PCI Express Connectors	Slot 1 (top): PCI Express Gen2 x4(1)* Full-height, Half-length (not available when 2nd CPU/Memory Module is installed) Slot 2: PCI Express Gen3 x16 Full-height, Full-length (with extender) Slot 3: PCI Express Gen2 x8(4)* with open-ended connector** Full-height, Full-length (with extender) Slot 4: PCI Express Gen3 x8 with open-ended connector** Full-height, Full-length (with extender) Slot 5: PCI Express Gen3 x16 Full-height, Full-length (with extender) * x<number> = number of lanes or size of the physical/mechanical connector.

	(number) = number of lanes supported electrically. Typically communicated as x# mechanical, x(#)electrical. ** open-ended connector allow a greater bandwidth (e.g. x16) card to be installed physically into a lower bandwidth connector/slot.	
PCI Connectors (5.0V)	Slot 6: PCI 32bit/33MHz Full-height, Full-length (with extender)	
Supported Drive Interfaces	**SATA**	Integrated 6-channel SATA interface (2@6Gb/s, 4@3Gb/s). Supports RAID 0, 1, 10 and NCQ. Factory integrated RAID is Microsoft Windows only.
	Serial Attached SCSI	Requires Optional PCIe card
Integrated RAID	• Integrated SATA RAID • RAID 0, RAID 1*, RAID 10 • Supports one RAID array with 2-4 drives • RAID 0 configuration - striped array (supported and configure to order) • RAID 1 configuration - mirrored array (supported and configure to order) • RAID 5 parity striping (supported with SAS drives only) • RAID 10 striped and mirrored array *HW RAID functionality not supported by Linux. Use SW RAID functionality provided in the Red Hat Operating system instead.	
Integrated Graphics	No	
Network Controller	• Integrated Intel 82579 and 82574 Controllers. • Memory Integrated 48KB receive buffer and 8KB transmit buffer • Data rates supported 10/100/1000 Mb/s • Compliance IEEE 802.3, 802.3AB and 802.3u compliant, 802.3x flow control • Bus architecture PCIe 1.0a • Data path width X1 • Data path speed 2.5Gbit per sec per direction transfer rate • Data transfer mode Bus-master DMA • Power requirement 1.0 watts @ +3.3V AUX supply • Boot ROM support Yes • Network transfer rate 10BASE-T (half-duplex) 10 Mb/s • 10BASE-T (full-duplex) 20 Mb/s • 100BASE-TX (half-duplex) 100 Mb/s • 100BASE-TX (full-duplex) 200 Mb/s • 1000BASE-T (full-duplex) 2000 Mb/s • Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP Professional 32 and 64 • Management capabilities AMT/vPro Technology	
SATA Connectors	10 ports/connectors (6 ports may be cabled to optional eSATA cable kits [2 ports per cable kit]) No hot plug / hot swap supported.	
IEEE 1394a or 1394b	1394a is integrated 1394b is optional with PCIe card Cable from Front IO can be plugged into PCIe Card. Not supported in Linux	
IEEE 1394 Connector(s)	**Front**	1 - 1394a
	Rear	1 - 1394a
	Internal	No
USB Connector(s)	**Front**	1 - USB 2.0 2 - USB 3.0
	Rear	4 - USB 2.0 2 - USB 3.0

	Internal	6 USB 2.0 ports available with three separate 2x5 headers. Each header supports either a HP Internal USB Port Kit (EM165AA) or USB Media Card reader. Each Internal Port Kit has one (1) USB 2.0 connector. Third-Party adaptors are available to convert the 2x5 headers to two USB 2.0 connectors. For these solutions, the adaptor should include a minimum of 8 inches of cable between the 2x5 female connector and the USB 2.0 connector to insure sufficient cable-routing length.
HD Integrated Audio	Realtek ALC262	
Flash ROM	Yes	
CPU Fan Header	One for each CPU socket	
Chassis Fan Header	Rear System Chassis Fan Header Front System Chassis Fan Header	
CMOS Battery Holder – Lithium	Yes	
Integrated Trusted Platform Module	TPM 1.2, Infineon	
Power Supply Headers	Yes	
Power Switch, Power LED & Hard Drive LED Header	Yes (includes speaker and intrusion sensor signals)	
Clear Password Jumper	Yes	
Serial Port	Optional	
Parallel Port	No	
Keyboard/Mouse	PS/2	

Z620 Required Power Supply Info		
Power Supply	800W 90% Efficient, Custom PSU (Wide Ranging, Active PFC)	
Operating Voltage Range	90–269 VAC	
Rated Voltage Range	100–240 V	118 V
Rated Line Frequency	50–60 Hz	400 Hz
Operating Line Frequency Range	47–66 Hz	393–407 Hz
Rated Input Current	9.7 A @ 100-240 V	9.7 A @ 400 V
Heat Dissipation (Configuration and software dependent)	Typical = 1972 btu/hr (497 kcal/hr) Maximum = 3139 btu/hr (791 kcal/hr)	
Power Supply Fan	92x25 mm variable speed	
ENERGY STAR Qualified (Configuration dependent)	Yes	
80 PLUS®Compliant	Yes, 90% Efficient The Z620 800W power supply efficiency report can be found at this link: S10-800P1A	
FEMP Standby Power Compliant @115V (<2W in S5 - Power Off)	Yes	
EuP Compliant @ 230V (<0.5 W in S5 - Power Off)	Yes	
CECP Compliant @ 220V (<4W in S3 - Suspend to RAM)	Yes; Configuration dependent	

System Technical Specifications

Power Consumption in sleep mode (as defined by ENERGY STAR) - Suspend to RAM (S3) (Instantly Available PC)	<15W
Built-in Selft Test LED	Yes
Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)	Yes

Access Panel Solenoid Lock Header	Yes
Access Panel Intrusion Sensor Header	Yes Integrated in Front User Interface (Power Switch, Power LED, HDD LED, Speaker) Cable
Multibay Header	No
Integrated Gigabit Ethernet	Integrated Intel 82579 and 82574 Controllers
Wake on LAN	Yes
ASF 1.0/2.0 (Alert Standard Format)	No
TPM	Integrated TPM 1.2; Infineon
Password Clear Header	Yes
AUX IN (audio)	No
Clear CMOS Button	Yes
Memory Fan Header	CPU0 Memory Fan Header; CPU1 Memory Fan Header

System Configuration

Example Configuration #1 (ENERGY STAR QUALIFIED)	Processor Info	1x Intel Xeon E5-2650 (Eight-Core)					
	Memory Info	4x 2GB DDR3 1600 (UDIMM)					
	Graphics Info	1x NVIDIA Quadro 600					
	Disks/Optical/Floppy	1x 250GB SATA 7200/1x 16X DVD-ROM SATA					
	Power Supply	800W 90% Custom PSU					
	Other	1x NVIDIA Tesla C2075					
Energy Consumption		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	111 W		110 W		111 W	
	Windows Busy Typ (S0)	287 W		276 W		286 W	
	Windows Busy Max (S0)	396 W		390 W		398 W	
	Sleep (S3)	4.25 W	4.10 W	4.43 W	4.31 W	4.25 W	4.11 W
	Off (S5)	1.81 W	1.62 W	2.07 W	1.89 W	1.79 W	1.61 W
	Zero Power Mode (ErP)	0.25 W		0.45 W		0.23 W	
Heat Dissipation**		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	379 btu/hr		375 btu/hr		379 btu/hr	
	Windows Busy Typ (S0)	979 btu/hr		942 btu/hr		976 btu/hr	
	Windows Busy Max (S0)	1351 btu/hr		1331 btu/hr		1358 btu/hr	
	Sleep (S3)	14.5 btu/hr	14.0 btu/hr	15.1 btu/hr	14.7 btu/hr	14.5 btu/hr	14.0 btu/hr
	Off (S5)	6.18 btu/hr	5.53 btu/hr	7.06 btu/hr	6.45 btu/hr	6.11 btu/hr	5.49 btu/hr
	Zero Power Mode (ErP)	0.85 btu/hr		1.54 btu/hr		0.78 btu/hr	

System Technical Specifications

Example Configuration #2 (ENERGY STAR QUALIFIED)	Processor Info	1x Intel Xeon E5-2643 (Four-Core)
	Memory Info	4x 4GB DDR3 1600 (UDIMM)
	Graphics Info	1x NVIDIA NVS 300
	Disks/Optical/Floppy	2x 500GB SATA 7200/1x 16X DVD-ROM SATA
	Power Supply	800W 90% Custom PSU
	Other	-

		115 VAC		230 VAC		100 VAC	
Energy Consumption		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	66.8 W		66.3 W		66.9 W	
	Windows Busy Typ (S0)	170 W		169 W		171 W	
	Windows Busy Max (S0)	193 W		190 W		193 W	
	Sleep (S3)	4.43 W	4.31 W	4.62 W	4.51 W	4.43 W	4.33 W
	Off (S5)	1.81 W	1.38 W	2.07 W	1.64 W	1.78 W	1.36 W
	Zero Power Mode (ErP)	0.24 W		0.45 W		0.23 W	
Heat Dissipation**		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	228 btu/hr		226 btu/hr		228 btu/hr	
	Windows Busy Typ (S0)	580 btu/hr		577 btu/hr		583 btu/hr	
	Windows Busy Max (S0)	659 btu/hr		648 btu/hr		659 btu/hr	
	Sleep (S3)	15.1 btu/hr	14.7 btu/hr	15.8 btu/hr	15.4 btu/hr	15.1 btu/hr	14.8 btu/hr
	Off (S5)	6.18 btu/hr	4.71 btu/hr	7.06 btu/hr	5.60 btu/hr	6.07 btu/hr	4.64 btu/hr
	Zero Power Mode (ErP)	0.82 btu/hr		1.54 btu/hr		0.78 btu/hr	

Example Configuration #3 (ENERGY STAR QUALIFIED)	Processor Info	2x Intel Xeon E5-2690 (Eight-Core)
	Memory Info	8x 8GB DDR3 1600 (RDIMM)
	Graphics Info	1x NVIDIA Quadro 2000
	Disks/Optical/Floppy	2x 250GB SATA 7200/1x 16X DVD+-RW SuperMulti SATA
	Power Supply	800W 90% Custom PSU
	Other	-

		115 VAC		230 VAC		100 VAC	
Energy Consumption		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	121 W		120 W		122 W	
	Windows Busy Typ (S0)	506 W		494 W		518 W	
	Windows Busy Max (S0)	541 W		531 W		544 W	
	Sleep (S3)	7.75 W	7.57 W	7.84 W	7.67 W	7.82 W	7.62 W
	Off (S5)	1.97 W	1.57 W	2.18 W	1.82 W	1.96 W	1.55 W
	Zero Power Mode (ErP)	0.24 W		0.44 W		0.23 W	
Heat Dissipation**		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	413 btu/hr		409 btu/hr		416 btu/hr	
	Windows Busy Typ (S0)	1727 btu/hr		1686 btu/hr		1767 btu/hr	
	Windows Busy Max (S0)	1846 btu/hr		1812 btu/hr		1856 btu/hr	
	Sleep (S3)	26.4 btu/hr	25.8 btu/hr	26.8 btu/hr	26.2 btu/hr	26.7 btu/hr	26.0 btu/hr
	Off (S5)	6.72 btu/hr	5.36 btu/hr	7.44 btu/hr	6.21 btu/hr	6.69 btu/hr	5.29 btu/hr
	Zero Power Mode (ErP)	0.82 btu/hr		1.50 btu/hr		0.78 btu/hr	

System Technical Specifications

Example Configuration #4	Processor Info Memory Info Graphics Info Disks/Optical/Floppy Power Supply Other	2x Intel Xeon E5-2620 (Six-Core) 12x 4GB DDR3 1600 (UDIMM) 2x NVIDIA Quadro 5000 4x 600GB SAS 15K/1x 16X DVD+-RW SuperMulti SATA 800W 90% Custom PSU LSI 9212 SAS Card

Energy Consumption		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	216 W		213 W		217 W	
	Windows Busy Typ (S0)	525 W		485 W		512 W	
	Windows Busy Max (S0)	644 W		631 W		647 W	
	Sleep (S3)	9.27 W	8.81 W	9.36 W	8.91 W	9.31 W	8.89 W
	Off (S5)	1.85 W	1.43 W	2.12 W	1.68 W	1.83 W	1.41 W
	Zero Power Mode (ErP)	0.25 W		0.45 W		0.23 W	
Heat Dissipation**		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	737 btu/hr		727 btu/hr		740 btu/hr	
	Windows Busy Typ (S0)	1791 btu/hr		1655 btu/hr		1747 btu/hr	
	Windows Busy Max (S0)	2197 btu/hr		2153 btu/hr		2208 btu/hr	
	Sleep (S3)	31.6 btu/hr	30.1 btu/hr	31.9 btu/hr	30.4 btu/hr	31.8 btu/hr	30.3 btu/hr
	Off (S5)	6.31 btu/hr	4.88 btu/hr	7.23 btu/hr	5.73 btu/hr	6.24 btu/hr	4.81 btu/hr
	Zero Power Mode (ErP)	0.85 btu/hr		1.54 btu/hr		0.78 btu/hr	

Declared Noise Emissions (Entry-level and High-end configurations)		
System Configuration (Entry level)	**Processor Info**	Single Intel Xeon E5-2640 2.50 GHz
	Memory Info	4 - 2 GB DDR3 1333 MT/s UDIMM
	Graphics Info	NVIDIA Q400
	Disks/Optical/Floppy	Single 1 TB 7200 RPM SATA DVD ROM

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	3.3	16
	Hard drive Operating (random reads)	3.9	22
	DVD-ROM Operating (sequential reads)	5.1	39

System Configuration (High-end)	**Processor Info**	Dual Xeon E5-2690 2.90 GHz
	Memory Info	12 - 4GB DDR3 1600 MT/s UDIMM
	Graphics Info	NVIDIA Q4000
	Disks/Optical/Floppy	Dual 600 GB 15K RPM SAS 3.5" DVD ROM

System Technical Specifications

		Sound Power (LWAd, bels)	Deskside Sound Pressure (LpAm, decibels)
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)	**Idle**	4.4	29
	Hard drive Operating (random reads)	4.8	32
	DVD-ROM Operating (sequential reads)	5.1	36

Environmental Requirements	**Temperature**	Operating: 5°C to 35°C (40°F to 95°F) Non-operating: -40°C to 60°C (-40°F to 140°F)
	Humidity	Operating: 8% to 85% RH, non-condensing Non-operating: 8% to 90% RH, non-condensing
	Maximum Altitude	Operating: 3,048 m (10,000 ft) Non-operating: 9,144 m (30,000 ft)
	Dynamic (new)	Shock Operating: ½sine: 40 g, 2-3ms (~62 cm/sec) Non-operating: ½sine: 160 cm/s, 2-3ms (~105 g) square: 20 g, 422 cm/s **NOTE:** Values represent individual shock events and do not indicate repetitive shock events. Vibration Operating random: 0.5 g (rms), 5-300 Hz, up to 0.0025 g²/Hz Non-operating random: 2.0 g (rms), 5-500 Hz, up to 0.0150 g²/Hz **NOTE:** Values do not indicate continuous vibration.
	Cooling	Above 1524m (5,000 ft) altitude, maximum operating temperature is de-rated by 1°C (1.8°F) per 305m (1,000 ft) elevation increase

Physical Security and Serviceability

Access Panel	Tool-less Includes system board and memory information
Optical Drive	Tool-less, no carrier or rails required
Hard Drives	Tool-less Integrated blind-mate drive carriers Optional 5.25" external bay carriers
Expansion Cards	Tool-less
Processor Socket	1st socket on main system board. 2nd socket on optional 2nd CPU/Memory Module.
Green User Touch Points	Yes, on primary serviceable components
Color-coordinated Cables and Connectors	Yes
Memory	Tool-less
System Board	Tool-less 2nd CPU/Memory Module: Tool-less
Dual Color Power and HD LED on Front of Computer	Yes

System Technical Specifications

Configuration Record SW	Yes
Over-Temp Warning on Screen	Yes, at POST screen on reboot.
Restore CD/DVD Set	Yes, restores the computer to its original factory shipping image - Can be obtained via HP Support.
Dual Function Front Power Switch	Yes, also acts as a reset switch when held for 4 seconds.
Padlock Support	No
Cable Lock Support	Yes, Kensington Cable Lock (optional): Prevents entire system theft only. 3mm x 7mm slot at rear of system
Universal Chassis Clamp Lock Support	No
Solenoid Lock and Hood Sensor	Access Panel Solenoid Lock: Yes (optional). Activated remotely to prevent system entry. Access Panel Intrusion Sensor: Yes (optional).
Rear Port Control Cover	No
Removable Media Write/Boot Control	Yes, user can prevent the workstation from writing to or booting from removable media.
Power-On Password	Yes, prevents an unauthorized person from booting up the computer.
Setup Password	Yes, prevents an unauthorized person from changing the system configuration.
3.3V Aux Power LED on System PCA	No
NIC LEDs (integrated) (Green & Amber)	Yes
CPUs and Heatsinks	CPU heatsink removal requires a T-15 Torx or flat blade screwdriver. CPU removal is tool-less.
Power Supply Diagnostic LED	Yes
Front Power Button	Yes
Rear Power Button	Yes
Front Power LED	Yes, blue (normal), red (fault)
Front Hard Drive Activity LED	Yes, green
Front ODD Activity LED	Yes
Internal Speaker	Yes
System/Emergency ROM Flash Recovery	Recovers corrupted system BIOS
Cooling Solutions	Air cooled forced convection
Power Supply Fans	1 - 92mm
CPU Heatsink Fan	1st CPU: 1 - 92mm Optional 2nd CPU: 1 - 92mm
Memory Heatsink Fan	System Board Memory: rear bank: 1 - 60mm, front bank: 1 - 40mm Optional 2nd CPU/Memory Module: rear bank: 1 - 80mm.
HP Vision Diagnostics Offline Edition	HP Vision Diagnostics Offline Edition The diagnostics utility enables you to perform testing and to view critical computer hardware and software configuration information from various sources. This utility enables you to: • Run diagnostics • View the hardware configuration of the system

	Key features and benefits HP Vision Diagnostics simplifies the process of effectively identifying, diagnosing, and isolating the hardware issues. In addition to robust management tools, service tools can be invaluable in quickly resolving system problems. To streamline the service process and resolve problems quickly, it is necessary to have the right information available at the time that a service call is placed. The primary information requirement, which is also the one that provides the greatest Vision into potential system issues, is the configuration of the system. Vision diagnostics helps provide higher system availability. Typical uses of the Vision Diagnostics are: • Testing and diagnosing apparent hardware failures • Documenting system configurations for upgrade planning, standardization, inventory tracking, disaster recovery, and maintenance • Sending configuration information to another location for more in-depth analysis
Access Panel Key Lock	Yes, prevents removal of the access panel and all internal components including devices installed in the external 5.25" bays.
ACPI-Ready Hardware	Advanced Configuration and Power Management Interface (ACPI). • Allows the system to wake from a low power mode • Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system
Trusted Platform Module Chip with optional ProtectTools Software	Yes, Infineon SLB9635TT1.2
Integrated Chassis Handles	Yes
Power Supply	Tool-less. Includes integrated handle.
PCI Card Retention	Yes, tool-less Rear (all) Middle (full-height cards) Front (full-length cards with extender)
Flash ROM	SPI ROM
Diagnostic Power Switch LED on board	Yes
Clear Password Jumper	Yes
Clear CMOS Button	Yes
CMOS Battery Holder	Yes
DIMM Connectors	Yes
HP ProtectTools Security Manager	Yes - Not supported on Linux

BIOS	
BIOS 32-bit Services	Standard BIOS 32-Bit Service Directory Proposal v0.4
PCI 3.0 Support	Full BIOS support for PCI Express through industry standard interfaces
ATAPI	ATAPI Removable Media Device BIOS Specification Version 1.0
BBS	BIOS Boot Specification v1.01
WMI Support	WMI is Microsoft's implementation of Web-Based Enterprise Management (WBEM) for Windows. WMI is fully compliant with the Distributed Management Task Force (DMTF) Common Information Model (CIM) and WBEM specifications.

System Technical Specifications

BIOS Boot Spec 1.01+	Provides more control over how and from what devices the workstation will boot
BIOS Power On	Users can define a specific date and time for the system to power on
ROM Based Computer Setup Utility (F10)	Review and customize system configuration settings controlled by the BIOS
System/Emergency ROM Flash Recovery with Video	Recovers system BIOS in corrupted Flash ROM
Replicated Setup	Saves BIOS settings to diskette or USB flash device in human readable file. Repset.exe utility can then replicate these settings on machines being deployed without entering Computer Configuration Utility (F10 Setup).
SMBIOS	System Management BIOS 2.7 for system management information
Boot Control	Disables the ability to boot from removable media on supported devices
Memory Change Alert	Alerts management console if memory is removed or changed
Thermal Alert	Monitors the temperature state within the chassis. Three modes: ● NORMAL - normal temperature ranges. ● ALERTED - excessive temperatures are detected. Raises a flag so action can be taken to avoid shutdown or provide for a smoother system shutdown. ● SHUTDOWN - excessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs.
Remote ROM Flash	Provides secure, fail-safe ROM image management from a central network console
ACPI (Advanced Configuration and Power Management Interface)	Allows the system to enter and resume from low power modes (sleep states). Enables an operating system to control system power consumption based on the dynamic workload. Makes it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system. Supports ACPI 2.0 for full compatibility with 64-bit operating systems.
Ownership Tag	A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen
Remote Wakeup/Remote Shutdown	System administrators can power on, restart, and power off a client computer from a remote location
Instantly Available PC (Suspend to RAM - ACPI sleep state S3)	Allows for very low power consumption with quick resume time
Remote System Installation via F12 (PXE 2.1) (Remote Boot from Server)	Allows a new or existing system to boot over the network and download software, including the operating system
ROM revision levels	Reports the system BIOS revision level in Computer Configuration Utility (F10 Setup). Version is available through an industry standard interface (SMBIOS) so that management SW applications can use and report this information.
System board revision level	Allows management SW to read revision level of the system board Revision level is digitally encoded into the HW and cannot be modified
Start-up Diagnostics (Power-on Self-Test)	Assesses system health at boot time with selectable levels of testing
Auto Setup when new hardware installed	System automatically detects the addition of new hardware
Keyboard-less Operation	The system can be booted without a keyboard
Localized ROM Setup	Common BIOS image supports System Configuration Utility (F10 Setup) menus in 12 languages with local keyboard mappings
Asset Tag	Allows the user or MIS to set a unique tag string in non-volatile memor

System Technical Specifications

Per-slot Control	Allows I/O slot parameters (option ROM enable/disable, bus latency) to be configured individually
Adaptive Cooling	Fan control parameters are set according to detected hardware configuration for optimal acoustics
Pre-boot Diagnostics	Early (pre-video) critical errors are reported via beeps and blinks on the power LED
Industry Standard Specification Support	
UEFI Specification Revision	2.3.1
Industry Standard	Revision Supported by the BIOS
ACPI	Advanced Configuration and Power Management Interface, Version 2.0
ATA (IDE)	AT Attachment 6 with Packet Interface (ATA/ATAPI-6), Revision 3b
CD Boot	"El Torito" Bootable CD-ROM Format Specification Version 1.0
EDD	• Enhanced Disk Drive Specification Version 1.1 • BIOS Enhanced Disk Drive Specification Version 3.0
EHCI	Enhanced Host Controller Interface for Universal Serial Bus, Revision 1.0
PCI	• PCI Local Bus Specification, Revision 2.3 • PCI Power Management Specification, Revision 1.1 • PCI Firmware Specification, Revision 3.0, Draft 0.7
PCI Express	PCI Express Base Specification, Revision 2.0 PCI Express Base Specification, Revision 3.0
PMM	POST Memory Manager Specification, Version 1.01
SATA	• Serial ATA Specification, Revision 1.0a • Serial ATA 3 Gb/s: Serial ATA Specification, Revision 2.5 • Serial ATA 6 Gb/s: Serial ATA Specification, Revision 3.0
SPD	PC SDRAM Serial Presence Detect (SPD) Specification, Revision 1.2
TPM	Trusted Computing Group TPM Specification Version 1.2
UHCI	Universal Host Controller Interface Design Guide, Revision 1.1
USB	Universal Serial Bus Revision 1.1 Specification Universal Serial Bus Revision 2.0 Specification Universal Serial Bus Revision 3.0 Specification
SMBIOS	System Management BIOS Reference Specification, Version 2.7

Social and Environmental Responsibility

Eco-Label Certifications & Declarations	This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks: • ENERGY STAR®(energy-saving features available on selected configurations-Windows only) • US Federal Energy Management Program (FEMP) • China Energy Conservation Program • IT ECO declaration
Batteries	The battery in this product complies with EU Directive 2006/66/EC Battery size: CR2032 (coin cell) Battery type: Lithium Metal The battery in this product does not contain: • Mercury greater than 5ppm by weight • Cadmium greater than 10ppm by weight • Lead greater than 40ppm by weight

System Technical Specifications

Restricted Material Usage	This product meets the material restrictions specified in HP's General Specification for the Environment. http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/gse.pdf 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 exceed compliance obligations by meeting the requirements of the RoHS Directive on a worldwide basis.
Low Halogen Statement	This product is low halogen except for power cords, cables and peripherals, as well as the following customer-configurable internal components: 3 ½ SAS HDDs, LSI 9260-8i SAS 6Gb/s ROC RAID Card, Creative Recon3D PCIe Audio Card, Liquid Cooling Solution and Broadcom 5761 Gigabit PCIe NIC are not Low Halogen. Service parts obtained after purchase may not be Low Halogen.
End-of-Life Management and Recycling	Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner. This product is greater than 90% recyclable by weight when properly disposed of at end of life.
Hewlett-Packard Corporate Environmental Information	For more information about HP's commitment to the environment: Global Citizenship Report: http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html Eco-label certifications: http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html ISO 14001 certificates: http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html
Additional Information	• This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive - 2002/96/EC. • Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043. • This product is >90% recycle-able when properly disposed of at end of life. • EPEAT Gold registered in the U.S. EPEAT registration varies by country. See www.epeat.net for registration status by country
Packaging	HP Workstation product packaging meets the HP General Specification for the Environment at http://www.hp.com/hpinfo/globalcitizenship/society/gen_specifications.html • Does not contain restricted substances listed in HP Standard 011-1 General Specification for the Environment • Does not contain ozone-depleting substances (ODS) • Does not contain heavy metals (lead, mercury, cadmium or hexavalent chromium) in excess of 100 ppm sum total for all heavy metals listed • Maximizes the use of post-consumer recycled content materials in packaging materials • All packaging material is recyclable • All packaging material is designed for ease of disassembly • Reduced size and weight of packages to improve transportation fuel efficiency • Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards formatting
Packaging Materials	
Internal	Cushions and plastic bags made of low density polyethylene (LDPE).
External	Outer carton, accessories carton, and insert made of corrugated paper board.

Manageability	
Industry Standard Specifications	This product meets the following industry standard specifications for manageability functionality: • DASH 1.1 required functionalities via Intel LAN on motherboard
Intel Active Management	Intel Active Management Technology (AMT) 7.0

System Technical Specifications

Technology (AMT)	An advanced set of remote management features and functionality providing IT administrators the latest and most effective tools to remotely discover, heal, and protect networked client systems regardless of the system's health or power state. AMT 7.0 includes the following advanced management functions: ● Power Management (on, off, reset) ● Hardware Inventory (includes BIOS and firmware revisions) ● Hardware Alerting ● Agent Presence ● System Defense Filters ● SOL/IDER ● Cisco NAC/SDN Support ● ME Wake-on-LAN ● DASH 1.1 compliance ● IPv6 Support ● Fast Call for Help - a client inside or outside the firewall may initiate a call for help via BIOS screen, periodic connections, or alert triggered connection ● Remote Scheduled Maintenance - pre-schedule when the system connects to the IT or service provider console for maintenance. ● Remote Alerts - automatically alert IT or service provider if issues arise ● Access Monitor - Provides oversight into Intel®AMT actions to support security requirements ● PC Alarm Clock ● Microsoft NAP Support ● Host Base set-up and configuration ● Management Engine (ME) firmware roll back
Intel®vPro™ Technology	The HP Z620 Workstation supports Intel vPro technology when configured as outlined below: ● Intel Xeon processor E5-1600 product family or E5-2600 product family featuring Intel vPro Technology ● Intel C602 chipset ● Intel 82579LM GbE LAN
Remote Manageability Software Solutions	The HP Z620 Workstation is supported on the following remote manageability software consoles: ● LANDesk Management Suite (HP recommended solution) ● Microsoft System Center Configuration Manager ● HP Client Automation Enterprise For questions or support for manageability needs, please visit http://www.hp.com/go/easydeploy
System Software Manager	For questions or support for SSM, please visit: http://www.hp.com/go/ssm
Service, Support, and Warranty	On-site Warranty and Service (Note 1): Three-years, limited warranty and service offering delivers on-site, next business-day (Note 2) service for parts and labor and includes free telephone support (Note 3) 8am - 5pm. Global coverage (Note 2) ensures that any product purchased in one country and transferred to another, non-restricted country will remain fully covered under the original warranty and service offering. **NOTE 1:** Terms and conditions may vary by country. Certain restrictions and exclusions apply. **NOTE 2:** On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country. **NOTE 3:** Technical telephone support applies only to HP-configured, HP and HP-qualified, third-party hardware and software. Toll-free calling and 24x7 support service may not be available in some countries. HP Care Pack Services extend service contracts beyond the standard warranties. Service starts from date of hardware purchase. To choose the right level of service for your HP product, use the HP Care Pack Services Lookup Tool at: http://www.hp.com/go/lookuptool. Additional HP Care Pack Services information by product is available at: http://www.hp.com/hps/carepack. Service

	levels and response times for HP Care Packs may vary depending on your geographic location.
Product Change Notification	• Program to proactively communicate Product Change Notifications (PCNs) and Customer Advisories by email to customers, based on a user-defined profile. • PCNs provide advance notification of hardware and software changes to be implemented in the factory providing time to plan for transition. • Customer Advisories provide concise, effective problem resolution, greatly reducing the need to call technical support.

Stable & Consistent Offerings

As part of its commitment to hardware, software, and solution innovation, HP is proud to introduce this breakthrough platform configuration stability to HP Workstation customers. HP Stable & Consistent Offerings are built on the foundation of a carefully chosen set of hardware 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**
	A2A06AV	Intel Xeon E5-2620 2 15M 1333 6C 1 CPU
	A2A19AV	Intel Xeon E5-2620 2 15M 1333 6C 2 CPU
	A2A09AV	Intel Xeon E5-2643 3.3 10M 1600 4C 1 CPU
	A2A22AV	Intel Xeon E5-2643 3.3 10M 1600 4C 2 CPU
Hard Drives	**Product #**	**Offering**
	QG001AV	500GB 7200 RPM SATA 1st HDD
	QG011AV	500GB 7200 RPM SATA 2nd HDD
	QG021AV	500GB 7200 RPM SATA 3rd HDD
	QG031AV	500GB 7200 RPM SATA 4th HDD
	QG002AV	1TB 7200 RPM SATA 1st HDD
	QG012AV	1TB 7200 RPM SATA 2nd HDD
	QG022AV	1TB 7200 RPM SATA 3rd HDD
	QG032AV	1TB 7200 RPM SATA 4th HDD
Graphics	**Product #**	**Offering**
	A7U49AV	NVIDIA NVS 310 512MB GFX
	A7U50AV	NVIDIA NVS 310 512MB 2nd GFX
	A7U51AV	NVIDIA NVS 310 512MB 3rd GFX
	A7U52AV	NVIDIA NVS 310 512MB 4th GFX
	C2J48AV	NVIDIA Quadro K2000 2GB Graphics
	C2J49AV	NVIDIA Quadro K2000 2GB Graphics
Memory	**Product #**	**Offering**
		Any configuration with 2GB DDR3-1866 ECC Unbuffered DIMMs
		Any configuration with 4GB DDR3-1866 ECC Unbuffered DIMMs
		Any configuration with 4GB DDR3-1866 ECC Registered DIMMs
		Any configuration with 8GB DDR3-1866 ECC Registered DIMMs
Optical and Removable Storage	**Product #**	**Offering**
	QG049AV	16X SuperMulti DVDRW SATA 1st ODD
	QG053AV	16x SuperMulti DVDRW SATA 2nd ODD

Stable & Consistent Offerings

Input Devices	Product #	Offering
	A8Z53AV	HP USB Keyboard (available June 2012)
	A8Z55AV	HP USB Optical Mouse (available June 2012)

Operating Systems	Product #	Offering
	LJ454AV	Windows 7 Professional 64-bit OS

Processors	Intel®Xeon®Processor E5-2620 6C 2.00GHz
	Intel®Xeon®Processor E5-2643 4C 3.30GHz

Introduction

The Intel®Xeon®processor E5-1600/E5-2600/E5-4600 product families are the next generation of 64-bit, multi-core enterprise processors built on 32-nanometer process technology. Throughout this document, the Intel®Xeon®processor E5-1600/E5-2600/E5-4600 product families may be referred to as simply the processor. Where information differs between the EP and EP 4S SKUs, this document uses specific Intel®Xeon®processor E5-1600 product family, Intel®Xeon® processor E5-2600 product family, and Intel®Xeon®processor E5-4600 product family notation.Based on the low-power/high performance 2nd Generation Intel®Core™Processor Family microarchitecture, the processor is designed for a two chip platform consisting of a processor and a Platform Controller Hub (PCH) enabling higher performance, easier validation, and improved x-y footprint. The Intel®Xeon®processor E5-1600 product family and the Intel®Xeon® processor E5-2600 product family are designed for Efficient Performance server, workstation and HPC platforms. The Intel®Xeon®processor E5-4600 product family processor supports scalable server and HPC platforms of two or more processors, including "glueless" 4-way platforms. Note: some processor features are not available on all platforms. These processors feature per socket, two Intel®QuickPath Interconnect point-to-point links capable of up to 8.0 GT/s, up to 40 lanes of PCI Express* 3.0 links capable of 8.0 GT/s, and 4 lanes of DMI2/PCI Express* 2.0 interface with a peak transfer rate of 5.0 GT/s. The processor supports up to 46 bits of physical address space and 48-bit of virtual address space.

Included in this family of processors is an integrated memory controller (IMC) and integrated I/O (IIO) (such as PCI Express* and DMI2) on a single silicon die. This single die solution is known as a monolithic processor.

Performance and Features

- Up to 8 execution cores
- Each core supports two threads (Intel®Hyper-Threading Technology), up to 16 threads per socket
- 46-bit physical addressing and 48-bit virtual addressing
- 1 GB large page support for server applications
- A 32-KB instruction and 32-KB data first-level cache (L1) for each core
- A 256-KB shared instruction/data mid-level (L2) cache for each core
- Up to 20 MB last level cache (LLC): up

	Intel®Xeon®Processor E5-1620 4C 3.60GHz
	Intel®Xeon®Processor E5-1603 4C 2.80GHz

Processor Note

For detailed processor specifications, please refer to the Overview section at the beginning of this document.

Z620 Xeon E5-2620 6C 2.00 15MB 1333 CPU2	A6S74AA
Z620 Xeon E5-2643 4C 3.30 10MB 1600 CPU2	A6S77AA

Introduction

The After Market Option kits for the Z620 processors include the "2nd CPU & Memory Module", the Intel Xeon processor, and the heatsink. Additional system memory must be ordered separately.

Technical Specifications - Processors

Intel®Xeon®Processor E5-2603 v2 4C 1.80GHz
Intel®Xeon®Processor E5-2609 v2 4C 2.50GHz
Intel®Xeon®Processor E5-2620 v2 6C 2.10GHz
Intel®Xeon®Processor E5-2630 v2 6C 2.60GHz
Intel®Xeon®Processor E5-2637 v2 4C 3.50GHz
Intel®Xeon®Processor E5-2640 v2 8C 2.00GHz
Intel®Xeon®Processor E5-2643 v2 6C 3.50GHz
Intel®Xeon®Processor E5-2650 v2 8C 2.60GHz
Intel®Xeon®Processor E5-2660 v2 10C 2.20GHz
Intel®Xeon®Processor E5-2667 v2 8C 3.30GHz
Intel®Xeon®Processor E5-2670 v2 10C 2.50GHz
Intel®Xeon®Processor E5-2680 v2 10C 2.80GHz
Intel®Xeon®Processor E5-2690 v2 10C 3.00GHz
Intel®Xeon®Processor E5-2695 v2 12C 2.40GHz
Intel®Xeon®Processor E5-2697 v2 12C 2.70GHz

Intel®Xeon®Processor E5-1607 v2 4C 3.00GHz
Intel®Xeon®Processor E5-1620 v2 4C 3.70GHz
Intel®Xeon®Processor E5-1650 v2 6C 3.50GHz
Intel®Xeon®Processor E5-1660 v2 6C 3.70GHz
Intel®Xeon®Processor E5-1680 v2 8C 3.00GHz

Z620 Xeon E5-2603 v2 4C 1.80 10MB 1333 CPU2	E3E04AA
Z620 Xeon E5-2609 v2 4C 2.50 10MB 1333 CPU2	E3E05AA
Z620 Xeon E5-2620 v2 6C 2.10 15MB 1600 CPU2	E3E06AA
Z620 Xeon E5-2630 v2 6C 2.60 15MB 1600 CPU2	E3E07AA
Z620 Xeon E5-2637 v2 4C 3.50 15MB 1866 CPU2	E3E08AA
Z620 Xeon E5-2640 v2 8C 2.00 20MB 1600 CPU2	E3E09AA
Z620 Xeon E5-2643 v2 6C 3.50 25MB 1866 CPU2	E3E10AA
Z620 Xeon E5-2650 v2 8C 2.60 20MB 1866 CPU2	E3E11AA
Z620 Xeon E5-2660 v2 10C 2.20 25MB 1866 CPU2	E3E12AA
Z620 Xeon E5-2667 v2 8C 3.30 25MB 1866 CPU2	E3E13AA
Z620 Xeon E5-2670 v2 10C 2.50 25MB 1866 CPU2	E3E14AA
Z620 Xeon E5-2680 v2 10C 2.80 25MB 1866 CPU2	E3E15AA
Z620 Xeon E5-2690 v2 10C 3.00 25MB 1866 CPU2	E3E16AA
Z620 Xeon E5-2695 v2 12C 2.40 30MB 1866 CPU2	E3E17AA
Z620 Xeon E5-2697 v2 12C 2.70 30MB 1866 CPU2	E3E18AA

Technical Specifications - Hard Drives

HP SAS (Serial Attached SCSI) Hard Drives for HP Workstations	**600GB SAS 15K rpm 6Gb/s 3.5" HDD**	**Capacity**	600GB	
		Height	1 in; 2.54 cm	
		Width	**Media Diameter**	3.5 in; 8.9 cm
			Physical Size	4 in; 10.17 cm
		Interface	SAS	
		Synchronous Transfer Rate (Maximum)	6.0 Gb/s	
		Buffer	16 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.2 ms
			Average	3.4 ms
			Full Stroke	6.6 ms
		Rotational Speed	15,000 rpm	
		Logical Blocks	1,172,123,568 - 512 byte blocks	
		Operating Temperature	50° to 95° F (10° to 35° C)	
	450GB SAS 15K rpm 6Gb/s 3.5" HDD	**Capacity**	450GB	
		Height	1 in; 2.54 cm	
		Width	**Media Diameter**	3.5 in; 8.9 cm
			Physical Size	4 in; 10.17 cm
		Interface	SAS	
		Synchronous Transfer Rate (Maximum)	6Gb/s	
		Buffer	16MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.2 ms
			Average	3.4 ms
			Full Stroke	6.6 ms
		Rotational Speed	15,000 rpm	
		Operating Temperature	50° to 95° F (10° to 35° C)	
	300GB SAS 15K rpm 6Gb/s 3.5" HDD	**Capacity**	300GB	
		Height	1 in; 2.54 cm	
		Width	**Media Diameter**	3.5 in; 8.9 cm
			Physical Size	4 in; 10.17 cm
		Interface	SAS	
		Synchronous Transfer Rate (Maximum)	6Gb/s	
		Buffer	16MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.2 ms
			Average	3.4 ms
			Full Stroke	6.6 ms
		Rotational Speed	15,000 rpm	
		Operating Temperature	50° to 95° F (10° to 35° C)	
	HP 300GB SAS 10K SFF HDD	**Capacity**	300GB	
		Height	0.6 in; 1.53 cm	

Technical Specifications - Hard Drives

	Width	**Media Diameter**	2.5 in; 6.36 cm
		Physical Size	2.75 in; 6.99 cm
	Interface	SAS 6Gb/s	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
	Buffer	64MB	
	Cache	multi-segmentable cache buffer	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.4 ms (max)
		Average	3.6 ms
		Full Stroke	7.3 ms
	Rotational Speed	10,000 rpm	
	Logical Blocks	585,937,500	
	Operating Temperature	41° to 131° F (5° to 55° C)	
HP 600GB SAS 10K SFF HDD	**Capacity**	600GB	
	Height	0.6 in; 1.53 cm	
	Width	**Media Diameter**	2.5 in; 6.36 cm
		Physical Size	2.75 in; 6.99 cm
	Interface	SAS 6Gb/s	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
	Buffer	64MB	
	Cache	multi-segmentable cache buffer	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.4 ms (max)
		Average	3.6 ms
		Full Stroke	7.3 ms
	Rotational Speed	10,000 rpm	
	Logical Blocks	1,172,123,568	
	Operating Temperature	41° to 131° F (5° to 55° C)	
HP 900GB SAS 10K SFF HDD	**Capacity**	900GB	
	Height	0.6 in; 1.53 cm	
	Width	**Media Diameter**	2.5 in; 6.36 cm
		Physical Size	2.75 in; 6.99 cm
	Interface	SAS 6Gb/s	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
	Buffer	64MB	
	Cache	multi-segmentable cache buffer	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.2ms (max)
		Average	3.5ms
		Full Stroke	7.0ms
	Rotational Speed	10,000 rpm	
	Logical Blocks	1,758,174,767	
	Operating Temperature	41° to 131° F (5° to 55° C)	

	HP 1.2TB SAS 10K SFF HDD	**Capacity**	1.2TB	
		Height	0.6 in; 1.53 cm	
		Width	**Media Diameter**	2.5 in; 6.36 cm
			Physical Size	2.75 in; 6.99 cm
		Interface	SAS 6Gb/s	
		Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
		Buffer	64MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.18ms (max)
			Average	3.5ms
			Full Stroke	7.17ms
		Rotational Speed	10,000 rpm	
		Logical Blocks	2,344,225,968	
		Operating Temperature	41° to 131° F (5° to 55° C)	
SATA (Serial ATA) Hard Drives for HP Workstations	**500GB SATA 7200 rpm 6Gb/s 3.5" HDD**	**Capacity**	500GB	
		Height	0.6 in; 1.53 cm	
		Width	**Media Diameter**	3.5 in; 8.9 cm
			Physical Size	4 in; 10.17 cm
		Interface	Serial ATA (6.0Gb/s), NCQ enabled	
		Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
		Buffer	16MB	
		Cache	Segmentable	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2 ms
			Average	11 ms
			Full-Stroke	21 ms
		Rotational Speed	7,200 rpm	
		Logical Blocks	976,773,168	
		Operating Temperature	41° to 131° F (5° to 55° C)	
	1TB SATA 7200 rpm 6Gb/s 3.5" HDD	**Capacity**	1 Terabyte (1000 GB)	
		Height	1 in; 2.54 cm	
		Width	**Media Diameter**	3.5 in; 8.9 cm
			Physical Size	4 in; 10.17 cm
		Interface	Serial ATA (6.0Gb/s), NCQ enabled	
		Synchronous Transfer Rate (Maximum)	Up to 600 MB/s	
		Cache	32 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2 ms
			Average	11 ms
			Full-Stroke	21 ms
		Rotational Speed	7,200 rpm	
		Logical Blocks	1,953,525,168	

	Operating Temperature	41° to 131° F (5° to 55° C)	
2.0TB SATA 7200 rpm 6Gb/s 3.5" HDD	**Capacity**	2TB	
	Height	1 in; 2.54 cm	
	Width	**Media Diameter**	3.5 in; 8.9 cm
		Physical Size	4 in; 10.17 cm
	Interface	Serial ATA (6.0 Gb/s), NCQ Enabled	
	Synchronous Transfer Rate (Maximum)	Up to 600 MB/s	
	Cache	64MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2 ms
		Average	11 ms
		Full-Stroke	21 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	3,907,029,168	
	Operating Temperature	41° to 131° F (5° to 55° C)	
3.0TB SATA 7200 rpm 6Gb/s 3.5" HDD	**Capacity**	3.0TB	
	Height	1 in; 2.54 cm	
	Width	**Media Diameter**	3.5 in; 8.9 cm
		Physical Size	4 in; 10.17 cm
	Interface	Serial ATA (6.0Gb/s), NCQ enabled	
	Synchronous Transfer Rate (Maximum)	Up to 6.0 Gb/s	
	Buffer	64MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.6 ms
		Average	11 ms
		Full-Stroke	Not specified
	Rotational Speed	7200 rpm	
	Operating Temperature	41° to 140° F (5° to 60° C)	
500GB SATA 7.2K SED SFF HDD	**Capacity**	500GB	
	Height	0.275 in; 0.7 cm	
	Width	**Media Diameter**	2.5 in; 6.36 cm
		Physical Size	2.75 in; 6.99 cm
	Interface	Serial ATA (6Gb/s)	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
	Buffer	32MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	1 ms
		Average	4.2 ms
		Full-Stroke	25 ms (typical)
	Rotational Speed	7,200 rpm	
	Operating Temperature	32° to 140° F (0° to 60° C)	

Technical Specifications - Hard Drives

HP Solid State Drives (SSDs) for Workstations	**HP 128GB SATA 6Gb/s SSD**	**Capacity**	128GB		
		Height	0.28 in; 0.7 cm		
		Width	**Physical Size**	2.5 in; 6.36 cm	
		Interface	SATA 6Gb/s		
		Synchronous Transfer Rate (Maximum)	Up to 500MB/s (Sequential Read)		
		Operating Temperature	32° to 158° F (0° to 70° C)		
	HP 256GB SATA 6Gb/s SSD	**Capacity**	256GB		
		Height	0.28 in; 0.7 cm		
		Interface	SATA 6Gb/s		
		Synchronous Transfer Rate (Maximum)	Up to 500MB/s (Sequential Read)		
		Operating Temperature	32° to 158° F (0° to 70° C)		
	HP 256GB SATA 6Gb/s SED SSD	**Capacity**	256GB		
		Height	0.28 in; 0.7 cm		
		Width	**Physical Size**	2.5 in; 6.36 cm	
		Interface	6Gb/s SATA		
		Synchronous Transfer Rate (Maximum)	Up to 500MB/s (Sequential Read)		
		Operating Temperature	32° to 158° F (0° to 70° C)		
	HP 512GB SATA 6Gb/s SSD	**Capacity**	512GB		
		Height	0.28 in; 0.7 cm		
		Width	**Physical Size**	2.5 in; 6.36 cm	
		Interface	6Gb/s SATA		
		Synchronous Transfer Rate (Maximum)	Up to 500MB/s (Sequential Read)		
		Operating Temperature	32° to 158° F (0° to 70° C)		
	Intel Pro 1500 180GB SATA SSD	**Capacity**	180GB		
		Width	**Physical Size**	2.5 in; 6.36 cm	
		Interface	6Gb/s SATA		
		Synchronous Transfer Rate (Maximum)	600 Mb/s		
	Samsung SM843T 240GB SATA SSD	**Capacity**	240GB		
		Width	**Physical Size**	2.5 in; 6.36 cm	
		Interface	SATA 6Gb/s		
		Synchronous Transfer Rate (Maximum)	Up to 600MB/s		
		Operating Temperature	32° to 158° F (0° to 70° C)		

Technical Specifications - Hard Drives

	Samsung SM843T 480GB SATA SSD	**Capacity**	480GB	
		Width	**Physical Size**	2.5 in; 6.36 cm
		Interface	SATA 6Gb/s	
		Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
		Operating Temperature	32° to 158° F (0° to 70° C)	
PCIe SSDs for HP Workstations	**HP Z Turbo Drive 256GB SSD**	**Capacity**	256GB	
		Interface	PCI Express 2.0 x4 electrical x4 physical	
		Operating Temperature	32° to 158° F (0° to 70° C)	
	HP Z Turbo Drive 512GB SSD	**Capacity**	512GB	
		Interface	PCI Express 2.0 x4 electrical x4 physical	
		Operating Temperature	32° to 158° F (0° to 70° C)	
	Fusion ioFX 410GB PCIe Accelerator	**Capacity**	410GB	
		Interface	PCI Express 2.0 x4 electrical x4 physical	
		Operating Temperature	32° to 95° F (0° to 35° C)	

Technical Specifications - Hard Drive Controllers

LSI 9217-4i4e 8-port SAS 6Gb/s RAID Card	**PCI Bus**	8 lanes, PCI Express 3.0
	RAID Levels	Offers Integrated RAID (0, 1, 1E and 10)
	PCI Data Burst Transfer Rate	Half Duplex x8, PCIe, 8000 MB/s
	SAS Bandwidth	**Half Duplex** 600 MB/s per lane
	PCI Card Type	3.3V Add-in Card
	PCI Voltage	12 V ± 10%
	PCI Power	9.8W typical, Airflow min 200 LFM
	Bracket	Full height and low profile
	Certification Level	PCI Express 3.0 compliant
	SAS Processor	LSI SAS2308/ Fusion MPT 2.0
	Internal Connectors	One x4 internal mini-SAS (SFF8087)
	External Connectors	One x4 external mini-SAS (SFF8088)
	Maximum Number of SCSI Devices	256 Non-RAID SAS/SATA devices
	LED Indicators	N/A
LSI 9270-8i SAS 6Gb/s ROC RAID Card and iBBU9 Battery Backup Unit	**PCI Bus**	x8 lane PCIe 3.0 compliant
	RAID Levels	RAID 0, 1, 5, and 6 RAID spans 10, 50 and 60
	PCI Card Type	Low profile, single PCIe slot design with full height bracket.
	PCI Voltage	+3.3V Add-in Card
	PCI Power	+3.3V, +12V
	Certification Level	PCI-Express 3.0
	IO Bus	Eight 6Gb/s and 3Gb/s compatible SAS/SATA ports
	SAS Processor	LSISAS2208 Dual-Core RAID on Chip (ROC)
	Internal Connectors	Two SAS SFF8087 x4 (Mini-SAS)
	External Connectors	None
	Maximum Number of SCSI Devices	Up to 128 SAS and/or SATA hard drives and SSDs **NOTE:** HP Workstations do not support this many internal drives.
	LED Indicators	Heartbeat LED on card

NVIDIA NVS 310 512MB Graphics	**Form Factor**	Low Profile: 2.713 inches in height × 6.150 inches in length Weight: ~142 grams
	Graphics Controller	NVIDIA NVS 310 GPU: GF119-825
	Bus Type	PCI Express x16, 2.0 compliant
	Memory	Size: 512MB DDR3 Clock: 875Mhz Memory Bandwidth: 14GB/s
	Connectors	2 x DisplayPort
	Maximum Resolution	Up to 2560 x 1600 (digital display) per display.
	Image Quality Features	The following video formats are supported: - MPEG2 - MPEG4 Part 2 Advanced Simple Profile - H.264 SVC codec support - Support for 3D Blu Ray - VC1 - DivX version 3.11 and later - MVC A full range of video resolutions are supported including 1080p, 1080i, 720p, 480p and 480i. The NVS 310 GPU provides hardware acceleration for the computationally intensive parts of video processing, as well as provides improved video playback speeds via faster decode and transcode.
	Display Output	Up to 2 displays in the following configurations: DisplayPort output: ● Drives two DisplayPort enabled digital display at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking, when connected natively using the 2 DisplayPort connectors on the NVS 310 graphics card ● Supports 2 monitors up to resolution of 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort 1.2 multi stream topology technology. DVI-D output: ● Drives two digital display at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort to DVI-D single-link cable adaptors ● Drives two digital display at resolutions up to 2560× 1600 at 60 Hz with reduced blanking using DisplayPort to DVI-D dual-link cable adaptors HDMI output: ● NVS 310 is capable of driving two high definition (HD) panels up to resolutions of 1920 × 1080P at 60 Hz using DisplayPort to HDMI cable adaptors VGA display output: ● Drives two analog display at resolutions up to 1920 × 1200 at 60 Hz using DisplayPort to VGA cable adaptors

Technical Specifications - Graphics

	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
	Power Consumption	19.5 Watts
	Note	1. The thermal solution used on this card is an active fan heatsink. 2. Factory configured NVS 310 graphics card have no cable adpaters included. Adapters must be ordered separately. 3. Option kit NVS 310 includes 2 DP to DVI-D cable adapters.
NVIDIA NVS 315 1GB Graphics (for HP Workstations)	**Form Factor**	Low Profile: 2.713 inches in height × 5.7 inches in length Weight: ~142 grams
	Graphics Controller	NVIDIA NVS 315 (using GF119-825 GPU) Number of Cores: 48 CUDA cores Max. Power: 19.3W Cooling Solution: Active fan heatsink
	Bus Type	PCI Express x16, 2.0 compliant
	Memory	Size: 1GB DDR3 Clock: 875Mhz Memory Bandwidth: 14GB/s
	Connectors	DMS-59 output Cables included: - For CTO: DMS-59 to DVI cable - For AMO: DMS-59 to DVI cable and DMS-59 to VGA cable
	Maximum Resolution	Maximum number of displays supported: 2 Maximum Resolution Support: - DMS-59 to VGA: 2048 x 1536 @ 85Hz - DMS-59 to DVI: 1980 x 1200 @ 60Hz - DMS-59 to DP: 2560 x 1600 @ 60Hz
	Image Quality Features	See Display Output section. The following video formats are supported: - MPEG2 - MPEG4 Part 2 Advanced Simple Profile - H.264 SVC codec support - Support for 3D Blu Ray - VC1 - DivX version 3.11 or later A full range of video resolutions are supported including 1080p, 1080i, 720p, 480p and 480i. The NVS 315 GPU provides hardware

		acceleration for the computationally intensive parts of video processing, as well as provides improved video playback speeds via faster decode and transcode.
	Display Output	Up to 2 displays using one of the following DMS-59 cables: DMS-59 to DVI DMS-59 to VGA DMS-59 to DP DisplayPort output: - Drives two DisplayPort enabled digital displays at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking, when connected via the DMS-59 to DP adapter. DVI-D output: - Drives two digital display 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 display at resolutions up to 2048 × 1536 at 85 Hz using DMS-59 to VGA cable adaptor.
	Shading Architecture	Shader Model 5.0
	Supported Graphics APIs	DX11, OpenGL 4.3
	Available Graphics Drivers	Windows 8 Microsoft Windows 7 Professional (64-bit and 32-bit) Microsoft Windows XP Professional (64-bit and 32-bit) Red Hat Enterprise Linux(RHEL) SUSE Linux Enterprise Desktop 11 (64-bit and 32-bit) HP qualified drivers may be preloaded or the latest HP qualified drivers are available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html SUSE Linux Enterprise drivers may also be obtained from: ftp://download.nvidia.com/novell or http://www.nvidia.com
	Notes	1. The thermal solution used on this card is an active fan heatsink. 2. Factory configured graphics card includes DMS-59 to DVI cable. 3. Option kit graphics card includes DMS-59 to DVI and DMS-59 to VGA cables (one each).
NVIDIA NVS 510 2GB Graphics	**Form Factor**	Low Profile, 2.713 inches × 6.3 inches, single slot
	Graphics Controller	NVS 510 GPU Core Clock: 797 Mhz Memory Clock: 891 Mhz CUDA Cores: 192
	Bus Type	PCI Express x16, Generation 2.0
	Memory	2GB DDR3
	Connectors	Four mini-DisplayPort. Four mini-DisplayPort to DisplayPort adapters included. (DisplayPort to DVI-D, DisplayPort to VGA, DisplayPort to HDMI, and DisplayPort to Dual-Link DVI adapters available as separate accessories)

Technical Specifications - Graphics

Maximum Resolution	Mini-DisplayPort connectors support ultra-high-resolution panels (up to 3840 x 2160 @ 60Hz) **NOTE:** This card supports up to four displays. For Windows XP, only 2 active displays are supported.
Image Quality Features	10-bit internal display processing, including hardware support for 10-bit scan-out
Display Output	DisplayPort with Multi-Stream Technology (MST) and High Bit Rate 2 (HBR2) support. Digital Display Support 1. DisplayPort Output - Drives four DisplayPort enabled digital display at resolutions up to 3840 × 2160 at 60 Hz with reduced blanking, when connected natively using the 4 DisplayPort connectors on the NVS 510 graphics card. - DisplayPort Multi-Stream Topology (MST) Technology: Supports various combinations of display resolutions and number of displays when using DisplayPort multi stream topology technology - up to a maximum of 4 monitors at a resolution of 1920 × 1200 at 60 Hz with reduced blanking. 2. DVI-D Output - Drives four digital displays at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort to DVI-D single-link cable adaptors. - Drives four digital displays at resolutions up to 2560× 1600 at 60 Hz with reduced blanking using DisplayPort to DVI-D dual-link cable adaptors. 3. HDMI Output - The NVS 510 graphics board is capable of driving four high definition (HD) panels up to resolutions of 1920 × 1080P at 60 Hz using DisplayPort to HDMI cable adaptors. Analog Display Support 1. VGA display output - Drives four analog displays at resolutions up to 1920 × 1200 at 60 Hz using DisplayPort to VGA cable adaptors.
Supported Graphics APIs	Full Microsoft DirectX 11, Shader Model 5.0 support Full OpenGL 4.3 support
Available Graphics Drivers	Genuine Windows 7 Professional (64-bit and 32-bit) Microsoft Windows XP Professional (64-bit and 32-bit) Red Hat Enterprise Linux(RHEL) 6 Desktop/Workstation SUSE Linux Enterprise Desktop 11 (64-bit and 32-bit) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
Power Consumption	33.4 Watts
Note	Heatsink cooler design is active.

Technical Specifications - Graphics

Graphics Cable Adapters	**Note**	Graphics Cable Adapter option choice is available starting Feb 1 2013 for the following graphics cards: NVS 310, Quadro 410, Qaudro 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 410 512MB Graphics	**Form Factor**	Low Profile: 2.713 inches × 5.7 inches, single slot
	Graphics Controller	NVIDIA Quadro 410 GPU: GK107
	Bus Type	PCI Express x16, 3.0 compliant
	Memory	Size: 512MB DDR3 Clock: 900MHz Memory Bandwidth: 14GB/s
	Connectors	One dual-link DVI-I connector One DisplayPort connector
	Maximum Resolution	VGA (through DVI to VGA cable): • 2048 × 1536 × 32 bpp at 85 Hz Dual-link DVI • 2560 × 1600 × 32 bpp at 60 Hz (reduced blanking) Single-link DVI • 1920 × 1200 × 32 bpp at 60 Hz (reduced blanking) DisplayPort 1.2 • 3840 × 2160 × 36 bpp at 60 Hz
	RAMDAC	400 MHz integrated RAMDAC
	Display Output	Maximum number of displays supported: 2
	Shading Architecture	Shader Model 5.0
	Supported Graphics APIs	DX11, OpenGL 4.2
	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

Technical Specifications - Graphics

	Notes	1. Factory configured Quadro 410 does not include any video adapters. Adapters must be ordered separately. 2. Option kit Quadro 410 includes one DP to DVI-D adapter
NVIDIA Quadro K600 1GB Graphics	**Form Factor**	2.731" H x 6.3" L Single Slot, Low Profile Full Height Profile bracket installed Low Profile bracket included
	Graphics Controller	NVIDIA Quadro K600 Graphics Card Kepler GK107 GPU 192 CUDA cores Max Power: 41 Watts
	Bus Type	PCI Express 2.0 x16
	Memory	1 GB GDDR3, 891 Mhz 128-bit memory I/O path 29 GB/s memory bandwidth
	Connectors	1 DL-DVI(I) output, 1 DisplayPort output 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
	Maximum Resolution	DisplayPort: - up to 3840 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
	Image Quality Features	10-bit internal display processing pipeline 10-bit scan-out support
	Display Output	VGA: - requires use of DVI-to-VGA and/or DP-to-VGA video cable adapters - 400 Mhz integrated RAMDAC - Max resolution: 2048 x 1536 x 32 bpp @ 85 Hz DL-DVI(I): - Max resolution: 2560 x 1600 x 32 bpp @ 60 Hz SL-DVI(I): - Max resolution: 1920 x 1200 x 32 bpp @ 60 Hz DisplayPort: - Supports HBR2 and MST - Max resolution: 3840 x 2160 x 30 bpp @ 60 Hz (only one monitor can be connected to the Quadro K600 DisplayPort connector at this resolution) - Max number of daisy-chained monitors: 2
	Shading Architecture	Full Microsoft DirectX 11 Shader Model 5.0
	Supported Graphics APIs	OpenGL 4.3 DirectX 11 API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran
	Available Graphics Drivers	Windows 8 Pro 64-bit Windows 8 (China) 64-bit

		Genuine Windows 7 Professional (64-bit and 32-bit) Red Hat Enterprise Linux (RHEL) 5 Desktop/Workstation (64-bit) Red Hat Enterprise Linux(RHEL) 6 Desktop/Workstation SUSE Linux Enterprise Desktop 11 (64-bit) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html SUSE Linux Enterprise drivers may also be obtained from: ftp://download.nvidia.com/novell or http://www.nvidia.com
	Notes	1. Quadro K600 offered as CTO does not include a video cable adapter. Video cable adapters must be ordered separately. 2. Quadro K600 offered as AMO includes one DP-to-DVI video cable adapter. Additonal cables must be ordered separately. 3. Quadro K600 is Windows 8 Compliant. 4. A total maximum of 2 active monitors are supported across all display output types.
AMD FirePro V3900 1GB Graphics	**Form Factor**	Full height, half length (full-height bracket included)
	Graphics Controller	AMD FirePro™V3900 professional graphics
	Bus Type	PCI Express®x16, Generation 2.1
	Memory	1GB DDR3 memory
	Connectors	1 DL DVI, 1 DP output One DP to DVI adapter included
	Maximum Resolution	2560x1600 per display (5120x1600 max. horizontal resolution)
	Display Output	1 DisplayPort®1.2 1 Dual-link DVI
	Supported Graphics APIs	OpenCL™1.1, DirectX®11 and OpenGL 4.2
	Available Graphics Drivers	Genuine Windows®7 Professional (64-bit and 32-bit) Genuine Windows Vista®Business (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 available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Power Consumption	<50W
	Note	AMD Eyefinity technology can support multiple displays using a single enabled AMD FirePro™professional graphics card; the number of supported displays varies by card model. Microsoft®Windows®7, Windows Vista® or Linux®is required in order to support more than 2 displays. Depending on the card model, native DisplayPort™connectors and/or certified DisplayPort™active or passive adapters to convert your monitor's native input to your card's DisplayPort™or Mini-DisplayPort™ connector(s) may be required. See www.amd.com/firepro for details.
NVIDIA Quadro K2000 2GB Graphics	**Form Factor**	4.38" H x 7.97" L Single Slot, Full Height

Technical Specifications - Graphics

Graphics Controller	NVIDIA Quadro K2000 Graphics Card Kepler GK107 GPU 384 CUDA cores Max Power: 51.1 Watts
Bus Type	PCI Express 2.0 x16
Memory	2 GB GDDR5, 2000 Mhz 128-bit memory I/O path 64 GB/s memory bandwidth
Connectors	1 DL-DVI(I) output, 2 DisplayPort outputs 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
Maximum Resolution	DisplayPort: - up to 3840 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
Image Quality Features	• 10-bit internal display processing pipeline • 10-bit scan-out support
Display Output	VGA: - requires use of DVI-to-VGA and/or DP-to-VGA video cable adapters - 400 Mhz integrated RAMDAC - Max resolution: 2048 x 1536 x 32 bpp @ 85 Hz DL-DVI(I): - Max resolution: 2560 x 1600 x 32 bpp @ 60 Hz SL-DVI(I): - Max resolution: 1920 x 1200 x 32 bpp @ 60 Hz DisplayPort: - Supports HBR2 and MST - Max resolution: 3840 x 2160 x 30 bpp @ 60 Hz (only one monitor can be connected to a Quadro K2000 DisplayPort connector at this resolution) - Max number of DisplayPort daisy-chained monitors or hub connected monitors from a single Quadro K2000 DisplayPort connector: 4 with maximum resolution of 1920 x 1200 Maximum number of monitors across all available Quadro K2000 outputs is 4.
Shading Architecture	Full Microsoft DirectX 11 Shader Model 5
Supported Graphics APIs	OpenGL 4.3 DirectX 11 API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran
Available Graphics Drivers	Windows 8 Pro 64-bit Windows 8 (China) 64-bit Genuine Windows 7 Professional (64-bit and 32-bit) Red Hat Enterprise Linux (RHEL) 5 Desktop/Workstation (64-bit) Red Hat Enterprise Linux(RHEL) 6 Desktop/Workstation

		SUSE Linux Enterprise Desktop 11 (64-bit) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html SUSE Linux Enterprise drivers may also be obtained from: ftp://download.nvidia.com/novell or http://www.nvidia.com
	Notes	1. Quadro K2000 offered as CTO does not include a video cable adapter. Video cable adapters must be ordered separately. 2. Quadro K2000 offered as AMO includes one DP-to-DVI video cable adapter. Additional cables must be ordered separately.
NVIDIA Quadro K4000 3GB Graphics	**Form Factor**	4.376" H x 9.5" L Single Slot, Full Height
	Graphics Controller	NVIDIA Quadro K4000 Graphics Card Kepler GK106 GPU 768 CUDA cores Max Power: 80 Watts
	Bus Type	PCI Express 2.0 x16
	Memory	3 GB GDDR5, 2800 Mhz 192-bit memory I/O path 134 GB/s memory bandwidth
	Connectors	1 DL-DVI(I) output, 2 DisplayPort outputs 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
	Maximum Resolution	DisplayPort: - up to 3840 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
	Image Quality Features	• 10-bit internal display processing pipeline • 10-bit scan-out support
	Display Output	VGA: - requires use of DVI-to-VGA and/or DP-to-VGA video cable adapters - 400 Mhz integrated RAMDAC - Max resolution: 2048 x 1536 x 32 bpp @ 85 Hz DL-DVI(I): - Max resolution: 2560 x 1600 x 32 bpp @ 60 Hz SL-DVI(I): - Max resolution: 1920 x 1200 x 32 bpp @ 60 Hz DisplayPort: - Supports HBR2 and MST - Max resolution: 3840 x 2160 x 30 bpp @ 60 Hz (only one monitor can be connected to a Quadro K4000 DisplayPort connector at this resolution) - Max number of DisplayPort daisy-chained monitors or hub connected monitors from a single Quadro K4000 DisplayPort connector: 4 with maximum resolution of 1920 x 1200

	HDMI: - Requires use of DP-to-HDMI cable - Max Resolution: 1920 x 1080 x 32 bpp @ 60Hz Maximum number of monitors across all available Quadro K4000 outputs is 4.
Shading Architecture	Full Microsoft DirectX 11 Shader Model 5.0
Supported Graphics APIs	OpenGL 4.3 DirectX 11 API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran
Available Graphics Drivers	Windows 8 Pro 64-bit Windows 8 (China) 64-bit Genuine Windows 7 Professional (64-bit and 32-bit) Red Hat Enterprise Linux (RHEL) 5 Desktop/Workstation (64-bit) Red Hat Enterprise Linux(RHEL) 6 Desktop/Workstation SUSE Linux Enterprise Desktop 11 (64-bit) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html SUSE Linux Enterprise drivers may also be obtained from: ftp://download.nvidia.com/novell or http://www.nvidia.com
Notes	1. Quadro K4000 offered as CTO does not include a video cable adapter. Video cable adapters must be ordered separately. 2. Quadro K4000 offered as AMO includes one DP-to-DVI video cable adapter. Additional cables must be ordered separately. 3. Quadro K4000 is Windows 8 Compliant. 4. A total maximum of 4 active monitors are supported across all display output types. To get 4 monitors, at least one monitor must be daisy chained on a DisplayPort output. 5. A DisplayPort hub device may be used to connect multiple DisplayPort monitors to a single Quadro K4000 DisplayPort output.

Technical Specifications - Graphics

NVIDIA Quadro K5000 4GB Graphics	**Form Factor**	4.376" H x 10.5" L Dual Slot
	Graphics Controller	NVIDIA Quadro K5000 Graphics Card based on the GK104 GPU
	Bus Type	PCI Express 2.0 x16
	Memory	4GB GDDR5 173GB/s memory bandwidth
	Connectors	DVI-I (1), DVI-D (1), DP (2), Optional 3D Stereo bracket with 3-pin mini-DIN connector. No adapter included with card. DVI to VGA, DisplayPort to VGA, DisplayPort to DVI, and DisplayPort to Dual-Link DVI adapters available as accessories
	Image Quality Features	• DisplayPort with Multi-Stream Technology (MST) and High Bit Rate 2 (HBR2), HDMI 1.4, and HDCP support • NVIDIA 3D Vision™ technology
	Display Output	400 MHz integrated RAMDAC • Maximum resolution over VGA (through DVI to VGA cable): 2048 × 1536 × 32 bpp at 85 Hz Dual-link internal TMDS (DVI 1.0) • Maximum resolution over digital port (single GPU and SLI mode): 2560 × 1600 × 32 bpp at 60 Hz (reduced blanking) Single-link internal TMDS (DVI 1.0) • Maximum resolution over digital port (single GPU and SLI mode):1920 × 1200 × 32 bpp at 60 Hz (reduced blanking) DisplayPort with MST and HBR2. • Maximum resolution: 3840 × 2160 × 36 bpp at 60Hz HDMI • Maximum resolution: 1920 × 1080 × 32 bpp at 60Hz
	Supported Graphics APIs	OpenGL 4.2 DirectX 11 Shader model 5.0 Support API support for NVIDIA's CUDA™C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, Fortran
	Available Graphics Drivers	Genuine Windows 7 Professional (64-bit and 32-bit) Genuine Windows Vista Business (64-bit and 32-bit) Microsoft Windows XP Professional (64-bit and 32-bit) Red Hat Enterprise Linux (RHEL) 5 Desktop/Workstation (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
	Power Consumption	122 Watts
	Note	No display output adapter included.

Technical Specifications - Graphics

AMD FirePro W7000 4GB Graphics	**Form Factor**	Full height, full length, single slot
	Graphics Controller	AMD FirePro™W7000 Professional Graphics Max Power: <150 Watts
	Bus Type	PCI Express™x16, Generation 3.0
	Memory	4GB GDDR5, 153.6 GB/s bandwidth, ECC support
	Connectors	4 x DisplayPort with HBR2 and MST support.
	Maximum Resolution	DisplayPort: 4096x2160 @24bpp 60Hz Dual Link DVI: 2560x1600 (requires DP to DL-DVI adapter) Single Link DVI: 1920x1200 (requires DP to DVI adapter) VGA: 1920x1200 (requires DP to VGA adapter)
	Image Quality Features	Advanced support for 8-bit, 10-bit, and 16-bit per RGB color component
	Display Output	Max number of monitors supported using DisplayPort: 6 Monitor chaining from a single DisplayPort options(subject to a max of 6 total monitors across all outputs, requires use of DisplayPort Monitors supporting MST or the use of DisplayPort hubs): • 1 4096x2169 display • 2 2560x1600 displays • 4 1920x1200 displays
	Shading Architecture	Shader Model 5.0
	Supported Graphics APIs	OpenGL®4.2 with OpenGL Shading Language OpenCL 1.1 Microsoft®DirectX®11.1
	Available Graphics Drivers	Windows 8 Windows 7 Professional (64-bit and 32-bit) Windows 8 (64bit 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 available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Note	1. AMD Eyefinity technology can support multiple displays using a single enabled AMD FirePro™professional graphics card; the number of supported displays varies by card model. Microsoft®Windows®7, Windows Vista®, or Linux®is required in order to support more than 2 displays. Depending on the card model, native DisplayPort™ connectors and/or certified DisplayPort™active or passive adapters to convert your monitor's native input to your card's DisplayPort™or Mini-DisplayPort™connector(s) may be required. See www.amd.com/firepro for details. 2. Factory configured FirePro W7000 graphics card does not include any video adapter cables. Adapters must be ordered separately. 3. Option Kit FirePro W7000 graphics card does not include any video cable adapters. Adapters must be ordered seperately.
NVIDIA Quadro K6000 12GB Graphics	**Form Factor**	4.376" H x 10.5" L Dual Slot Power: 234 Watts Weight: ~880 grams

Technical Specifications - Graphics

Graphics Controller	NVIDIA Quadro K6000 Graphics Card based on the GK180 GPU Core Count: 2880 Base Clock: 797 MHz Boost Clock: 902 MHz
Bus Type	PCI Express 3.0 x16
Memory	12GB GDDR5 384-bit memory I/O path 288 GB/s memory bandwidth ECC Memory
Connectors	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.
Maximum Resolution	Dual DisplayPort (up to 2560 x 1600 @ 60Hz and 1920x1200 @ 120Hz) Dual-link DVI-I output (up to 2560 x 1600 @ 60Hz and 1920x1200 @ 120Hz)
Image Quality Features	• DisplayPort with Multi-Stream Technology (MST) and High Bit Rate 2 (HBR2), HDMI 1.4, and HDCP support • NVIDIA 3D Vision™ technology • NVIDIA Premium Mosaic and nView
Display Output	400 MHz integrated RAMDAC • Maximum resolution over VGA (through DVI to VGA cable): 2048 × 1536 × 32 bpp at 85 Hz Dual-link internal TMDS (DVI 1.0) • Maximum resolution over digital port (single GPU and SLI mode): 2560 × 1600 × 32 bpp at 60 Hz (reduced blanking) Single-link internal TMDS (DVI 1.0) • Maximum resolution over digital port (single GPU and SLI mode):1920 × 1200 × 32 bpp at 60 Hz (reduced blanking) DisplayPort with MST and HBR2. • Maximum resolution: 3840 × 2160 × 36 bpp at 60Hz HDMI • Maximum resolution: 1920 × 1080 × 32 bpp at 60Hz
Shading Architecture	Shader Model 5.0 Full IEEE 764-2008 32-bit and 64-bit precision
Supported Graphics APIs	Full OpenGL 4.3 Full DirectX 11 CUDA API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran
Available Graphics Drivers	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)

	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	1. NVIDIA GRID VGX Pass Through feature supported on NVIDIA Quadro K6000 to enable direct mapping of GPU to Virtual Machine. 2. No display output adapter included.

Technical Specifications - High Performance GPU Computing

NVIDIA Tesla K20c Compute Processor	**Form Factor**	4.376 inches by 10.5 inches Dual Slot
	System Interface	PCI Express Gen2 ×16
	Video Outputs	None.
	Memory	5GB GDDR5, 320-bit memory path
	Peak Memory Bandwidth	208 GB/s (with ECC off)
	Supported APIs	CUDA and OpenACC API support includes: CUDA C, CUDA C++, Java, Python, and Fortran
	Supported Operating Systems	Windows 8 (64-bit) Genuine Windows 7 Professional (64-bit) Red Hat Enterprise Linux (RHEL) 5, 6 Desktop/Workstation (64-bit) SUSE Linux Enterprise Desktop 11 (64-bit) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html Novell SUSE Linux Enterprise drivers may also be obtained from: ftp://download.nvidia.com/novell or http://www.nvidia.com
	Processor Cores	GK110 GPU, 706 MHz clock 2496 CUDA cores
	Power Consumption	~225 Watts **NOTE 1:** A 1125W PSU is required for any K20 configuration on the Z820
NVIDIA Tesla K40 Compute Processor	**Form Factor**	Size: 4.376 inches by 10.5 inches Slots: Dual Slot Power Connectors: One 6-pin and one 8-pin Weight: ~826 grams
	System Interface	PCI Express Gen3 ×16
	Video Outputs	None.
	Memory	12GB GDDR5, memory path: 384-bit memory clock: 3Ghz
	Peak Memory Bandwidth	288 GB/s
	Supported APIs	CUDA, OpenACC, OpenCL 1.2 API support includes: C, C++, Java, Python, and Fortran
	Supported Operating Systems	Windows 8 (64-bit) Genuine Windows 7 Professional (64-bit) Red Hat Enterprise Linux (RHEL) 5, 6 Desktop/Workstation (64-bit) SUSE Linux Enterprise Desktop 11 (64-bit) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html Novell SUSE Linux Enterprise drivers may also be obtained from: ftp://download.nvidia.com/novell or http://www.nvidia.com

Technical Specifications - High Performance GPU Computing

Processor Cores	GK110B GPU Base Clock: 745 MHz Boost Clock: up to 875 Mhz 2888 CUDA cores
Power Consumption	~235 Watts **Note 1**: A 1125W PSU is required for any K40 configuration on the Z820
Tesla K40 GPU Boost	By default the Tesla K40 active ships with the core clock set to the base clock. HPC workloads can have one or more characteristics as described. When selecting one of the supported boost clocks a good strategy is to characterize the workload with the available boost clocks. For example, DGEMM/Linpack are extremely demanding on power. Therefore, the "base clock" may be the correct choice when running Linpack. Some workloads in life sciences, manufacturing, CFD, CAD, etc., may have power headroom and can take advantage of one of the boost clocks.

Technical Specifications - Multimedia and Audio Devices

HP Thin USB Powered Speakers	**Frequency Response** (-3dB, 24-bit/96kHz input)	FO to 20kHz
	Dimensions	Speakers: 14.52 x 9.50 x 2.45 cm (5.72 x 3.74 x 0.96 in) per speaker

Technical Specifications - Optical and Removable Storage

HP DVD-ROM Drive	**Description**	5.25-inch, half-height, tray-load	
	Mounting Orientation	Either horizontal or vertical	
	Interface Type	SATA/ATAPI	
	Dimensions (WxHxD)	15.0 x 4.4 x 20.3 cm (5.9 x 1.7 x 8.0 in)	
	Disc Capacity	**DVD-ROM**	Single layer: Up to 4.7 GB Double layer: Up to 8.5 GB
	Access Times	**DVD-ROM Single Layer**	< 140 ms (typical)
		CD-ROM Mode 1	< 125 ms (typical)
		Full Stroke DVD	< 250 ms (seek)
		Full Stroke CD	< 210 ms (seek)
	Power	**Source**	SATA DC power receptacle
		DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 5%-200 mV ripple p-p
		DC Current	5 VDC - <1000 mA typical, < 1600 mA maximum 12 VDC - < 600 mA typical, < 1400 mA maximum
	Operating Environmental (all conditions non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)
		Relative Humidity	10% to 90%
		Maximum Wet Bulb Temperature	86° F (30° C)
		Operating Systems Supported	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, Removed reference to "Novell" because of acquisition and changed product reference to "SUSE Linux Enterprise Desktop 10 & 11", No driver is required for this device. Native support is provided by the operating system.

HP DVD+/-RW Drive	**Description**	5.25-inch, half-height, tray-load	
	Mounting Orientation	Either horizontal or vertical	
	Interface Type	SATA/ATAPI	
	Dimensions (WxHxD)	15.0 x 4.4 x 17.5 cm (5.9 x 1.7 x 8.0 in)	
	Disc Formats	DVD-RAM DVD+R DVD+RW DVD+R DL DVD-R DL DVD-R DVD-RW CD-R CD-RW	
	Disc Capacity	**DVD-ROM**	8.5 GB DL or 4.7 GB standard
		Full Stroke DVD	< 240 ms (seek)
		Full Stroke CD	< 200 ms (seek)

Technical Specifications - Optical and Removable Storage

Maximum Data Transfer Rates	**CD ROM Read**	CD-ROM, CD-R Up to 40X CD-RW Up to 32X	
	DVD ROM Read	DVD-RAM	Up to 12X
		DVD+RW	Up to 8X
		DVD-RW	Up to 8X
		DVD+R DL	Up to 12X
		DVD-R DL	Up to 12X
		DVD-ROM	Up to 16X
		DVD-ROM DL	Up to 12X
		DVD+R	Up to 16X
		DVD-R	Up to 16X
Power	**Source**	SATA DC power receptacle	
	DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 5%-200 mV ripple p-p	
	DC Current	5 VDC -<1000 mA typical, <1600 mA maximum 12 VDC -<1200 mA typical, <2000 mA maximum	
Operating Environmental (all conditions non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)	
	Relative Humidity	10% to 90%	
	Maximum Wet Bulb Temperature	86° F (30° C)	
	Operating Systems Supported	Windows 8 32-bit and 64-bit, Windows 7 Professional 32-bit and 64-bit, Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*. Red Hat Enterprise Linux(RHEL) WS4**, 5, 6 Desktop/Workstation SUSE Linux Enterprise Desktop 10 & 11 No driver is required for this device. Native support is provided by the operating system.	
	Kit Contents	HP SATA SuperMulti DVD Writer Drive, Roxio Easy Media Creator software, Intervideo WinDVD Software, installation guide, and DVD+R media.	

HP Blu-Ray Writer	**Description**	5.25-inch, half-height, tray-load
	Mounting Orientation	Either horizontal or vertical
	Interface Type	SATA
	Dimensions (WxHxD)	15.0 x 4.4 x 20.3 cm (5.9 x 1.7 x 8.0 in)
	Disc Formats	BD-ROM BD-R BD-RE DVD-RAM DVD+R DVD+RW DVD+R DL DVD-R DL DVD-R

Technical Specifications - Optical and Removable Storage

	DVD-RW CD-R CD-RW		
Disc Capacity	**DVD-ROM**	8.5 GB DL or 4.7 GB standard	
	Blu-ray	50 GB DL or 25 GB standard	
	Full Stroke DVD	< 250 ms (seek)	
	Full Stroke CD	< 210 ms (seek)	
	Blu-ray	<275 ms (seek)	
	Startup Time (Time to drive ready from tray loading)	BD-ROM (SL/DL)	25S / 28S
		BD-R (SL/DL)	25S / 28S
		BD-RE (SL/DL)	25S / 28S
		DVD-ROM (SL/DL)	18S / 18S
		DVD-R (SL/DL)	25S / 25S
		DVD-RW	25S
		DVD+R (SL/DL)	25S / 25S
		DVD+RW	25S
		DVD-RAM	45S
		CD-ROM	45S
Maximum Data Transfer Rates	**CD ROM Read**	CD-ROM	Up to 40X
		CD-R	Up to 40X
		CD-RW	Up to 40X
	DVD ROM Read	DVD-RAM	Up to 5X
		DVD+RW	Up to 10X
		DVD-RW	Up to 10X
		DVD+R DL	Up to 8X
		DVD-R DL	Up to 8X
		DVD-ROM	Up to 16X
		DVD-ROM DL	Up to 8X
		DVD+R	Up to 12X
		DVD-R	Up to 12X
	Blu-Ray	BD-ROM	Up to 6X
		BD-ROM DL	Up to 4.8X
		BD-R	Up to 6X
		BD-R DL	Up to 4.8X
		BD-R	Up to 6X
		BD-RE SL/DL	Up to 4.8X
Power	**Source**	SATA DC power receptacle	
	DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 10%-100 mV ripple p-p	
	DC Current	5 VDC -900 mA typical, 1200 mA maximum 12 VDC -1000 mA typical, 1600 mA maximum	
Operating Environmental (all conditions non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)	
	Relative Humidity	15% to 80%	
	Maximum Wet Bulb Temperature	86° F (30° C)	
	Operating Systems Supported	Windows 7 Professional 32-bit and 64-bit, Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic	

Technical Specifications - Optical and Removable Storage

			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. ** RHEL WS4 not supported on Z200/Z200SFF
		Kit Contents	HP Blue Laser RW Drive, Roxio Easy Media Creator software, Intervideo WinDVD Software, installation guide.
	Disclaimer	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
	Dimensions (WxHxL)	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	CompCompactFlash 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)

	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. 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

Technical Specifications - Controller Cards

HP IEEE 1394b FireWire PCIe Card	**Data Transfer Rate**	Supports up to 800 Mbps
	Devices Supported	IEEE-1394 compliant devices
	Bus Type	PCIe card full height PCIe slots
	Ports	Two IEEE-1394b bilingual 9-Pin connectors (Rear)
	Internal Connectors	One 10-Pin Header connector
	System Requirements	Windows 7 Professional 32-bit and 64-bit, Microsoft®Windows®XP Professional, Windows XP Home, Windows Vista, SLED 11 and RHEL 6. Intel Pentium®G series or higher processor, 128-MB RAM, 1-GB Hard Drive, CD-ROM drive, built in sound system, Available PCIe slot.
	Temperature – Operating	50° to 131° F (10° to 55° C)
	Temperature – Storage	–22° to 140° F (–30° to 60° C)
	Relative Humidity – Operating	20% to 80%
	Compliances	FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC
	Operating Systems Supported	Windows 7 Professional 32-bit and 64-bit, Windows Vista®Business 32-bit and 64-bit, Windows®XP Professional, XP Professional 64-bit, RHEL 6 and SLED 11.
HP Thunderbolt-2 PCIe 1-port I/O Card	**Data Transfer Rate**	Supports up to 20 Gb/s (20,000 Mb/s)
	Devices Supported	Thunderbolt™certified devices
	Bus Type	PCIe card, full or half height PCIe slots
	Ports	One Thunderbolt™2 external 20-Pin output connectors (Rear)
	Internal Connectors	One 5-Pin header connector
	System Requirements	Genuine Windows 7 Professional 64-bit, Genuine Windows 8.1 64-bit, Intel i5 series or higher processor, 128-MB RAM, 1-GB Hard Drive, available PCIe slot.
	Temperature - Operating	50° to 131° F (10° to 55° C)
	Temperature - Storage	-22° to 140° F (-30° to 60° C)
	Relative Humidity - Operating	20% to 80%
	Compliances	FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC
	Operating Systems Supported	Genuine Windows 7 Professional 64-bit, Genuine Windows 8.1 64-bit.
	Kit Contents	HP Thunderbolt™2 PCIe 1-port I/O Card, full height and half height bracket, DisplayPort to DisplayPort cable, internal header cables (2), user documentation and warranty card.
	Warranty	The HP Thunderbolt™2 PCIe 1-port I/O Card has a one-year Limited Warranty or the remainder of the warranty of the HP supported product in which it is installed. Technical support is available seven days a week, 24 hours a day, by phone, as well as online support forums. Certain restrictions and exclusions apply.

Technical Specifications - Networking and Communications

Integrated Intel 82579LM PCIe GbE Controller	**Connector**	RJ-45
	Controller	Intel 82579LM GbE platform LAN connect networking controller
	Memory	24 KB FIFO packet buffer memory
	Data Rates Supported	10/100/1000 Mbps
	Compliance	802.1P, 802.1Q, 802.2, 802.3, 802.3ab, 802.3az, 802.3u
	Bus Architecture	PCI Express 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 and 1.05V or just 3.3V with integrated regulators
	Boot ROM Support	Yes
	Network Transfer Mode	Full-duplex; Half-duplex (not supported for the 1000BASE-T transceiver)
	Network Transfer Rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps
	Management Capabilities	WOL, auto MDI crossover, PXE, Muti-port teaming, RSS, Advanced cable diagnostic. AMT 7.0 support

Broadcom (5761) NetXtreme Gigabit Ethernet Plus NIC	**Connector**	RJ-45
	Controller	Broadcom 5761 PCI-Express LAN Controller
	Memory	8 MB NVRAM serial Flash
	Data Rates Supported	10/100/1000 Mbps
	Compliance	IEEE 802.1P, 802.1Q, 802.2, 802.3, 802.3AB, 802.3u, and 802.3x
	Bus Architecture	PCI-Express
	Data Path Width	Single Channel PCI-Express
	Data Transfer Mode	Bus Master DMA
	Hardware Certifications	FCC class B, Canada and US NRTL Mark, C-Tick for Australia, BSMI for Taiwan, VCCI for Japan, MIC for Korea, GOST for Russia, UL listed (E212044), European Union Notice (CE 0682)
	Power Requirement	1.8W @ 3.3V
	Boot ROM Support	Yes
	Network Transfer Mode	Full-duplex Half-duplex (not available for the 1000BASE-T transceiver)
	Network Transfer Rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps
	Operating Temperature	32° to 131°F (0° to 55° C)
	Operating Humidity	131° F (55° C) with 5% to 95% non-condensing humidity
	Dimensions	7 cm x 10.5 cm (2.75 in x 4.13 in), low profile compatible
	Operating System Driver Support	Windows 7 Professional 32-bit and 64-bit, Windows Vista 32-bit SP1, Windows Vista x64 SP1, Windows XP 32 bit professional, Windows XP x64 Red Hat Enterprise Linux (RHEL) 5, 6; Novell SLED 10 & 11
	Management Capabilities	ACPI, WOL and DMI 2.0, PXE 2.0, WfM 2.0, Broadcom mgmt utility, ASF2.0, DASH 1.0 and DASH 1.1 profiles

Technical Specifications - Networking and Communications

	Kit Contents	Broadcom NetXtreme Gigabit Ethernet Plus NIC, Broadcom NetXtreme Gigabit Ethernet Plus NIC USB Cable Assembly, CD, drivers, quick install guide, product warranty statement
Intel Gigabit CT Desktop NIC	**Connector**	RJ-45
	Controller	Intel WG82574L Gigabit Ethernet Controller
	Memory	Integrated Dual 48K configurable transmit receive FIFO Buffers
	Data Rates Supported	10/100/1000 Mbps
	Compliance	IEEE 802.1P, 802,1Q, 802.2, 802.3, 802.3AB and 802.3u compliant, 802.3x flow control
	Bus Architecture	PCI-E 1.0a
	Data Path Width	X1, 250 MB/s, Bi-directional interface
	Data Transfer Mode	Bus-master DMA
	Hardware Certifications	FCC, B, CE, TUV- cTUVus Mark Canada and United States, TUV- GS Mark for European Union
	Power Requirement	Aux 3.3V, 3.0 Watts in 1000base-T and 2.0 Watts in 100Base-T
	Boot ROM Support	Yes
	Network Transfer Rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps
	Operating Temperature	32° to 131°F (0° to 55° C)
	Operating Humidity	85% at 131° F (55° C)
	Dimensions	12.1 x 5.7 x 2.0 cm (4.75 x 2.25 x 0.8 in)
	Operating System Driver Support	Windows 7 Professional 32-bit and 64-bit, Windows Vista Business 64, Windows Vista Business 32, Windows XP Professional, Windows XP x64. Red Hat Enterprise Linux 4 (RHEL4.8 or newer)*, Red Hat Enterprise Linux 5 (RHEL5.3 or newer), Red Hat Enterprise Linux 6, SUSE Linux Enterprise Desktop (SLED) 11 RHEL 4 and 5, SLED 10, are not supported on the Z220 CMT/SFF
	Management Capabilities	WOL , PXE, DMI, WFM 2.0
	Kit Contents	Intel Gigabit CT Desktop NIC, low profile bracket, CD containing Intel PROset II NIC drivers, quick install guide, product warranty statement
HP X520 10GbE Dual Port Adapter	**Hardware Certifications**	FCC B, UL, CE, VCCI, BSMI, CTICK, KCC
HP 10GbE SFP+ SR Transceiver	**Operating Temperature**	0°C to 45°C (32°F to 113°F)
	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)

Technical Specifications - Networking and Communications

HP 361T PCIe Dual Port Gigabit NIC	**Connector**	Two RJ-45
	Controller	Intel®Ethernet I350 Controller
	Data Rates Supported	10/100/1000 Mbps, Half- and full-duplex
	Compliance	802.3, 802.3u, 802.3x, 802.3ab, 802.3ad, 802.1p, 802.1Q, 802.3az, IEEE 1588 PCIe v2.0 standard RoHS (6 of 6) FCC (U.S. only) Class B DOC (Canada) Class B CE EN 55024, EN55022 Class B VCCI Class II UL 1950 CSA 950 EN 60950 CE ACPI 1.1a Microsoft WHQL (Windows Hardware Quality Labs)
	Bus Architecture	PCI-E 1.0a
	Data Path Width	Four lane (x4) PCI Express compatible with x4, x8, and x16 PCI Express slots
	Power Requirement	4.1W idle without EEE link partner 3.2W idle with EEE link partner 4.2W maximum
	Network Transfer Rate	10BASE-T (half-duplex) 10 Mb/s 10BASE-T (full-duplex) 20 Mb/s 100BASE-TX (half-duplex) 100 Mb/s 100BASE-TX (full-duplex) 200 Mb/s 1000BASE-T (full-duplex) 2000 Mb/s
	Operating Temperature	32° to 131°F (0° to 55° C)
	Operating Humidity	10% to 95% non-condensing
	Dimensions (H x W x D)	5.3 x 2.5 in (13.50 cm x 6.4 cm) (without brackets)
	Operating System Driver Support	Windows 7 Professional 32-bit and 64-bit. Red Hat Enterprise Linux(RHEL) WS4, 5, 6 Desktop/Workstation Novell SLED 10 & SLED 11
	Management Capabilities	WOL , PXE 2.1
	Kit Contents	HP 361T PCIe Dual Port Gigabit NIC PCA with a standard height bracket attached to it (the low profile bracket is included in the clamshell that the PCA ships in) Product Warranty statement and the Quick Install Card (QIC).

Summary of Changes

Date	Version History	Action	Description of Change
June 24, 2014	From v40 to v41	Changed	Memory tables and SATA ports availability
Sept 22, 2014	From v41 to v42	Changed	Overview OS, additional details sections. SATA and connectors, RAID sections
		Removed	Creative Recon3D card from multimedia
October 1, 2014	From v42 to v43	Changed	SATA spec from 10-port to 6-port in multiple locations, OS offerings, the AMO kit number for the media card reader
		Added	HP Z Turbo Drives & 15-in-1 media card reader
November 1, 2014	From v43 to v44	Removed	Windows 7 Ultimate 64-bit, Windows 7 Home Basic, Windows 7 Home Premium 32/64-bit
January 1, 2015	From v44 to v45	Changed	Internal USB 22-in-One MCR
		Removed	250GB, 500Gb, and 1TB SATA 10K rpm SFF HDD
April 1, 2015	From v45 to v46	Added	Preinstalled and Supported OS from Operating Systems
		Changed	Memory Notes and Speed Supported from Supported Components and System Board sections