

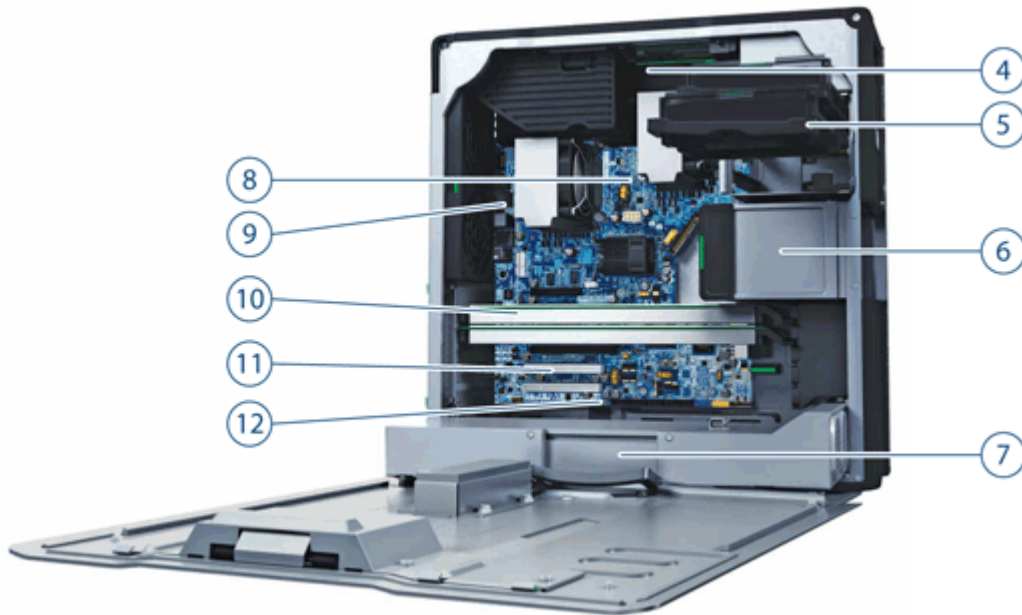
## Overview

HP recommends Windows Vista®  
Business



1. Power Button
2. 2 External 5.25" Bays
3. Front I/O: 3 USB 2.0, 1 IEEE 1394a (optional card required), Headphone, Microphone

Overview



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| <ul style="list-style-type: none"> <li>4. 6 DIMM Slots for DDR3 ECC Memory</li> <li>5. 2 Internal 3.5" Bays</li> <li>6. 2 External 5.25" Bays</li> <li>7. 650W, 85% efficient Power Supply</li> <li>8. 2 Quad Core Intel 5500 Series Processors</li> </ul> | <ul style="list-style-type: none"> <li>9. Rear I/O: 6 USB 2.0, PS/2 keyboard/mouse<br/>1 RJ-45 to Integrated Gigabit LAN<br/>1 Audio Line In, 1 Audio Line Out, 1 Microphone In</li> <li>10. 2 PCIe x16 Gen2 Slots</li> <li>11.. 1 PCIe x4 Gen2, 1 PCIe x4 Gen1, 2 PCI Slots</li> <li>12 3 Internal USB 2.0 ports</li> </ul> |
|--|--|

<b>Form Factor</b>	Minitower
<b>Compatible Operating Systems</b>	<p>Genuine Windows Vista® Business 64-bit*</p> <p>Genuine Windows Vista® Business 32-bit*</p> <p>Genuine Windows Vista® 64-bit downgrade to Genuine Microsoft® Windows® XP Professional 64-bit (expected available until August 2009)**</p> <p>Genuine Windows Vista® 32-bit downgrade to Genuine Microsoft® Windows® XP Professional 32-bit (expected available until August 2009)**</p> <p>HP Linux Installer Kit for Linux (includes drivers for both 32-bit &amp; 64-bit OS versions of Red Hat Enterprise Linux WS4 and WS5 - see: <a href="http://www.hp.com/workstations/software/linux">http://www.hp.com/workstations/software/linux</a>)</p> <p>For detailed OS/hardware support information for Linux, see: <a href="http://www.hp.com/support/linux_hardware_matrix">http://www.hp.com/support/linux_hardware_matrix</a></p> <p>*Certain Windows Vista product features require advanced or additional hardware. See <a href="http://www.microsoft.com/windowsvista/getready/hardwarereqs.msp">http://www.microsoft.com/windowsvista/getready/hardwarereqs.msp</a> and <a href="http://www.microsoft.com/windowsvista/getready/capable.msp">http://www.microsoft.com/windowsvista/getready/capable.msp</a> for details. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit <a href="http://www.windowsvista.com/upgradeadvisor">http://www.windowsvista.com/upgradeadvisor</a>.</p> <p>**Windows Vista Business disk may also be included for future upgrade if desired. To qualify for this downgrade an end user must be a business (including governmental or educational institutions) and is</p>

## Overview

<p><b>Available Processors</b></p>	<p>expected to order at least 25 customer systems with the same custom image.</p> <p>Intel® Xeon® Processor X5570 QC 2.93 GHz, 95W, 8M cache, 6.40GT/s QPI, DDR3 1333MHz, HT, Turbo          Intel Xeon Processor X5560 QC 2.80 GHz, 95W, 8M cache, 6.40GT/s QPI, DDR3 1333MHz, HT, Turbo          Intel Xeon Processor X5550 QC 2.66 GHz, 95W, 8M cache, 6.40GT/s QPI, DDR3 1333MHz, HT, Turbo          Intel Xeon Processor E5540 QC 2.53 GHz, 80W, 8M cache, 5.86GT/s QPI, DDR3 1066MHz, HT, Turbo          Intel Xeon Processor E5530 QC 2.40 GHz, 80W, 8M cache, 5.86GT/s QPI, DDR3 1066MHz, HT, Turbo          Intel Xeon Processor E5520 QC 2.26 GHz, 80W, 8M cache, 5.86GT/s QPI, DDR3 1066MHz, HT, Turbo          Intel Xeon Processor E5506 QC 2.13 GHz, 80W, 4M cache, 4.80GT/s QPI, DDR3 800MHz          Intel Xeon Processor E5504 QC 2.00 GHz, 80W, 4M cache, 4.80GT/s QPI, DDR3 800MHz</p>
<p><b>Available Processor Disclaimers</b></p>	<p>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: <a href="http://www.intel.com/products/processor_number/">http://www.intel.com/products/processor_number/</a> for details.</p> <p>Quad-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.</p> <p>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: <a href="http://www.intel.com/info/em64t">http://www.intel.com/info/em64t</a> for more information.</p> <p>Intel's numbering is not a measurement of higher performance.</p>
<p><b>Additional Details</b></p>	<ul style="list-style-type: none"> <li>● Intel® Nehalem Architecture</li> <li>● Up to 6.40GT/s QPI support</li> <li>● 3-channel 800/1066/1333 MHz DDR3 memory* subsystem</li> <li>● Up to 24 GB Memory capacity with 6 DIMM slots and 4 GB DIMMs</li> <li>● PCI Express I/O and PCIe x16 Gen2 graphics</li> <li>● Integrated Broadcom 5764 Gigabit LAN on Motherboard (LOM)</li> <li>● 6 channels of Serial ATA (SATA) 3.0 Gb/s natively supported internally</li> <li>● SATA RAID** 0, 1, 5, and 10 support standard on motherboard</li> <li>● SAS RAID 0, 1, and 10 supported using the LSI 3041E PCIe controller</li> <li>● SATA optical drives</li> <li>● High Definition integrated audio with internal speaker</li> <li>● 650W 85% efficient power supply</li> <li>● ENERGY STAR® qualification and energy-saving features available on selected configurations (Not supported by Linux)</li> <li>● 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.</li> </ul> <p>*Each processor supports up to 3 channels of DDR3 memory. To realize full performance at least 1 DIMM must be inserted into each channel. To get full 6 channel support, 2 processors MUST be installed.</p>



## Overview

	**SATA hardware RAID is not supported on Linux systems. The Linux kernel, with built-in software RAID, provides excellent functionality and performance. It is a good alternative to hardware-based RAID. Please visit <a href="http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00060684/c00060684.pdf">http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00060684/c00060684.pdf</a> for RAID capabilities with Linux.	
<b>Form Factor</b>	Rackable Minitower	
<b>Color</b>	Black/Silver	
<b>I/O Slots</b> (see system board section for more details)	<ul style="list-style-type: none"> <li>• 2 PCI Express Gen2 x16 slots (full-length, full-height)</li> <li>• 1 PCI Express Gen2 x8 slot - with x8 connectors (full-length, full-height)</li> <li>• 1 PCI Express Gen1 x8 slot - with x8 connectors (full-length, full-height)</li> <li>• 2 PCI 32bit/33MHz slot, (full-length, full-height)</li> <li>• The PCIe x8 connectors are open ended, allowing a PCIe x16 card to be seated in the slot.</li> </ul>	
<b>Bays</b> (see storage section for more details)	Total Bays = 4	
<b>Internal Bays</b>	2 internal 3.5" bays (with acoustic dampening rail assemblies)	
<b>External Bays</b>	2 external 5.25" bays (3rd & 4th HDDs occupy one external bay)	
<b>Front I/O</b>	3 USB 2.0, 1 Headphone Out, 1 Microphone In, and 1 IEEE 1394a (For front 1394a port to function, optional 1394 card must be installed.)	
<b>Rear I/O</b>	6 USB 2.0 1 RJ-45 to integrated Gigabit LAN 2 legacy PS/2 1 Audio Line In, 1 Audio Line Out, 1 Microphone In; audio ports can be retasked to function as line in, line out, microphone, or headphone. Serial supported with optional rear bulkhead adapter.	
<b>Internal USB</b>	3 USB 2.0 headers	
<b>Chassis Dimensions</b> (W x D x H)	17.5 x 6.5 x 17.3 in (44.51 x 16.53 x 44 cm)	
<b>Weight</b>	Exact weights depend upon configuration Minimum config – 33.0 lb (15.0 kg) Typical config – 37.4 lb (16.9 kg) Maximum config – 43.3 lb (19.6 kg) (Maximum shipping weight – 52.0 lb / 23.6 kg)	
<b>Temperature</b>	Operating:	40° to 95°F (5° to 35°C)
	Non-operating	-40° to 140° F (-40° to 60° C)
<b>Humidity</b>	Operating:	8% to 85%
	Non-operating	8% to 90%
<b>Maximum Altitude</b> (non-pressurized)	Operating:	10,000 feet; 3,000 m
	Non-operating	30,000 feet; 9,100 m
<b>Power Supply</b>	650W 85% (80PLUS Bronze) Efficient wide-ranging, active Power Factor Correction, with tool-free & cable-free connection	
<b>Interfaces Supported</b>	6-channel SATA 3.0 Gb/s Interface (6 Serial-ATA connectors on the motherboard, 4 channels are eSATA configurable for use with eSATA CTO/AMO Kit) SAS interface supported with optional LSI 3041E 4-port SAS/SATA PCIe card. 1 Floppy interface (1 Floppy connector), USB 2.0	
<b>Hard Drive Controllers Supported</b>	SATA and SAS controllers	

## Supported Components

### Processors

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
<b>Quad-Core Intel Xeon Processor 5500 Series with Intel® 64 Architecture</b>				
Intel Xeon X5570, 2.93GHz, 8MB cache, 1333MHz Memory, 6.40 GT/s QPI, 95W	Y	Y	NF153AA	
Intel Xeon X5560, 2.80GHz, 8MB cache, 1333MHz Memory, 6.40 GT/s QPI, 95W	Y	Y	NF152AA	
Intel Xeon X5550, 2.66GHz, 8MB cache, 1333MHz Memory, 6.40 GT/s QPI, 95W	Y	Y	NF151AA	
Intel Xeon E5540, 2.53GHz, 8MB cache, 1066MHz Memory, 5.86 GT/s QPI, 80W	Y	Y	NF150AA	
Intel Xeon E5530, 2.40GHz, 8MB cache, 1066MHz Memory, 5.86 GT/s QPI, 80W	Y	Y	NF149AA	
Intel Xeon E5520, 2.26GHz, 8MB cache, 1066MHz Memory, 5.86 GT/s QPI, 80W	Y	Y	NF148AA	
Intel Xeon E5506, 2.13GHz, 4MB cache, 800MHz Memory, 4.80 GT/s QPI, 80W	Y	Y	NF147AA	
Intel Xeon E5504, 2.00GHz, 4MB cache, 800MHz Memory, 4.80 GT/s QPI, 80W	Y	Y	NF146AA	

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

Quad-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.

## Supported Components

### Sub-Section Description/Notes

For hard drives, 1 GB = 1 billion bytes; TB = 1 trillion bytes. Actual formatted capacity is less. Up to 12 GB of hard drive (or system disk) is reserved for the system recovery software (XP and XP Pro). Up to 3 GB of system disk is reserved for system recovery software (Vista).

#### SAS Hard Drives

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
<b>HP SAS (Serial Attached SCSI) Hard Drives for HP Workstations</b>				
146 GB 15K rpm SAS 3.0 Gb/s 3.5" Hard Drive	Y	Y	EA330AA	
300 GB 15K rpm SAS 3.0 Gb/s 3.5" Hard Drive	Y	Y	EM174AA	
450 GB 15K rpm SAS 3.0 Gb/s 3.5" Hard Drive	Y	Y	FM803AA	

### Sub-Section Description/Notes

Up to 3 of the following 3.5" SATA and 3.5" 15K SAS drives, or up to 4 of the 2.5" small form factor (SFF) 10K SATA drives are allowed.  
(2.5" SFF drives cannot be mixed with 3.5" drives)

#### SATA Hard Drives

##### SATA (Serial ATA) Hard Drives for HP Workstations

160 GB 7,200 rpm SATA 3.0 Gb/s with NCQ 3.5" Hard Drive	Y	Y	PV944A	
250 GB 7,200 rpm SATA 3.0 Gb/s with NCQ 3.5" Hard Drive	Y	Y	EA788AA	
320 GB 7,200 rpm SATA 3.0 Gb/s with NCQ 3.5" Hard Drive	Y	Y	FH963AA	
500 GB 7,200 rpm SATA 3.0 Gb/s with NCQ 3.5" Hard Drive	Y	Y	PV943A	
1 TB 7,200 rpm SATA 3.0 Gb/s with NCQ 3.5" Hard Drive	Y	Y	GE262AA	
160 GB 10K rpm SATA with NCQ 2.5" Hard Drive	Y	Y	EW222AA	
300 GB 10K rpm SATA with NCQ 2.5" Hard Drive	Y	Y	FM802AA	

**NOTE:** SAS Controller, not integrated, is required)

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).

## Supported Components

Hard Drive Controllers	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
<b>Integrated SATA 3.0 Gb/s Controller</b>				
Integrated SATA 3.0 Gb/s Controller, RAID 0, 1, 10, 5 supported	Y	N		
<b>Factory integrated RAID on motherboard for SATA drives</b>				
RAID 0 Configuration - Striped Array	Y	N		See note 1
RAID 1 Configuration - Mirrored Array	Y	N		See note 1
<b>LSI 3041E 4-Port SAS 3.0 Gb/s RAID Card</b>				
LSI 3041E 4-Port SAS 3.0 Gb/s RAID Card	Y	Y	EH417AA	
<b>LSI MegaRAID® SAS 8888ELP Host Bus Adapter (HBA)</b>				
LSI 8888ELP 8-port SAS HW RAID Card	N	Y	GE258AA	
All RAID arrays must be less than 2 TB in size				

**NOTE 1:** Requires 2 identical hard drives (speeds, capacity, interface). RAID 1 does not support a 3rd HDD. No Linux support for SATA RAID.

**NOTE:** Specific user-configured hardware SAS RAID configurations are supported on this system with Linux. Please visit: [http://www.hp.com/support/linux\\_hardware\\_matrix](http://www.hp.com/support/linux_hardware_matrix) for details.

**LSI RAID Definitions:**

SATA hardware RAID is not supported on Linux systems. 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://h20000.www2.hp.com/bc/docs/support/SupportManual/c00060684/c00060684.pdf> for RAID capabilities with Linux.

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

IM: Mirroring of 2 HDDs into a single logical volume

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

**NOTE:** Specific user-configured hardware SAS RAID configurations are supported on this Linux system. Please visit: [http://www.hp.com/support/linux\\_hardware\\_matrix](http://www.hp.com/support/linux_hardware_matrix) for details

Supported Components

Graphics

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes	Supported Multi Mixed
<b>Professional 2D</b>					
NVIDIA Quadro NVS 295 256MB PCIe Graphics Card	Y	Y	FY943AA	2nd card must be NVS 450 or NVS 295	2 X
NVIDIA Quadro NVS 450 512 MB PCIe Graphics Card	Y	Y	FH519AA	2nd card must be NVS 450 or NVS 295	2 X
NVIDIA Quadro NVS 290 256 MB PCIe Graphics Card with 'DMS-59 to Dual DVI cable' included - for Workstations	N	Y	GN502AA	1 or 2 of these cards are supported - 2nd card must be NVS 290	2
<b>Entry 3D</b>					
NVIDIA Quadro FX 380 256MB PCIe Graphics Card	Y	Y	NB769AA		2
ATI FirePro V3700 256MB PCIe Graphics Card	Y	Y	FY944AA		2
NVIDIA Quadro FX 580 512MB PCIe Graphics Card	Y	Y	FY945AA		2
<b>Mid-range 3D</b>					
NVIDIA Quadro FX 1800 768MB PCIe Graphics Card	Y	Y	FY946AA		2
ATI FirePro V5700 512MB PCIe Graphics Card	Y	Y	FY947AA		2
<b>High End 3D</b>					
NVIDIA Quadro FX 3800 1.0GB PCIe Graphics Card (AVAILABLE JUNE 2009)	Y	Y	FY949AA		1
ATI FirePro V7750 1.0GB PCIe Graphics Card	Y	Y	FY948AA		1
NVIDIA Quadro FX 4800 1.5GB PCIe Graphics Card	Y	Y	FQ138AA		1
NVIDIA Quadro CX - The Accelerator for Creative Suite 4	Y	N			1



## Supported Components

### Memory

#### CTO

##### PC3-10600 DDR3-1333 ECC Unbuffered DIMMs CTO

- 1GB (1x1GB) DDR3-1333 ECC Unbuffered RAM 1-CPU
- 2GB (2x1GB) DDR3-1333 ECC Unbuffered RAM 1-CPU
- 3GB (3x1GB) DDR3-1333 ECC Unbuffered RAM 1-CPU
- 4GB (2x2GB) DDR3-1333 ECC Unbuffered RAM 1-CPU
- 6GB (3x2GB) DDR3-1333 ECC Unbuffered RAM 1-CPU
- 8GB (2x4GB) DDR3-1333 ECC Unbuffered RAM 1-CPU
- 12GB (3x4GB) DDR3-1333 ECC Unbuffered RAM 1-CPU
- 2GB (2x1GB) DDR3-1333 ECC Unbuffered RAM 2-CPU
  
- 4GB (4x1GB) DDR3-1333 ECC Unbuffered RAM 2-CPU
  
- 4GB (2x2GB) DDR3-1333 ECC Unbuffered RAM 2-CPU
  
- 6GB (6x1GB) DDR3-1333 ECC Unbuffered RAM 2-CPU
  
- 8GB (4x2GB) DDR3-1333 ECC Unbuffered RAM 2-CPU
  
- 8GB (2x4GB) DDR3-1333 ECC Unbuffered RAM 2-CPU
  
- 12GB (6x2GB) DDR3-1333 ECC Unbuffered RAM 2-CPU
  
- 16GB (4x4GB) DDR3-1333 ECC Unbuffered RAM 2-CPU
  
- 24GB (6x4GB) DDR3-1333 ECC Unbuffered RAM 2-CPU

### Support Notes

- Both processor sockets must be populated.
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#### Sub-Section Description/Notes

**NOTE:** The Z600 has a three-channel memory architecture. Three channels are associated with each processor. For optimal performance, populate a DIMM in each channel.

#### AMO

##### PC3-10600 DDR3-1333 ECC Unbuffered DIMMs AMO

- 1GB (1x1GB) DDR3-1333 ECC Unbuffered RAM
- 2GB (1x2GB) DDR3-1333 ECC Unbuffered RAM
- 4GB (1x4GB) DDR3-1333 ECC Unbuffered RAM

**NOTE:** Although all of these memory configurations incorporate 1333MHz 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	
Creative X-Fi Titanium PCIe Audio Card	Y	Y	NH222AA	

### Optical and Removable Storage

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP 16X DVD-ROM SATA Drive	Y	Y	AR629AA	See note 1
HP 16X DVD+-RW SuperMulti SATA Drive	Y	Y	AR630AA	
HP Slot Load DVD+/-RW Drive	Y	N		
HP Blu-ray Writer	Y	Y	AR482AA	
1.44 MB Diskette Drive (1 only)	Y	Y	NK360AA	
HP 22-in-1 Media Card Reader Kit (Workstations)	Y	Y	NK361AA	
<b>HP DX115 Removable Drive Enclosure</b>				
HP DX115 Carrier with 160GB SATA HDD	N	Y	FZ577AA	
HP DX115 Removable HDD Frame/Carrier	N	Y	FX576AA	
HP DX115 Removable HDD Carrier	N	Y	NB792AA	

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.

### Controller Cards

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP FireWire/IEEE 1394a PCI Card	Y	Y	PA997A	
HP IEEE 1394b FireWire PCIe Card	Y	Y	NK653AA	

## Supported Components

### Monitors

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP LP3065 30-inch Widescreen LCD Monitor	Y	Y	EZ320A	
HP DreamColor LP2480zx Professional Display	Y	Y	GV546A	
HP LP2475w 24-inch Widescreen LCD Monitor	Y	Y	KD911A	
HP LP2275w 22-inch Widescreen LCD Monitor	Y	Y	KE289A	
HP LP1965 19-inch LCD Monitor	Y	Y	RA373A	

**NOTE:** Supported by all Operating Systems available from HP (screen size diagonally measured)

### Networking and Communications

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Integrated Broadcom 5764 PCIe LOM Controller	Y	N		
Broadcom NetXtreme Gigabit Ethernet Plus NIC (PCIe)	Y	Y	FS215AA	
HP NC360T PCI Express Dual Port Gigabit NIC	N	Y	KU004AA	
Intel Gigabit CT Desktop NIC	N	Y	FH969AA	

The Broadcom NetXtreme Plus card may be used, along with the integrated 5764 LOM, for teaming, redundancy, or additional network bandwidth.

"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 Solenoid Hood Lock & Hood Sensor	Y	N		
HP (CMT) Solenoid Lock	N	Y	DE618A	
HP Z6/Z8 Adjustable Sliding Rail Rack Kit	N	Y	NN124AA	

### Supported Components

#### Input Devices

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP PS/2 Standard Keyboard	Y	Y	DT527A	
HP USB Standard Keyboard	Y	Y	DT528A	
HP PS/2 Optical Scroll Mouse	Y	Y	EY703AA	
HP USB 2-Button Optical Scroll Mouse	Y	Y	DC172B	
HP USB Laser Mouse	Y	Y	GW405AA	
HP USB Optical 3-Button Mouse	Y	Y	DY651A	
HP USB Smart Card Keyboard	N	Y	ED707AA	
HP 2.4GHz Wireless Keyboard & Mouse	N	Y	NB896AA	
HP USB Optical 3-Button 2.9M OEM Mouse	N	Y	ET424AA	
HP SpaceExplorer 3D USB Controller	N	Y	RY429AA	
HP SpacePilot 3D USB Intelligent Controller	N	Y	EF390AA	

#### 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	
HP 2nd Serial Port Adapter	N	Y	PA716A	Provides 1st Serial Port for the Z600.
HP Internal USB Port Kit	N	Y	EM165AA	
HP Workstation to LTO SAS Int. Cable	N	Y	EH925A	
HP Optical Bay HDD Mounting Bracket	Y	Y	NQ099AA	For 3.5" HDDs
HP ENERGY STAR 5.0 Enabled Configuration	Y	N		

## Supported Components

### Software

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Performance Tuning Framework	Y	N		
Roxio Easy Media Creator (CD or DVD burner)	Y	N		
Intervideo WinDVD with DVD player	Y	N		
HP Backup and Recovery	Y	N		Supported on Windows XP ONLY
PDF Complete	Y	N		
Microsoft Office 2007 Small Business Edition	Y	N		
Microsoft Office 2007 Trial Edition	Y	N		
HP Client Manager Software v6.2 (optional download)	Y	N		
HP ProtectTools Security	Y	N		Must select as a Configure to Order Option. Delivered as a "Drop in the Box" CD

### Operating Systems

### Support Notes

Genuine Windows Vista® Business 32-bit	Certain Windows Vista product features require advanced or additional hardware. See <a href="http://www.microsoft.com/windowsvista/getready/hardwarereqs.mspx">www.microsoft.com/windowsvista/getready/hardwarereqs.mspx</a> and <a href="http://www.microsoft.com/windowsvista/getready/capable.mspx">www.microsoft.com/windowsvista/getready/capable.mspx</a> for details. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit <a href="http://www.windowsvista.com/upgradeadvisor">www.windowsvista.com/upgradeadvisor</a> .
Genuine Windows Vista® Business 64-bit	Certain Windows Vista product features require advanced or additional hardware. See <a href="http://www.microsoft.com/windowsvista/getready/hardwarereqs.mspx">www.microsoft.com/windowsvista/getready/hardwarereqs.mspx</a> and <a href="http://www.microsoft.com/windowsvista/getready/capable.mspx">www.microsoft.com/windowsvista/getready/capable.mspx</a> for details. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit <a href="http://www.windowsvista.com/upgradeadvisor">www.windowsvista.com/upgradeadvisor</a> .
Genuine Windows Vista® Business 32-bit with downgrade to Windows® XP Professional 32-bit custom installed	Windows Vista Business disk may also be included for future upgrade if desired. To qualify for this downgrade an end user must be a business (including governmental or educational institutions) and is expected to order at least 25 customer systems with the same custom image.
Genuine Windows Vista® Business 64-bit with downgrade to Windows® XP Professional x64 custom installed	Windows Vista Business disk may also be included for future upgrade if desired. To qualify for this downgrade an end user must be a business (including governmental or educational institutions) and is expected to order at least 25 customer systems with the same custom image.
HP Linux Installer Kit	see: <a href="http://www.hp.com/workstations/software/linux">http://www.hp.com/workstations/software/linux</a>

## System Technical Specifications

System Board																																																																																																																	
System Board Form Factor	14.2 x 11 inches																																																																																																																
Processor Socket	Dual LGA 1366																																																																																																																
CPU Bus Speed	QPI: Up to 6.4GT/second, depending on processor																																																																																																																
Chipset	Intel® 5520																																																																																																																
Super I/O Controller	SMSC SCH5327, Rev B																																																																																																																
Memory Expansion Slots	6 (3 per processor)																																																																																																																
Memory Type Supported	DDR3, UDIMM (Unbuffered), ECC																																																																																																																
Memory Modes	NUMA (Non-Uniform Memory Architecture), Memory Node Interleave																																																																																																																
Memory Speed Supported	800, 1066, & 1333MHz																																																																																																																
<b>Memory</b>																																																																																																																	
Maximum Memory	Supports up to 24GB																																																																																																																
	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="7">Dual Processor</th> </tr> <tr> <th rowspan="2">Capacity</th> <th colspan="3">CPU0</th> <th colspan="3">CPU1</th> </tr> <tr> <th>DDMM1</th> <th>DDMM2</th> <th>DDMM3</th> <th>DDMM1</th> <th>DDMM2</th> <th>DDMM3</th> </tr> </thead> <tbody> <tr> <td>2GB</td> <td>1GB</td> <td></td> <td></td> <td>1GB</td> <td></td> <td></td> </tr> <tr> <td>4GB</td> <td>1GB</td> <td>1GB</td> <td></td> <td>1GB</td> <td>1GB</td> <td></td> </tr> <tr> <td>4GB</td> <td>2GB</td> <td></td> <td></td> <td>2GB</td> <td></td> <td></td> </tr> <tr> <td>6GB</td> <td>1GB</td> <td>1GB</td> <td>1GB</td> <td>1GB</td> <td>1GB</td> <td>1GB</td> </tr> <tr> <td>8GB</td> <td>2GB</td> <td>2GB</td> <td></td> <td>2GB</td> <td>2GB</td> <td></td> </tr> <tr> <td>12GB</td> <td>2GB</td> <td>2GB</td> <td>2GB</td> <td>2GB</td> <td>2GB</td> <td>2GB</td> </tr> <tr> <td>16GB</td> <td>4GB</td> <td>4GB</td> <td></td> <td>4GB</td> <td>4GB</td> <td></td> </tr> <tr> <td>24GB</td> <td>4GB</td> <td>4GB</td> <td>4GB</td> <td>4GB</td> <td>4GB</td> <td>4GB</td> </tr> </tbody> </table> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="4">Single Processor - CPU0</th> </tr> <tr> <th>Capacity</th> <th>DDMM1</th> <th>DDMM2</th> <th>DDMM3</th> </tr> </thead> <tbody> <tr> <td>1GB</td> <td>1GB</td> <td></td> <td></td> </tr> <tr> <td>2GB</td> <td>1GB</td> <td>1GB</td> <td></td> </tr> <tr> <td>3GB</td> <td>1GB</td> <td>1GB</td> <td>1GB</td> </tr> <tr> <td>4GB</td> <td>2GB</td> <td>2GB</td> <td></td> </tr> <tr> <td>6GB</td> <td>2GB</td> <td>2GB</td> <td>2GB</td> </tr> <tr> <td>8GB</td> <td>4GB</td> <td>4GB</td> <td></td> </tr> <tr> <td>12GB</td> <td>4GB</td> <td>4GB</td> <td>4GB</td> </tr> </tbody> </table>	Dual Processor							Capacity	CPU0			CPU1			DDMM1	DDMM2	DDMM3	DDMM1	DDMM2	DDMM3	2GB	1GB			1GB			4GB	1GB	1GB		1GB	1GB		4GB	2GB			2GB			6GB	1GB	1GB	1GB	1GB	1GB	1GB	8GB	2GB	2GB		2GB	2GB		12GB	2GB	2GB	2GB	2GB	2GB	2GB	16GB	4GB	4GB		4GB	4GB		24GB	4GB	4GB	4GB	4GB	4GB	4GB	Single Processor - CPU0				Capacity	DDMM1	DDMM2	DDMM3	1GB	1GB			2GB	1GB	1GB		3GB	1GB	1GB	1GB	4GB	2GB	2GB		6GB	2GB	2GB	2GB	8GB	4GB	4GB		12GB	4GB	4GB	4GB
Dual Processor																																																																																																																	
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12GB	4GB	4GB	4GB																																																																																																														
Memory Configuration (Supported)	<ul style="list-style-type: none"> <li>Not all memory configurations possible are represented below.</li> <li>Only ECC DIMMs are supported.</li> <li>Do not install memory modules into memory slots if corresponding processor is not installed.</li> <li>Dual processor configurations with memory modules installed for only one processor is not supported.</li> <li>The 4GB DIMM for Z400 and Z600 is not compatible with the Z800 4GB DIMM. They are not interchangeable.</li> </ul>																																																																																																																
PCI Express Connectors (Gen2 Rev 0.7 connectors)	2 PCI Express x16 Gen2 graphics 1 PCI Express Gen2 (x8 mechanically, x4 electrically) 1 PCI Express Gen1 (x8 mechanically, x4 electrically)																																																																																																																
PCI Connectors (5.0V)	2 full length 33 MHz 32-Bit																																																																																																																
Interfaces Supported	SATA Integrated 6-channel SATA 3.0Gb/sec controller with RAID 0, 1, 5, 10 and NCQ. (Factory integrated RAID is Microsoft Windows only)																																																																																																																
Serial Attached SCSI	Requires Optional PCIe card																																																																																																																
Integrated RAID	<ul style="list-style-type: none"> <li>Integrated SATA RAID</li> </ul>																																																																																																																



## System Technical Specifications

	<ul style="list-style-type: none"> <li>• RAID 0, RAID 1*, RAID 5, RAID 10</li> <li>• Supports one RAID array with 2-4 drives</li> <li>• RAID 0 configuration - striped array (supported and configure to order)</li> <li>• RAID 1 configuration - mirrored array (supported and configure to order)</li> <li>• RAID 5 parity striping (supported but not configure to order)</li> <li>• RAID 10 striped and mirrored array (supported but not configure to order)</li> </ul> <p><b>NOTES:</b> *HW RAID functionality not supported by Linux. Use SW RAID functionality provided in the Red Hat Operating system instead.</p>	
<b>Integrated Graphics</b>	No	
<b>Network Controller</b>	<p>Controller Broadcom 5764 PCI-E LAN Controller          Memory Integrated 48KB receive buffer and 8KB transmit buffer          Data rates supported 10/100/1000 Mbps          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 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          Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP Professional 32 and 64          Management capabilities WOL, PXE 2.1 and ASF 2.0</p>	
<b>SATA Connectors</b>	6 ports/connectors (Include 4 are eSATA configurable with optional eSATA After-Market Option cable kit)	
<b>IEEE 1394a or 1394b</b>	<p>No integrated 1394a - optional PCI card required.          No integrated 1394b - optional PCIe card required.          Cable from Front IO can be plugged into PCI Card.          Not supported in Linux</p>	
<b>IEEE 1394 Connector(s)</b>	<b>Front</b>	1 IEEE 1394a (requires optional PCI card to function)
	<b>Rear</b>	No
	<b>Internal</b>	No
<b>USB Connector(s)</b>	<b>Front</b>	3 on header for front
	<b>Rear</b>	6
	<b>Internal</b>	3
<b>Audio</b>	High Definition Integrated Realtek ALC262 Audio with Line in, Line Out, Microphone, Headphone	
<b>CD-ROM input/Audio</b>	No	
<b>AUX INPUT; Audio</b>	Yes	
<b>IEEE 1394 Connector(s)</b>	<b>Front</b>	1 IEEE 1394a (requires optional PCI card to function)
	<b>Rear</b>	No
	<b>Internal</b>	No

## System Technical Specifications

USB Connector(s)	Front	3 on header for front
	Rear	6
	Internal	3
HD Integrated Audio	High Definition Integrated Realtek ALC262 Audio with Line in, Line Out, Microphone, Headphone Line-in, Line-out, Mic-in x2, and Headphone jacks	
Flash ROM	Yes	
Clear Fan Header	No	
CPU Fan Header	One for each CPU socket	
Chassis Fan Header	2 Rear System Chassis Fan Header 1 Optional Front Chassis Fan Header	
Front PCI Fan Header	Yes	
Front Control Panel/Speaker Header	Yes	
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	
Clear Password Jumper	Yes	
Serial Port	Optional	
Parallel Port	No	
Keyboard/Mouse	PS/2	
Power Supply	650 watt 85% efficient custom power supply (Wide Ranging, Active PFC)	
Operating Voltage Range	90-269 VAC	
Rated Voltage Range	100 - 240 VAC 118 VAC	
Rated Line Frequency	50/60Hz 400Hz	
Operating Line Frequency Range	47-66Hz 393-407 Hz	
Rated Input Current	10 A @ 100-127 VAC; 6 A @ 200-240 VAC 10 A @ 118 VAC	
Heat Dissipation	Typical = 434 btu/hr (109 kg-cal/hr) Maximum = 964 btu/hr (243 kg-cal/hr)	
Power Supply Fan	92x25 mm variable speed	
ENERGY STAR® qualified (Config Dependent)	Yes	
80 PLUS Compliant	Yes	



## System Technical Specifications

FEMP Standby Power Compliant 115V (Wake-on LAN disabled) (<2W in S5 - Power Off)	Yes
Power consumption in sleep mode (as defined by ENERGY STAR) - Suspend to RAM (S3)	<5W
Built-in Self Test (BIST) LED	Yes
Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)	Withstands power surges up to 2000V
Hood Lock Header	Yes
Hood Sensor Header	Yes Integrated in Front Control Panel Cable
Multibay Header	No
Integrated Gigabit Ethernet	Integrated Broadcom 5764 Gigabit Ethernet LOM
Wake on LAN	Yes
ASF 1.0/2.0 (Alert Standard Format)	Yes
TPM	Integrated TPM 1.2; Infineon
Password Clear Header	Yes
CD-ROM ; analog audio cable	No
AUX ; analog audio in	No
Clear CMOS Button	Yes
Chassis Speaker Header	Yes (Integrated in Front Control Panel Cable)
ENERGY STAR® qualified (Config Dependent)	Yes

## System Technical Specifications

Z600 Required Power Supply Info		
Power Supply	650 watt custom power supply - (Wide Ranging Active PFC)	
Operating Voltage Range	90 - 269 VAC	
Rated Voltage Range	100 - 240 VAC	118 VAC
Rated Line Frequency	50-60 Hz	400 Hz
Operating Line Frequency Range	47 - 66 Hz	393 - 407 Hz
Rated Input Current	10 A @ 110-127 VAC 6 A @ 200-240 VAC	10 A @118 VAC
Heat Dissipation (Configuration and software dependent)	Typical 1578 btu/hr (397.7 kg-cal/hr) Maximum 2705 btu/hr (681.8 kg-cal/hr)	
Power Supply Fan	2x60x25 mm variable speed (sleeve-bearing)fans	
Energy Star Compliant (config dependent)	YES	
80 PLUS® Compliant	Yes, Bronze	
FEMP Standby Power Compliant@115V (Wake-on LAN disabled)(<2W in S5-Power Off)	YES	
EuP Compliant@230V (<1 W in S5-Power Off)	YES	
Power Consumption in sleep mode (as defined by ENERGY STAR) - Suspend to RAM (S3) (Instantly Available PC) measured at 115V.	<9W	
Built-in Self Test LED	YES	
Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)	YES	

## System Technical Specifications

### System Configuration

**Example Configuration #1**

Processor Info 1x Intel Xeon E5506  
 Memory Info 1x1 GB DDR3 1333 (UDIMM)  
 Graphics Info NVS290  
 Disks/Optical/Floppy 1x1 60GB SATA / 0 Optical / 0 Floppy  
 PSU 650W 80PLUS® BRONZE

### Energy Consumption

	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	62.2 W		61.8 W		63.1 W	
Windows Busy Typ (S0)	117.9 W		114.9 W		118.2 W	
Windows Busy Max (S0)	156.9 W		155.1 W		157.5 W	
Sleep (S3)	3.71 W	3.47 W	4.05 W	3.84 W	3.69 W	3.44 W
Off (S5)	1.14 W	1.32 W	1.45 W	1.32 W	1.12 W	0.99 W
Zero Power Mode (EuP)	0.24 W		0.52 W		0.29 W	

### Heat Dissipation\*\*

	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	212.4 btu/hr		210.8 btu/hr		215.2 btu/hr	
Windows Busy Typ (S0)	402.3 btu/hr		392.0 btu/hr		403.4 btu/hr	
Windows Busy Max (S0)	535.6 btu/hr		529.3 btu/hr		538.1 btu/hr	
Sleep (S3)	12.7 btu/hr	11.8 btu/hr	13.8 btu/hr	13.1 btu/hr	12.6 btu/hr	11.7 btu/hr
Off (S5)	3.9 btu/hr	4.5 btu/hr	4.9 btu/hr	4.5 btu/hr	3.8 btu/hr	3.4 btu/hr
Zero Power Mode (EuP)	0.8 btu/hr		1.77 btu/hr		0.7 btu/hr	

**Example Configuration #2**

Processor Info 2 x Intel Xeon E5506  
 Memory Info 2x1 GB DDR3 1333MHz (UDIMM)  
 Graphics Info 1xFX580  
 Disks/Optical/Floppy 1x250GB SATA / 0 Optical / 0 Floppy  
 PSU 650W 80PLUS® BRONZE

### Energy Consumption

	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	89.2 W		87.8 W		90.0 W	
Windows Busy Typ (S0)	294.1 W		287.8 W		294.9 W	
Windows Busy Max (S0)	313.5 W		307.3 W		317.0 W	
Sleep (S3)	5.08 W	4.84 W	5.43 W	5.25 W	5.05 W	4.82 W
Off (S5)	1.14 W	1.01 W	1.45 W	1.32 W	1.12 W	0.99 W
Zero Power Mode (EuP)	0.24 W		0.52 W		0.22 W	

### Heat Dissipation\*\*

	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	304.5 btu/hr		299.5 btu/hr		307 btu/hr	
Windows Busy Typ (S0)	1003.8 btu/hr		982.3 btu/hr		1006.5 btu/hr	
Windows Busy Max (S0)	1070 btu/hr		1048.8 btu/hr		1081.9 btu/hr	
Sleep (S3)	17.3 btu/hr	16.5 btu/hr	18.5 btu/hr	17.9 btu/hr	17.2 btu/hr	16.5 btu/hr



## System Technical Specifications

Off (S5)	3.9 btu/hr	3.5 btu/hr	5.0 btu/hr	4.5 btu/hr	3.8 btu/hr	3.38 btu/hr
Zero Power Mode (EuP)	0.8 btu/hr		1.8 btu/hr		0.8 btu/hr	

**Example Configuration #3**

Processor Info: 2x Intel Xeon X5570  
 Memory Info: 6x2GB DDR3 1333MHz (UDIMM)  
 Graphics Info: 1 x FX4800  
 Disks/Optical/Floppy: 2x1000GB SATA / 1 Optical / 1 Floppy  
 PSU: 1xBroadcom 5761 Gigabit PCIe NIC  
 650W 80PLUS® BRONZE

**Energy Consumption**

	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	123.3 W		119.9 W		123.6 W	
Windows Busy Typ(S0)	455.7 W		443.0 W		462.3 W	
Windows Busy Max (S0)	564.8 W		554.4 W		570.7 W	
Sleep (S3)	7.0 W	6.28 W	7.2 W	6.61 W	7.0 W	6.27 W
Off (S5)	1.6 W	0.90W	1.9 W	1.21W	1.6 W	0.88 W
Zero Power Mode (EuP)	0.24 W		0.51 W		0.22 W	

**Heat Dissipation\*\***

	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	420.8 btu/hr		409.2 btu/hr		421.8 btu/hr	
Windows Busy Typ(S0)	1555.3 btu/hr		1512.0 btu/hr		1577.8 btu/hr	
Windows Busy Max (S0)	1927.7 btu/hr		1892.2 btu/hr		1947.8 btu/hr	
Sleep (S3)	23.9 btu/hr	21.4 btu/hr	24.6 btu/hr	22.6 btu/hr	23.9 btu/hr	21.4 btu/hr
Off (S5)	5.5 btu/hr	3.1 btu/hr	6.5 btu/hr	4.1 btu/hr	5.5 btu/hr	3.0 btu/hr
Zero Power Mode (EuP)	0.8 btu/hr		1.7 btu/hr		0.8 btu/hr	

## System Technical Specifications

**Example Configuration #4 (ENERGY STAR Qualified)**

Processor Info	2x Intel Xeon X5570
Memory Info	6x2GB DDR3 1333MHz (UDIMM)
Graphics Info	1 x FX4800
Disks/Optical/Floppy I/O	2x1000GB SATA / 1 Optical / 1 Floppy
PSU	1xBroadcom 5761 Gigabit PCIe NIC 650W 80PLUS® BRONZE

### Energy Consumption

	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
<i>On-Idle (ENERGY STAR® Idle (S0))</i>	123.3 W		119.9 W		123.6 W	
<i>ENERGY STAR® P<sub>MAX</sub></i> <small>Windows running Linpack and Vneperft</small>	455.7 W		443.0 W		462.3 W	
<i>ENERGY STAR® "Sleep" (S3)</i>	7.0 W	-	7.2 W	-	7.0 W	-
<i>ENERGY STAR® "Standby" (Off) (S5)</i>	1.6 W	-	1.9 W	-	1.6 W	-

### Heat Dissipation\*\*

	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
<i>On-Idle (ENERGY STAR® Idle (S0))</i>	420.8 btu/hr		409.2 btu/hr		421.8 btu/hr	
<i>ENERGY STAR® P<sub>MAX</sub></i> <small>Windows running Linpack and Vneperft</small>	1555.3 btu/hr		1512.0 btu/hr		1577.8 btu/hr	
<i>ENERGY STAR® "Sleep" (S3)</i>	23.9 btu/hr	-	24.6 btu/hr	-	23.9 btu/hr	-
<i>ENERGY STAR® "Standby" (Off) (S5)</i>	5.5 btu/hr	-	6.5 btu/hr	-	5.5 btu/hr	-

**NOTES:**

\* Energy Star low energy mode

\*\* Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

This product is in compliance with US executive order 13221, WOL (wake on LAN) disabled.

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

Declared Noise Emissions (Entry-level and High-end configurations)		
System Configuration (Entry level)	Processor Info	Dual Intel Xeon X5570 2.93Ghz processors
	Memory Info	4 x 1GB 1333Mhz
	Graphics Info	nVidia Quadro NVS 295
	Disks/Optical/Floppy	2x 250GB 7200 rpm SATA / 1 DVD-ROM/ 1 Floppy



## System Technical Specifications

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		Sound Power ( LWAd, bels )	Deskside Sound Pressure
	Idle	4.1	24
	SATA Hard drive Operating (random reads)	4.2	26
	Floppy Drive Operating (continuous copy)	4.8	33
	DVD-ROM Operating (sequential reads)	5.1	36

System Configuration (High-end)	Processor Info	Dual Intel Xeon X5570 2.93GHz processors
	Memory Info	6 x 2GB 1333 Mhz
	Graphics Info	nVidia FX4800
	Disks/Optical/Floppy	2x300GB 15k SAS / 1 DVD-ROM/ 1 Floppy

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		Sound Power ( LWAd, bels )	Deskside Sound Pressure
	Idle	4.7	28
	SATA Hard drive Operating (random reads)	4.9	31
	Floppy Drive Operating (continuous copy)	5.1	36
	DVD-ROM Operating (sequential reads)	5.3	30

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

## System Technical Specifications

Physical Security and Serviceability	
Access Panel	Tool-less Includes system board and memory information
Optical Drive	Tool-less
Floppy Drive	Tool-less
Hard Drives	Tool-less
Expansion Cards	Tool-less
Processor Socket	Tool-less
Green User Touch Points	Yes, on tool-free internal chassis components
Color-coordinated Cables and Connectors	Yes
Memory	Tool-less
System Board	Tool-less
Dual Color Power and HD LED on Front of Computer	Yes
Configuration Record SW	Yes
Over-Temp Warning on Screen	Yes
Restore CD Set	Restores the computer to its original factory shipping image - Can be obtained via HP Support
Dual Function Front Power Switch	Yes, causes a fail-safe power off when held for 4 seconds
Padlock Support	Yes (optional): Locks side cover and secures chassis from theft 0.22-in diameter padlock loop at rear of system
Cable Lock Support	Yes, Kensington Cable Lock (optional): Locks side cover and secures chassis from theft 3 mm x 7 mm slot at rear of system
Universal Chassis Clamp Lock Support	Yes (optional): Locks side cover and locks cables to chassis. Secures chassis from theft and allows multiple units to be chained together when used with optional cable Threaded feature at rear of system
Solenoid Lock and Hood Sensor	Yes (optional) The Solenoid Hood Lock eliminates the need for a physical key by making the chassis lockable through software and a password. You can also lock and unlock the chassis remotely over the network. The Sensor Kit detects when the access panel has been removed
Rear Port Control Cover	Yes, locks rear IO cables to prevent cable theft
Serial, Parallel, USB, Audio, Network, Enable/Disable Port Control	Yes, enables or disables serial, USB, audio, and network ports
Removable Media Write/Boot Control	Yes, prevents ability to boot from removable media on supported devices (and can disable writes to media)
Power-On Password	Yes, prevents an unauthorized person from booting up the workstation
Setup Password	Yes, prevents an unauthorized person from changing the workstation configuration
3.3V Aux Power LED on System PCA	Yes

## System Technical Specifications

NIC LEDs (integrated) (Green & Amber)	Yes
CPUs and Heatsinks	A T-15 Torx or flat blade screwdriver is needed to remove the CPU heatsink before the CPU can be removed. CPU removal is tool-less
Power supply diagnostic LED	Yes
Power Button	Yes, ACPI multi-function
Power LED	Yes, blue (normal), red (fault)
Hard drive activity LED	Yes, green
Internal speaker	Yes
System/Emergency ROM Flash Recovery	Recovers corrupted system BIOS.
OS CD (Restore OS CD)	Restores computer to its original factory shipping Operating System - No recovery CDs will ship with Windows XP, Vista or Linux - an ISO image will be available on an HD partition.
ASF 2.0 support (Alert Standard Format)	Industry-standard specification for network alerting in operating system-absent environments
Cooling Solutions	Air cooled forced convection
Power Supply Fans	2x -- 60mm x 25mm
CPU Heatsink Fan(s)	80mm x 15mm
Chassis Fans	Rear: 2x -- 92mm x 25mm Front: 80mm x 25mm
Memory Fans	80mm x 25mm
Insight Diagnostics	<p><b>HP Insight Diagnostics Offline Edition</b></p> <p>The diagnostics utility enables you to perform testing and to view critical computer hardware and software configuration information from various sources. This utility enables you to:</p> <ul style="list-style-type: none"> <li>• Run diagnostics</li> <li>• View the hardware configuration of the system</li> </ul> <p><b>Key features and benefits</b></p> <p>HP Insight 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 insight into potential system issues, is the configuration of the system. Insight Diagnostics helps provide higher system availability. Typical uses of the Insight Diagnostics are:</p> <ul style="list-style-type: none"> <li>• Testing and diagnosing apparent hardware failures</li> <li>• Documenting system configurations for upgrade planning, standardization, inventory tracking, disaster recovery, and maintenance</li> <li>• Sending configuration information to another location for more in-depth analysis</li> </ul>
Access Panel Key Lock	Yes, prevents removal of the access panel and all internal components including optical and floppy drives



## System Technical Specifications

ACPI-Ready Hardware	Advanced Configuration and Power Management Interface (ACPI). <ul style="list-style-type: none"> <li>Allows the system to wake from a low power mode.</li> <li>Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system</li> </ul>
Trusted Platform Module Chip with optional ProtectTools Software	Yes, Infineon SLB9635TT1.2
Integrated Chassis Handles	Yes
Power Supply	Tool-less, direct-connect (blind-mate)
PCI Card Retention	Yes, rear (all), middle (full-height cards), front (full-length with extender cards)
Flash ROM	SPI ROM
Diagnostic Power Switch LED on board	Yes
Clear Password Jumper	Yes
Clear CMOS Button	Yes
CMOS Battery Holder for easy Replacement	Yes
DIMM Connectors for easy Upgrade	Yes
HP ProtectTools Security Manager	Yes - Not supported on Microsoft XP x64 or Linux

<b>BIOS</b>	
BIOS 32-bit Services	Standard BIOS 32-Bit Service Directory Proposal v0.4
PCI 3.0 Support	Full BIOS support for PCI Express through industry standard interfaces
ATAPI	ATAPI Removable Media Device BIOS Specification Version 1.0
BBS	BIOS Boot Specification v1.01
WMI Support	WMI is Microsoft's implementation of Web-Based Enterprise Management (WBEM) for Windows. WMI is fully compliant with the Distributed Management Task Force (DMTF) Common Information Model (CIM) and WBEM specifications.
BIOS Boot Spec 1.01 +	Provides more control over how and from what devices the workstation will boot.
BIOS Power On	Users can define a specific date and time for the system to power on
ROM Based Computer Setup Utility (F10)	Review and customize system configuration settings controlled by the BIOS
System/Emergency ROM Flash Recovery with Video	Recovers system BIOS in corrupted Flash ROM
Replicated Setup	Saves BIOS settings to 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 2.5, previously known as DMI BIOS, 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



## System Technical Specifications

<b>Thermal Alert</b>	Monitors the temperature state within the chassis. Three modes: <ul style="list-style-type: none"> <li>● NORMAL - normal temperature ranges</li> <li>● ALERTED - excessive temperatures are detected. Raises a flag so action can be taken to avoid shutdown or provide for a smoother system shutdown</li> <li>● SHUTDOWN - excessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs</li> </ul>
<b>Remote ROM Flash</b>	Provides secure, fail-safe ROM image management from a central network console
<b>ACPI (Advanced Configuration and Power Management Interface)</b>	<ul style="list-style-type: none"> <li>● Allows the system to enter and resume from low power modes (sleep states).]</li> <li>● Enables an operating system to control system power consumption based on the dynamic workload.</li> <li>● Makes it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system.</li> <li>● Supports ACPI 2.0 for full compatibility with 64-bit operating systems.</li> </ul>
<b>Ownership Tag</b>	A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen
<b>Remote Wakeup/Remote Shutdown</b>	System administrators can power on, restart, and power off a client computer from a remote location
<b>ASF 2.0 Compliant</b>	Allows workstation status to be monitored on a remote console
<b>Instantly Available PC (Suspend to RAM - ACPI sleep state S3)</b>	Allows for very low power consumption with quick resume time
<b>Remote System Installation via F12 (PXE 2.1) (Remote Boot from Server)</b>	Allows a new or existing system to boot over the network and download software, including the operating system
<b>ROM revision levels</b>	Reports the system BIOS revision level in Computer Configuration Utility (F10 Setup). Version is available through an industry standard interface (SMBIOS) so that management SW applications can use and report this information.
<b>System board revision level</b>	<ul style="list-style-type: none"> <li>● Allows management SW to read the revision level of the system board</li> <li>● Revision level is digitally encoded into the HW and cannot be modified.</li> </ul>
<b>Start-up Diagnostics (Power-on Self-Test)</b>	Assesses system health at boot time with selectable levels of testing
<b>Auto Setup when new hardware installed</b>	System automatically detects the addition of new hardware
<b>Keyboard-less Operation</b>	The system can be booted without a keyboard
<b>Localized ROM Setup</b>	Common BIOS image supports System Configuration Utility (F10 Setup) menus in 12 languages with local keyboard mappings
<b>Asset Tag</b>	Allows the user or MIS to set a unique tag string in non-volatile memory
<b>Per-slot Control</b>	Allows I/O slot parameters (option ROM enable/disable, bus latency) to be configured individually
<b>Adaptive Cooling</b>	Fan control parameters are set according to detected hardware configuration for optimal acoustics
<b>Pre-boot Diagnostics</b>	Early (pre-video) critical errors are reported via beeps and blinks on the power LED
<b>Industry Standard Specification Support</b>	
<b>Industry Standard</b>	Revision Supported by the BIOS
<b>ACPI</b>	Advanced Configuration and Power Management Interface, Version 2.0
<b>ASF</b>	Alert Standard Format Specification, Version 2.0

## System Technical Specifications

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	<ul style="list-style-type: none"> <li>Enhanced Disk Drive Specification Version 1.1</li> <li>BIOS Enhanced Disk Drive Specification Version 3.0</li> </ul>
EHCI	Enhanced Host Controller Interface for Universal Serial Bus, Revision 1.0
PCI	<ul style="list-style-type: none"> <li>PCI Local Bus Specification, Revision 2.3</li> <li>PCI Power Management Specification, Revision 1.1</li> <li>PCI Firmware Specification, Revision 3.0, Draft 0.7</li> </ul>
PCI Express	PCI Express Base Specification, Revision 2.0
PMM	POST Memory Manager Specification, Version 1.01
SATA	<ul style="list-style-type: none"> <li>Serial ATA Specification, Revision 1.0a</li> <li>Serial ATA 3.0Gb/s: Extensions to Serial ATA 1.5Gb/s, Revision 1.0</li> </ul>
SPD	PC SDRAM Serial Presence Detect (SPD) Specification, Revision 1.2B
TPM	Trusted Computing Group TPM Specification Version 1.2
UHCI	Universal Host Controller Interface Design Guide, Revision 1.1
USB 1.1	Universal Serial Bus Revision 1.1 Specification
USB 2.0	Universal Serial Bus Revision 2.0 Specification
SMBIOS	System Management BIOS Reference Specification, Version 2.6

## System Software Management and Updating

HP Client Management Solutions	Visit: <a href="http://www.hp.com/go/easydeploy">http://www.hp.com/go/easydeploy</a>
Product Change	<ul style="list-style-type: none"> <li>Program to proactively communicate Product Change Notifications (PCNs) and Customer Advisories by email to customers, based on a user-defined profile.</li> <li>PCNs provide advance notification of hardware and software changes to be implemented in the factory providing time to plan for transition.</li> <li>Customer Advisories provide concise, effective problem resolution, greatly reducing the need to call technical support.</li> </ul>
Support Software CD & WWW	Yes
HP Client Manager	Visit: <a href="http://www.hp.com/go/easydeploy">http://www.hp.com/go/easydeploy</a>
System Software Manager (free)	Visit: <a href="http://www.hp.com/go/ssm">http://www.hp.com/go/ssm</a>
Social and Environmental Responsibility	
Eco-Label Certifications & Declarations	<p>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:</p> <ul style="list-style-type: none"> <li>ENERGY STAR (Configuration dependent, Microsoft Windows only)</li> <li>US Federal Energy Management Program (FEMP)</li> <li>China Energy Conservation Program</li> <li>IT ECO declaration</li> <li>Japan PC Green label*</li> </ul> <p>*This product conforms to the examination standards (2003 version) under JEITA's 'PC Green Label System.'</p>

## System Technical Specifications

<b>Batteries</b>	<p>This product complies with ISO standards:</p> <ul style="list-style-type: none"><li>• EU Directive 91/ 157/ EEC</li><li>• EU Directive 93/ 86/ EEC</li><li>• EU Directive 98/ 101/ EEC</li></ul> <p>Batteries used in the product do not contain:</p> <ul style="list-style-type: none"><li>• Mercury greater than 5ppm by weight</li><li>• Cadmium greater than 10ppm by weight</li><li>• Lead greater than 4000ppm by weight</li></ul> <p>Battery size: CR2032 (coin cell) Battery type: Lithium</p>
<b>Restricted Material Usage</b>	<p>This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html">http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html</a>):</p> <ul style="list-style-type: none"><li>• Asbestos</li><li>• Batteries - Mercury</li><li>• Batteries - Cadmium</li><li>• Batteries - Lead (non-rechargeable)</li><li>• Batteries - Non-rechargeable Alkaline and Carbon-Zinc Batteries</li><li>• Batteries - Classification as "Not Restricted" for Transport</li><li>• Brominated Flame Retardants (PBBs, PBDEs, including DecaBDE)</li><li>• Brominated Flame Retardants (all BFRs in external case plastic parts)</li><li>• Cadmium and its compounds</li><li>• Certain Azo Colorants</li><li>• Chlorinated Hydrocarbons</li><li>• Chlorinated Paraffins</li><li>• Formaldehyde</li><li>• Formaldehyde - emissions</li><li>• Hexavalent Chromium and its compounds in metallic applications</li><li>• Hexavalent Chromium and its compounds in non-metallic applications</li><li>• Lead and its compounds</li><li>• Lead in paint</li><li>• Lead in Polyvinyl Chloride (PVC) coating of external cables, wires and cords</li><li>• Mercury and its compounds</li><li>• Nickel on external surfaces</li><li>• Ozone Depleting Substances (ODS)</li><li>• Polycyclic Aromatic Hydrocarbons (PAH)</li><li>• Perfluorooctane sulfonates (PFOS) in parts</li><li>• Perfluorooctane sulfonates (PFOS) in preparations</li><li>• Polychlorinated Biphenyls (PCBs) and Polychlorinated Terphenyls (PCTs)</li><li>• Polychlorinated Naphthalenes</li><li>• Polyvinyl Chloride (PVC) in external case plastic parts</li><li>• Radioactive Substances</li><li>• Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)</li></ul>
<b>Packaging</b>	<p>HP Workstation product packaging meets the following (refer to the HP General Specification for the Environment at <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html">http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html</a>):</p>



## System Technical Specifications

	<ul style="list-style-type: none"> <li>• Does not contain restricted substances listed in HP Standard 011-1 General Specification for the Environment (see link above).</li> <li>• Does not contain ozone-depleting substances (ODS).</li> <li>• Design packaging materials for ease of disassembly.</li> <li>• Does not contain heavy metals (lead, mercury, cadmium or hexavalent chromium) in excess of 100 ppm sum total for all heavy metals listed.</li> <li>• Maximizes the use of post-consumer recycled content materials in packaging materials.</li> <li>• All packaging material is recyclable.</li> <li>• Reduces size and weight of packages to improve transportation fuel efficiency.</li> <li>• Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.</li> </ul>
<b>Longevity and Upgrading</b>	<p>This product is designed to be upgraded, possibly extending its useful life by several years. Spare parts are available throughout the warranty period and for up to 5 years after the end of production. Upgradeability features contained in the product include:</p> <ul style="list-style-type: none"> <li>• Intel LGA771 processor socket</li> <li>• 8 USB ports (5 rear, 2 front, 1 internal)</li> <li>• 2 PCI slots and 4 PCI Express slots</li> <li>• 5/6 storage bays (2 - 3.5 inch OR 3 - 2.5" internal, 1 - 3.5 inch FDD, 2 - 5.25 inch removable)</li> <li>• 8 memory slots</li> </ul>
<b>Packaging Materials</b>	
External	Cardboard carton and insert: 1.537 kg
Internal	LDPE Foam: .740 kg
<b>End-of-Life Management and Recycling</b>	Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: <a href="http://www.hp.com/recycle">http://www.hp.com/recycle</a> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.
<b>Hewlett-Packard Corporate Environmental Information</b>	<p>For more information about HP's commitment to the environment:          [link to new HP white paper now in progress]          Global Citizenship Report: <a href="http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html">http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html</a>          Eco-label certifications:  <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html">http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html</a>          ISO 14001 certificates:  <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html">http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html</a></p>
<b>Service, Support and Warranty</b>	<p>On-site Warranty and Service (<a href="#">Note 1</a>): This three-year, limited warranty and service offering delivers three years of on-site, next business-day (<a href="#">Note 2</a>) service for parts and labor and includes free telephone support (<a href="#">Note 3</a>) service for parts and labor and includes free telephone support (<a href="#">Note 2</a>) ensures that any product purchased in one country and transferred to another, non-restricted country will remain fully covered under the original warranty and service offering.</p> <p><b>NOTE 1:</b> Terms and conditions may vary by country. Certain restrictions and exclusions apply.</p> <p><b>NOTE 2:</b> On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.</p> <p><b>NOTE 3:</b> Technical telephone support applies only to HP-configured, HP and HP-qualified, third-party hardware and software. Toll-free calling and 24 x 7 support may not be available in some countries.</p> <p>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 <a href="http://www.hp.com/go/lookuptool">http://www.hp.com/go/lookuptool</a>. Additional HP Care Pack Services information by product is available at <a href="http://www.hp.com/hps/carepack">http://www.hp.com/hps/carepack</a>. Service levels and response times for HP Care Packs may vary depending on your geographic location</p>
<b>Additional Information</b>	<ul style="list-style-type: none"> <li>• This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2002/95/EC.</li> </ul>

## System Technical Specifications

- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive - 2002/96/EC.
- Plastic parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.
- This product contains 0% recycled materials (by weight)
- This product is >90% recycle-able when properly disposed of at end of life.

## Technical Specifications - Processors

<b>Processors</b>	Intel Xeon E5504, 2.00GHz, 4MB cache, 800MHz Memory, 4.80 GT/s QPI, 80W
	Intel Xeon E5506, 2.13GHz, 4MB cache, 800MHz Memory, 4.80 GT/s QPI, 80W
	Intel Xeon E5520, 2.26GHz, 8MB cache, 1066MHz Memory, 5.86 GT/s QPI, 80W
	Intel Xeon E5530, 2.40GHz, 8MB cache, 1066MHz Memory, 5.86 GT/s QPI, 80W
	Intel Xeon E5540, 2.53GHz, 8MB cache, 1066MHz Memory, 5.86 GT/s QPI, 80W
	Intel Xeon X5550, 2.66GHz, 8MB cache, 1333MHz Memory, 6.40 GT/s QPI, 95W
	Intel Xeon X5560, 2.80GHz, 8MB cache, 1333MHz Memory, 6.40 GT/s QPI, 95W
	Intel Xeon X5570, 2.93GHz, 8MB cache, 1333MHz Memory, 6.40 GT/s QPI, 95W

## Introduction

Intel's latest-generation microarchitecture represents the next step in unprecedented processor performance and dynamic scalability. Designed from the ground up to take advantage of hafnium-based Intel® 45nm hi-k metal gate silicon technology, Intel® Microarchitecture (Nehalem) unleashes parallel processing performance enabled by Intel® QuickPath technology providing an integrated memory controller and high-speed interconnect per independent processing core.

## Performance and Features

Maximum multitasking performance Intel® Microarchitecture (Nehalem) offers the latest in processor innovation, including:

- Dynamic scalability, managed cores, threads, cache, interfaces, and power for energy-efficient performance on demand.
- Design and performance scalability for servers, workstations, notebooks and desktops with support for 2-8+ cores and up to 16+ threads with Intel® Hyper-Threading Technology (Intel® HT Technology), and scalable cache sizes, system interconnects, and integrated memory controllers.
- Intel® Turbo Boost Technology delivers additional performance automatically when needed by taking advantage of the processor's power and thermal headroom. This enables increased performance of both multi-threaded and single-threaded workloads.
- Intel Hyper-Threading Technology brings high-performance applications into mainstream computing with 1-16+ threads optimized for a new generation multi-core processor architecture.
- Scalable shared memory of Intel® QuickPath technology features memory distributed to each processor with integrated memory controllers and high-speed point-to-point interconnects to unleash the performance of future versions of next-generation Intel® multi-core processors.
- Multi-level shared cache improves performance and efficiency by reducing latency to frequently used data.

## Turbo Boost Technology

This technology now built into Xeon 5500 processors will increase the speed of your processor on demand (from OS) if the CPU is operating below power / thermal specifications:

- Benefit of Turbo Boost (how much CPU speed up) depends on number of active cores
- Likelihood of Turbo Boost operation increases when less cores are active
- Likelihood of Turbo Boost operation increases when dynamic power mgt is enabled

## Technical Specifications - Hard Drives

HP SAS (Serial Attached SCSI) Hard Drives for HP Workstations	300 GB (15K)	<b>Capacity</b>	300 GB		
		<b>Height</b>	1 in; 2.5 cm		
		<b>Width</b>		<b>Media Diameter</b>	3.5 in; 8.9 cm
				<b>Physical Size</b>	4 in; 10.2 cm
		<b>Interface</b>	SAS		
		<b>Synchronous Transfer Rate (Maximum)</b>	3.0 Gb/s		
		<b>Buffer</b>	16 MB		
		<b>Seek Time (typical reads, includes controller overhead, including settling)</b>		<b>Single Track</b>	0.2 ms
				<b>Average</b>	3.5 ms
				<b>Full Stroke</b>	6.7 ms
		<b>Rotational Speed</b>	15,000 rpm		
		<b>Logical Blocks</b>	585,937,500 - 512 byte blocks		
		<b>Operating Temperature</b>	50° to 95° F (10° to 35° C)		
	146 GB (15K)	<b>Capacity</b>	146 GB		
		<b>Height</b>	1 in; 2.5 cm		
		<b>Width</b>		<b>Media Diameter</b>	3.5 in; 8.9 cm
				<b>Physical Size</b>	4 in; 10.2 cm
		<b>Interface</b>	SAS		
		<b>Synchronous Transfer Rate (Maximum)</b>	3.0 Gb/s		
		<b>Buffer</b>	16 MB		
		<b>Seek Time (typical reads, includes controller overhead, including settling)</b>		<b>Single Track</b>	0.2 ms
				<b>Average</b>	3.5 ms
				<b>Full Stroke</b>	6.7 ms
		<b>Rotational Speed</b>	15,000 rpm		
		<b>Logical Blocks</b>	86,749,488 - 512 byte blocks		
		<b>Operating Temperature</b>	50° to 95° F (10° to 35° C)		
	450 GB (15K)	<b>Capacity</b>	450 GB		
		<b>Height</b>	1 in; 2.5 cm		
		<b>Width</b>		<b>Media Diameter</b>	3.5 in; 8.9 cm
				<b>Physical Size</b>	4 in; 10.2 cm
		<b>Interface</b>	SAS		
		<b>Synchronous Transfer Rate (Maximum)</b>	3.0 Gb/s		
		<b>Buffer</b>	16 MB		



## Technical Specifications - Hard Drives

<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b>	0.2 ms
	<b>Average</b>	3.6 ms
	<b>Full Stroke</b>	6.6 ms
<b>Rotational Speed</b>	15,000 rpm	
<b>Logical Blocks</b>	879, 097, 968 - 512 byte blocks	
<b>Operating Temperature</b>	50° to 95° F (10° to 35° C)	

SATA (Serial ATA) Hard Drives for HP Workstations 160,041,885,696 bytes (10K)

<b>Capacity</b>	160,041,885,696 bytes	
<b>Height</b>	1 in; 2.5 cm	
<b>Width</b>	<b>Media Diameter</b>	3.5 in; 8.9 cm
	<b>Physical Size</b>	4 in; 10.2 cm
<b>Interface</b>	Serial ATA (1.5 Gb/s), Native Command Queuing enabled	
<b>Synchronous Transfer Rate</b> (Maximum)	Up to 150 MB/s	
<b>Buffer</b>	16 Mbytes	
<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b>	0.3 ms
	<b>Average</b>	4.6 ms
	<b>Full Stroke</b>	10.2 ms
<b>Rotational Speed</b>	10,000 rpm	
<b>Logical Blocks</b>	312,581,808	
<b>Operating Temperature</b>	41 to 131 F (5 to 55 C)	

1,000,204,886,016 bytes (7,200)

<b>Capacity</b>	1,000,204,886,016 bytes	
<b>Height</b>	1 in; 2.5 cm	
<b>Width</b>	<b>Media Diameter</b>	3.5 in; 8.9 cm
	<b>Physical Size</b>	4 in; 10.2 cm
<b>Interface</b>	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
<b>Synchronous Transfer Rate</b> (Maximum)	Up to 300 MB/s	
<b>Buffer</b>	32 MB	
<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b>	2 ms
	<b>Average</b>	11 ms
	<b>Full Stroke</b>	21 ms
<b>Rotational Speed</b>	7,200 rpm	
<b>Logical Blocks</b>	1,953,525,168	
<b>Operating Temperature</b>	41 to 131 F (5 to 55 C)	

500,107,862,016

<b>Capacity</b>	500,107,862,016 bytes
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## Technical Specifications - Hard Drives

bytes (7,200)	<b>Height</b>	1 in; 2.5 cm
	<b>Width</b>	<b>Media Diameter</b> 3.5 in; 8.9 cm
		<b>Physical Size</b> 4 in; 10.2 cm
	<b>Interface</b>	Serial ATA (3.0 Gb/s), Native Command Queuing enabled
	<b>Synchronous Transfer Rate (Maximum)</b>	300 MB/s
	<b>Buffer</b>	16 MB
	<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b> 2 ms
		<b>Average</b> 11 ms
		<b>Full Stroke</b> 21 ms
	<b>Rotational Speed</b>	7,200 rpm
	<b>Logical Blocks</b>	976,773,168
<b>Operating Temperature</b>	41 to 131 F (5 to 55 C)	

250,059,350,016 bytes (7,200)	<b>Capacity</b>	250,059,350,016 bytes
	<b>Height</b>	1 in; 2.5 cm
	<b>Width</b>	<b>Media Diameter</b> 3.5 in; 8.9 cm
		<b>Physical Size</b> 4 in; 10.2 cm
	<b>Interface</b>	Serial ATA (3.0 Gb/s), Native Command Queuing enabled
	<b>Synchronous Transfer Rate (Maximum)</b>	300 MB/s
	<b>Buffer</b>	16 MB
	<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b> 2 ms
		<b>Average</b> 11 ms
		<b>Full Stroke</b> 21 ms
	<b>Rotational Speed</b>	7,200 rpm
<b>Logical Blocks</b>	488,397,168	
<b>Operating Temperature</b>	41 to 131 F (5 to 55 C)	

160,041,885,696 bytes (7,200)	<b>Capacity</b>	160,041,885,696 bytes
	<b>Height</b>	1 in; 2.5 cm
	<b>Width</b>	<b>Media Diameter</b> 3.5 in; 8.9 cm
		<b>Physical Size</b> 4 in; 10.2 cm
	<b>Interface</b>	Serial ATA (3.0 Gb/s), Native Command Queuing enabled
	<b>Synchronous Transfer Rate (Maximum)</b>	300 MB/s
	<b>Buffer</b>	8 MB

## Technical Specifications - Hard Drives

	<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b>	2 ms
		<b>Average</b>	11 ms
		<b>Full Stroke</b>	21 ms
	<b>Rotational Speed</b>	7,200 rpm	
	<b>Logical Blocks</b>	312,581,808	
	<b>Operating Temperature</b>	41 to 131 F (5 to 55 C)	
<b>300,069,052,416 bytes (10K)</b>	<b>Capacity</b>	300,069,052,416 bytes	
	<b>Height</b>	0.6 in; 1.53 cm	
	<b>Width</b>	<b>Media Diameter</b>	2.5 in; 6.36 cm
		<b>Physical Size</b>	4 in; 10.17 cm
	<b>Interface</b>	Serial ATA (3.0Gb/s), Native Command Queuing enabled	
	<b>Synchronous Transfer Rate</b> (Maximum)	Up to 300 MB/s	
	<b>Buffer</b>	16 MB	
	<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b>	0.7 ms (maximum)
		<b>Average</b>	4.4 ms
		<b>Full Stroke</b>	9.5 ms
	<b>Rotational Speed</b>	10,000 rpm	
	<b>Logical Blocks</b>	586,072,368	
	<b>Operating Temperature</b>	41° to 131° F (5° to 55° C)	
<b>320,072,933,376 bytes (7,200)</b>	<b>Capacity</b>	320,072,933,376 bytes	
	<b>Height</b>	0.98 in; 2.5 cm	
	<b>Width</b>	<b>Media Diameter</b>	3.5 in; 8.9 cm
		<b>Physical Size</b>	4.0 in; 10.17 cm
	<b>Interface</b>	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
	<b>Synchronous Transfer Rate</b> (Maximum)	300 MB/s	
	<b>Buffer</b>	8 MB	
	<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b>	2
		<b>Average</b>	12
		<b>Full Stroke</b>	21
	<b>Rotational Speed</b>	7,200 rpm	
	<b>Logical Blocks</b>	625,142,448	
	<b>Operating Temperature</b>	41° to 131° F (5° to 55° C)	

## Technical Specifications - Hard Drive Controllers

LSI 3041E 4-Port SAS 3.0 Gb/s RAID Card	PCI Bus	PCI-Express x4 lanes	
	PCI Modes	Bus Master DMA	
	RAID Levels	RAID 0, 1, 1E and 10E	
	PCI Data Burst Transfer Rate	250 MB/s per lane half duplex	
		500 MB/s per lane full duplex	
		1,000 MB/s 4-lane half duplex	
	SAS Bandwidth	<b>Half Duplex</b>	Single lane – 300 MB/s
			Wide Port (2 lanes) – 600 MB/s
		Wide Port (4 lanes) – 1200 MB/s	
		<b>Full Duplex</b>	Single SAS Lane – 600 MB/s
	Wide Port (2 lanes) – 1200 MB/s		
	Wide Port (4 lanes) – 2400 MB/s		
	PCI Card Type	3.3 volt add-in c	
	PCI Voltage	12 V ± 10%	
	PCI Power	7.5 Watts	
Bracket	Full height and Low-profile		
Certification Level	PCI-Express 1.0a		
IO Bus	Four 3 Gb/s SAS/SATA ports		
SAS Processor	LSISAS1064E		
Internal Connectors	Four- SATA x1 connectors		
External Connectors	None		
Maximum Number of SCSI Devices	122		
LED Indicators	On-board activity and fault LEDs		
Integrated Mirroring	Integrated Mirroring option available		

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LSI MegaRAID® SAS 8888ELP Host Bus Adapter (HBA)	PCI Bus	PCI-Express x8 lanes
	PCI Modes	Bus Master DMA
	RAID Levels	RAID 0, 1, and 5 RAID spans 10 and 50
	PCI Data Burst Transfer Rate	Up to 3Gb/s per port
		Full Duplex
	PCI Voltage	+3.3V Add-in Card
	PCI Power	7.5 Watts
	Certification Level	PCI-Express 1.0a
	IO Bus	Eight 3Gb/s SAS/SATA ports
	Internal Connectors	Two SAS SFF8087 x4
	External Connectors	Two SAS SFF8088 x4
	Maximum Number of SCSI DeviceS	32

## Technical Specifications - Hard Drive Controllers

### LED Indicators

Connector LEDs indicate whether the internal or external connector is active for ports 0-3 and 4-7

### Technical Specifications - Graphics

<b>NVIDIA Quadro NVS 295 Form Factor 256MB Graphics Card</b>		2.731 inches (H) × 6.600 inches (L), Half-Height
<b>Graphics Controller</b>		NVIDIA Quadro NVS 295 Graphics Board
<b>Bus Type</b>		PCI Express x16, Generation 2.0
<b>Memory</b>		256 MB GDDR3 SDRAM unified graphics memory
<b>Connectors</b>		2 DisplayPort Comes with 2 DisplayPort to DVI-D Adapters (‘DisplayPort to VGA’ and ‘DisplayPort to DL DVI’ adapters available as an accessory)
<b>Maximum Resolution</b>		Two DisplayPort outputs drive two digital displays up to 2560 x 1600
<b>Display Output</b>		<ul style="list-style-type: none"><li>• Drives DisplayPort enabled digital displays at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking</li><li>• Drives DVI enabled digital displays at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking (through DisplayPort to DVI-D (single link) cable)</li></ul>
<b>Supported Graphics APIs</b>		OpenGL 3.0 DirectX 10.0
<b>Available Graphics Drivers</b>		Genuine Windows Vista Business (64-bit and 32-bit) Microsoft Windows XP Professional (64-bit and 32-bit) Red Hat Enterprise Linux(RHEL) WS4 & 5 Desktop/Workstation  HP qualified drivers may be preloaded or available from the HP support Web site: <a href="http://welcome.hp.com/country/us/en/support.html">http://welcome.hp.com/country/us/en/support.html</a>  Novell SUSE Linux Enterprise drivers may be obtained from: <a href="ftp://download.nvidia.com/novell">ftp://download.nvidia.com/novell</a> or <a href="http://www.nvidia.com">http://www.nvidia.com</a>
<b>Power consumption</b>		22.69 Watts

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<b>NVIDIA Quadro NVS 450 Form Factor 512 MB PCIe Graphics Card</b>		ATX Full Height, 1/2 length Passive cooling
<b>Bus Type</b>		PCI Express x16, Generation 2.0
<b>Memory</b>		512 MB GDDR3 (256MB per GPU)
<b>Connectors</b>		Four DisplayPort; Four DisplayPort to DVI-D adapters included. (‘DisplayPort to VGA’ and ‘DisplayPort to Dual Link DVI’ adapters available as an accessory)
<b>Maximum Resolution</b>		DisplayPort connectors support ultra-high-resolution panels (up to 2560 x 1600)
<b>Supported Graphics APIs</b>		OpenGL 3.0 Direct X 10.0
<b>Available Graphics Drivers</b>		Genuine Microsoft Windows Vista(64-bit and 32-bit), Microsoft Windows XP Professional(64-bit and 32-bit) Red Hat Enterprise Linux(RHEL) WS4 & 5 Desktop/Workstation HP qualified drivers may be preloaded or available from the HP support web site: <a href="http://welcome.hp.com/country/us/eng/software_drivers.html">http://welcome.hp.com/country/us/eng/software_drivers.html</a> . Novell SUSE Linux Enterprise drivers may be obtained from:

## Technical Specifications - Graphics

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

Power consumption 35 Watts

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<b>NVIDIA Quadro NVS 290 Form Factor</b>	Low Profile
<b>256 MB PCIe Graphics Card</b>	PCIe x16
<b>Memory</b>	256 MB 400MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
<b>Connectors</b>	DMS-59, includes DMS-59 to Dual DVI-I cable. DMS-59 to Dual VGA cable available as an option.
<b>Maximum Resolution</b>	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft® Windows®
<b>RAMDAC</b>	Integrated dual 400MHz
<b>Image Quality Features</b>	Full-screen, full-frame video playback of HDTV and DVD content DVD-ready motion compensation for MPEG-2 Independent hardware color controls for video overlay Hardware color-space conversion (YUV 4:2:2 and 4:2:0) IDCT motion compensation 5-tap horizontal by 3-tap vertical filtering 8:1 up/down scaling
<b>Programmable Video Processor</b>	Full-screen, full-frame video playback of HDTV and DVD content DVD-ready motion compensation for MPEG-2 Independent hardware color controls for video overlay Hardware color-space conversion (YUV 4:2:2 and 4:2:0) IDCT motion compensation 5-tap horizontal by 3-tap vertical filtering 8:1 up/down scaling
<b>Display Output</b>	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft® Windows®
<b>Supported Graphics APIs</b>	OGL 2.1 & DX10 Support; Shader Model 4.0
<b>Available Graphics Drivers</b>	Genuine Windows Vista Business(64-bit and 32-bit), Microsoft Windows XP Professional(64-bit and 32-bit)(Provides full native Dual View mode, Span or Big Desktop mode, and Clone mode ) Red Hat Enterprise Linux(RHEL) WS3, WS4 & 5 Desktop/Workstation HP qualified drivers may be preloaded or available from the HP support web site: <a href="http://welcome.hp.com/country/us/eng/software_drivers.html">http://welcome.hp.com/country/us/eng/software_drivers.html</a> . Novell SUSE Linux Enterprise drivers may be obtained from: <a href="ftp://download.nvidia.com/novell">ftp://download.nvidia.com/novell</a> or <a href="http://www.nvidia.com">http://www.nvidia.com</a>
<b>High-Resolution AntiAliasing</b>	Color planes: 32-bit color buffer Overlay planes: Hardware supported

### Technical Specifications - Graphics

**CUDA™ Parallel Processor Cores** NVIDIA Quadro NVS 290 (256 MB DH) PCIe Graphics Card with full height bracket attached, DMS-59 to Dual DVI cable, Workstation Software Driver CD, documentation.

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<b>NVIDIA Quadro FX 380 256MB Graphics Card</b>	<b>Form Factor</b>	4.376 inches (H) × 6.60 inches (L)
	<b>Graphics Controller</b>	NVIDIA Quadro FX 380 Graphics Board
	<b>Bus Type</b>	PCI Express x16, Generation 2.0
	<b>Memory</b>	256 MB GDDR3 SDRAM unified graphics memory
	<b>Connectors</b>	2 Dual Link DVI-I Two DVI-I to VGA adapters included
	<b>Maximum Resolution</b>	Two dual-link DVI-I outputs drive two digital displays at resolutions up to 2560 x 1600 @ 60Hz or two analog displays at resolutions up to 2048 x 1536 @ 85Hz
	<b>RAMDAC</b>	Dual Internal 400 MHz DAC
	<b>Shading architecture</b>	Full Shader Model 4.0 (OpenGL 2.1/DirectX 10 class) <ul style="list-style-type: none"><li>● Long fragment programs (unlimited instructions)</li><li>● Long vertex programs (unlimited instructions)</li><li>● Looping and subroutines (up to 256 loops per vertex program)</li><li>● Dynamic flow control</li><li>● Conditional execution</li></ul>
	<b>Supported graphics APIs</b>	OpenGL 3.0 Direct X 10.0
	<b>Available graphics drivers</b>	Genuine Windows Vista Business(64-bit and 32-bit), Microsoft Windows XP Professional(64-bit and 32-bit) Red Hat Enterprise Linux(RHEL) WS4 & 5 Desktop/Workstation  HP qualified drivers may be preloaded or available from the HP support Web site: <a href="http://welcome.hp.com/country/us/en/support.html">http://welcome.hp.com/country/us/en/support.html</a>  Novell SUSE Linux Enterprise drivers may be obtained from: <a href="ftp://download.nvidia.com/novell">ftp://download.nvidia.com/novell</a> or <a href="http://www.nvidia.com">http://www.nvidia.com</a>
	<b>High-level Shader Languages</b>	<ul style="list-style-type: none"><li>● Optimized compiler for Cg and Microsoft HLSL</li><li>● OpenGL 2.1 and DirectX 10 support</li><li>● Open source compiler</li></ul>
	<b>CUDA™ Parallel Processor Cores</b>	16
	<b>Power consumption</b>	33.91 Watts

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### Technical Specifications - Graphics

ATI FirePro V3700 256MB Graphics Card	Form Factor	4.40 inches (H) × 6.70 inches (L) (11.18 cm (H) × 17.02 cm (L))
	Graphics Controller	ATI FirePro V3700 Graphics Board
	Bus Type	PCI Express x16, Generation 2.0
	Memory	256 MB GDDR3 SDRAM unified graphics memory
	Connectors	2 Dual Link DVI-I Two DVI-I to VGA adapters included
	Maximum Resolution	Two dual-link DVI-I outputs drive two digital displays at resolutions up to 2560 x 1600 @ 60Hz or two analog displays at resolutions up to 2048 x 1536 @ 85Hz
	Shading architecture	Full Shader Model 4.0 <ul style="list-style-type: none"><li>● 40 Stream Processing Units</li><li>● Dynamic load balancing and resource allocation for vertex, geometry, and pixel shaders</li><li>● Common instruction set and texture unit access supported for all types of shaders</li><li>● Dedicated branch execution units and texture address processors</li></ul>
	Supported graphics APIs	OpenGL 2.1 DirectX 10.1
	Available graphics drivers	Genuine Windows Vista Business (64-bit and 32-bit) Microsoft Windows XP Professional (64-bit and 32-bit)  HP qualified drivers may be preloaded or available from the HP support Web site: <a href="http://welcome.hp.com/country/us/en/support.html">http://welcome.hp.com/country/us/en/support.html</a>  Linux drivers may be obtained from: <a href="http://ati.amd.com/support/driver.html">http://ati.amd.com/support/driver.html</a>
	Power consumption	32 Watts

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NVIDIA Quadro FX 580 512MB Graphics Card	Form Factor	4.376 inches (H) × 6.60 inches (L)
	Graphics Controller	NVIDIA Quadro FX 580 Graphics Board
	Bus Type	PCI Express x16, Generation 2.0
	Memory	512MB GDDR3 SDRAM unified graphics memory
	Connectors	2 DisplayPort, 1 Dual-Link DVI-I. One DisplayPort to DVI and one DVI to VGA adapter included  (‘DisplayPort to VGA’ and ‘DisplayPort to Dual Link DVI’ adapters available as an accessory)
	Maximum Resolution	<ul style="list-style-type: none"><li>● Two DisplayPort outputs drive two digital displays up to 2560 x 1600</li><li>● One dual-link DVI-I output drives one digital display at resolutions up to 2560 x 1600 @ 60Hz or one analog display at resolutions up to 2048 x 1536 @ 85Hz</li></ul>
	RAMDAC	Single Internal 400 MHz DAC
	Shading architecture	Full Shader Model 4.0 (OpenGL 2.1/DirectX 10 class) <ul style="list-style-type: none"><li>● Long fragment programs (unlimited instructions)</li></ul>

### Technical Specifications - Graphics

	<ul style="list-style-type: none"><li>● Long vertex programs (unlimited instructions)</li><li>● Looping and subroutines (up to 256 loops per vertex program)</li><li>● Dynamic flow control</li><li>● Conditional execution</li></ul>
<b>Supported graphics APIs</b>	OpenGL 3.0 Direct X 10.0
<b>Available graphics drivers</b>	Genuine Windows Vista Business(64-bit and 32-bit), Microsoft Windows XP Professional(64-bit and 32-bit) Red Hat Enterprise Linux(RHEL) WS4 & 5 Desktop/Workstation  HP qualified drivers may be preloaded or available from the HP support Web site: <a href="http://welcome.hp.com/country/us/en/support.html">http://welcome.hp.com/country/us/en/support.html</a>  Novell SUSE Linux Enterprise drivers may be obtained from: <a href="ftp://download.nvidia.com/novell">ftp://download.nvidia.com/novell</a> or <a href="http://www.nvidia.com">http://www.nvidia.com</a>
<b>High-level Shader Languages</b>	<ul style="list-style-type: none"><li>● Optimized compiler for Cg and Microsoft HLSL</li><li>● OpenGL 2.1 and DirectX 10 support</li><li>● Open source compiler</li></ul>
<b>CUDA™ Parallel Processor Cores</b>	32
<b>Power consumption</b>	40 Watts

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<b>NVIDIA Quadro FX 1800 768MB Graphics Card</b>	<b>Form Factor</b>	4.376 inches (H) x 7.8 inches (L)
	<b>Graphics Controller</b>	NVIDIA Quadro FX 1800 Graphics Board
	<b>Bus Type</b>	PCI Express x16, Generation 2.0
	<b>Memory</b>	768MB GDDR3 SDRAM unified graphics memory
	<b>Connectors</b>	2 DisplayPort, 1 Dual-Link DVI-I. One DisplayPort to DVI-D and one DVI to VGA adapter included  (‘DisplayPort to VGA’ and ‘DisplayPort to Dual Link DVI’ adapters available as an accessory)
	<b>Maximum Resolution</b>	<ul style="list-style-type: none"><li>● Two DisplayPort outputs drive two digital displays up to 2560 x 1600</li><li>● One dual-link DVI-I output drives one digital display at resolutions up to 2560 x 1600 @ 60Hz or one analog display at resolutions up to 2048 x 1536 @ 85Hz</li></ul>
	<b>RAMDAC</b>	Single Internal 400 MHz DAC
	<b>Shading Architecture</b>	Full Shader Model 4.0 (OpenGL 2.1/DirectX 10 class)  <ul style="list-style-type: none"><li>● Long fragment programs (unlimited instructions)</li><li>● Long vertex programs (unlimited instructions)</li><li>● Looping and subroutines (up to 256 loops per vertex program)</li><li>● Dynamic flow control</li><li>● Conditional execution</li></ul>
	<b>Supported Graphics APIs</b>	OpenGL 3.0 Direct X 10.0
	<b>Available Graphics Drivers</b>	Genuine Windows Vista Business(64-bit and 32-bit), Microsoft Windows XP Professional(64-bit and 32-bit)

### Technical Specifications - Graphics

Red Hat Enterprise Linux(RHEL) WS4 & 5 Desktop/Workstation

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 be obtained from:

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

#### High-level Shader Languages

- Optimized compiler for Cg and Microsoft HLSL
- OpenGL 2.1 and DirectX 10 support
- Open source compiler

#### CUDA™ Parallel Processor Cores

64.

#### Power consumption

59 Watts

#### ATI FirePro V5700 512MB Graphics Card

##### Form Factor

4.40 inches (H) × 6.70 inches (L) (11.18 cm (H) × 17.02 cm (L))

##### Graphics Controller

ATI FirePro V5700 Graphics Board

##### Bus Type

PCI Express x16, Generation 2.0

##### Memory

512 MB GDDR3 SDRAM unified graphics memory

##### Connectors

2 DisplayPort, 1 Dual-Link DVI-I.

One DisplayPort to DVI and one DVI to VGA adapter included

('DisplayPort to VGA' and 'DisplayPort to Dual Link DVI' adapters available as an accessory)

##### Maximum Resolution

- Two DisplayPort outputs drive two digital displays up to 2560 x 1600
- One dual-link DVI-I output drives one digital display at resolutions up to 2560 x 1600 @ 60Hz or one analog display at resolutions up to 2048 x 1536 @ 85Hz

##### Shading architecture

Full Shader Model 4.0

- 320 Stream Processing Units
- Dynamic load balancing and resource allocation for vertex, geometry, and pixel shaders
- Common instruction set and texture unit access supported for all types of shaders
- Dedicated branch execution units and texture address processors

##### Supported graphics APIs

OpenGL 2.1  
DirectX 10.1

##### Available graphics drivers

Genuine Windows Vista Business (64-bit and 32-bit)  
Microsoft Windows XP Professional (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>

Linux drivers may be obtained from:

<http://ati.amd.com/support/driver.html>

##### Power consumption

56 Watts



### Technical Specifications - Graphics

<b>NVIDIA Quadro FX 3800 Form Factor</b>	4.376 inches (H) x 9.0 inches (L)
<b>1.0GB Graphics Card</b>	Single slot card
<b>(NOT AVAILABLE UNTIL JUNE 2009)</b>	
<b>Graphics Controller</b>	NVIDIA Quadro FX 3800 Graphics Board
<b>Bus Type</b>	PCI Express x16, Generation 2.0
<b>Memory</b>	1GB GDDR3 SDRAM unified graphics memory
<b>Connectors</b>	2 DisplayPort, 1 Dual-Link DVI-I. One DisplayPort to DVI-D and one DVI to VGA adapter included
	(‘DisplayPort to VGA’ and ‘DisplayPort to Dual Link DVI-I’ adapters available as an accessory)
<b>Maximum Resolution</b>	<ul style="list-style-type: none"><li>• Two DisplayPort outputs drive two digital displays up to 2560 x 1600</li><li>• One dual-link DVI-I output drives one digital display at resolutions up to 2560 x 1600 @ 60Hz or one analog display at resolutions up to 2048 x 1536 @ 85Hz</li></ul>
<b>RAMDAC</b>	Single Internal 400 MHz DAC
<b>Shading architecture</b>	Full Shader Model 4.0 (OpenGL 2.1/DirectX 10 class) <ul style="list-style-type: none"><li>• Long fragment programs (unlimited instructions)</li><li>• Long vertex programs (unlimited instructions)</li><li>• Looping and subroutines (up to 256 loops per vertex program)</li><li>• Dynamic flow control</li><li>• Conditional execution</li></ul>
<b>Supported graphics APIs</b>	OpenGL 3.0 Direct X 10.0
<b>Available graphics drivers</b>	Genuine Windows Vista Business(64-bit and 32-bit), Microsoft Windows XP Professional(64-bit and 32-bit) Red Hat Enterprise Linux(RHEL) WS4 & 5 Desktop/Workstation  HP qualified drivers may be preloaded or available from the HP support Web site: <a href="http://welcome.hp.com/country/us/en/support.html">http://welcome.hp.com/country/us/en/support.html</a>  Novell SUSE Linux Enterprise drivers may be obtained from: <a href="ftp://download.nvidia.com/novell">ftp://download.nvidia.com/novell</a> or <a href="http://www.nvidia.com">http://www.nvidia.com</a>
<b>High-level Shader Languages</b>	<ul style="list-style-type: none"><li>• Optimized compiler for Cg and Microsoft HLSL</li><li>• OpenGL 2.1 and DirectX 10 support</li><li>• Open source compiler</li></ul>
<b>CUDA™ Parallel Processor Cores</b>	192
<b>Power consumption</b>	107.9 Watts

### Technical Specifications - Graphics

<b>ATI FirePro V7750 1.0GB Form Factor Graphics Card</b>		4.40 inches (H) × 13.0 inches (L) (11.18 cm (H) × 33.02 cm (L))
<b>Graphics Controller</b>		ATI FirePro V7750 Graphics Board
<b>Bus Type</b>		PCI Express x16, Generation 2.0
<b>Memory</b>		1024 MB GDDR3 SDRAM unified graphics memory
<b>Connectors</b>		2 DisplayPort, 1 Dual-Link DVI-I. One DisplayPort to DVI and one DVI to VGA adapter included ('DisplayPort to VGA' and 'DisplayPort to Dual Link DVI' adapters available as an accessory)
<b>Maximum Resolution</b>		<ul style="list-style-type: none"><li>• Two DisplayPort outputs drive two digital displays up to 2560 x 1600</li><li>• One dual-link DVI-I output drives one digital display at resolutions up to 2560 x 1600 @ 60Hz or one analog display at resolutions up to 2048 x 1536 @ 85Hz</li></ul>
<b>Shading architecture</b>		Full Shader Model 4.0 <ul style="list-style-type: none"><li>• 320 Stream Processing Units</li><li>• Dynamic load balancing and resource allocation for vertex, geometry, and pixel shaders</li><li>• Common instruction set and texture unit access supported for all types of shaders</li><li>• Dedicated branch execution units and texture address processors</li></ul>
<b>Supported graphics APIs</b>		OpenGL 2.1 DirectX 10.1
<b>Available graphics drivers</b>		Genuine Windows Vista Business (64-bit and 32-bit) Microsoft Windows XP Professional (64-bit and 32-bit)  HP qualified drivers may be preloaded or available from the HP support Web site: <a href="http://welcome.hp.com/country/us/en/support.html">http://welcome.hp.com/country/us/en/support.html</a>  Linux drivers may be obtained from: <a href="http://ati.amd.com/support/driver.html">http://ati.amd.com/support/driver.html</a>
<b>Power consumption</b>		76 Watts

### Technical Specifications - Graphics

NVIDIA Quadro FX 4800 Form Factor 1.5GB PCIe Graphics Card	4.36" (H) x 10.5" (L) Dual slot card
<b>Graphics Controller</b>	NVIDIA Quadro FX 4800 graphics board
<b>Bus Type</b>	PCI Express x16, Generation 2.0
<b>Memory</b>	1.5 GB GDDR3 SDRAM unified graphics memory
<b>Connectors</b>	2 DisplayPort, 1 Dual-Link DVI-I, 1 3-pin Mini DIN stereo output, Two DisplayPort to DVI-D adapters included ('DisplayPort to VGA' and 'DisplayPort to Dual Link DVI' adapters available as an accessory)
<b>Maximum Resolution</b>	<ul style="list-style-type: none"><li>• 2 DisplayPort connectors support ultra-high-resolution panels (up to 2560 x 1600)</li><li>• Dual-link DVI-I output drives one digital display at resolutions up to 2560 x 1600 @ 60Hz</li><li>• Internal 400 MHz DACs-One analog display up to 2048 x 1536 @ 85Hz</li></ul>
<b>Shading Architecture</b>	<ul style="list-style-type: none"><li>• Full Shader Model 4.0 (OpenGL 2.1/DirectX 10 class)</li><li>• Long fragment programs (unlimited instructions)</li><li>• Long vertex programs (unlimited instructions)</li><li>• Looping and subroutines (up to 256 loops per vertex program)</li><li>• Dynamic flow control</li><li>• Conditional execution</li></ul>
<b>Supported Graphics APIs</b>	OpenGL 3.0 Direct X 10.0
<b>Available Graphics Drivers</b>	Genuine Windows Vista Business (64-bit and 32-bit) Microsoft Windows XP Professional (64-bit and 32-bit) Red Hat Enterprise Linux(RHEL) WS4 & 5 Desktop/Workstation  HP qualified drivers may be preloaded or available from the HP support Web site: <a href="http://welcome.hp.com/country/us/en/support.html">http://welcome.hp.com/country/us/en/support.html</a>  Novell SUSE Linux Enterprise drivers may be obtained from: <a href="ftp://download.nvidia.com/novell">ftp://download.nvidia.com/novell</a> or <a href="http://www.nvidia.com">http://www.nvidia.com</a>
<b>High-Resolution AntiAliasing</b>	<ul style="list-style-type: none"><li>• Rotated Grid Full-Scene Antialiasing (RG FSAA)</li><li>• 32xFSAA dramatically reduces visual aliasing artifacts or "jaggies" at resolution up to 1920 x 1200</li><li>• 64x FSAA SLI Mode</li></ul>
<b>High-level Shader Languages</b>	<ul style="list-style-type: none"><li>• Optimized compiler for Cg and Microsoft HLSL</li><li>• OpenGL 2.1 and DirectX 10 support</li><li>• Open source compiler</li></ul>
<b>CUDA™ Parallel Processor Cores</b>	192
<b>Power consumption</b>	146 Watts

### Technical Specifications - Graphics

NVIDIA Quadro CX	Form Factor	4.36" (H) x 10.5" (L) Dual slot card
	Graphics Controller	NVIDIA Quadro CX 1.5GB Graphics Card
	Bus Type	PCI Express x16, Generation 2.0
	Memory	1.5 GB GDDR3 SDRAM unified graphics memory
	Connectors	2 DisplayPort, 1 Dual-Link DVI-I, 1 3-pin Mini DIN stereo output. Two DisplayPort to DVI-D adapters included  (‘DisplayPort to VGA’ and ‘DisplayPort to Dual Link DVI’ adapters available as an accessory)
	Maximum Resolution	<ul style="list-style-type: none"><li>• 2 DisplayPort connectors support ultra-high-resolution panels (up to 2560 x 1600)</li><li>• Dual-link DVI-I output drives one digital display at resolutions up to 2560 x 1600 @ 60Hz</li><li>• Internal 400 MHz DACs-One analog display up to 2048 x 1536 @ 85Hz</li></ul>
	RAMDAC	400MHz
	Shading Architecture	<ul style="list-style-type: none"><li>• Full Shader Model 4.0 (OpenGL 2.1/DirectX 10 class)</li><li>• Long fragment programs (unlimited instructions)</li><li>• Long vertex programs (unlimited instructions)</li><li>• Looping and subroutines (up to 256 loops per vertex program)</li><li>• Dynamic flow control</li><li>• Conditional execution</li></ul>
	Supported Graphics APIs	OpenGL 3.0 Direct X 10.0
	Available Graphics Drivers	Genuine Windows Vista Business (64-bit and 32-bit) Microsoft Windows XP Professional (64-bit and 32-bit)  HP qualified drivers may be preloaded or available from the HP support Web site: <a href="http://welcome.hp.com/country/us/en/support.html">http://welcome.hp.com/country/us/en/support.html</a>
	High-Resolution AntiAliasing	<ul style="list-style-type: none"><li>• Rotated Grid Full-Scene Antialiasing (RG FSAA)</li><li>• 32xFSAA dramatically reduces visual aliasing artifacts or "jaggies" at resolution up to 1920 x 1200</li><li>• 64x FSAA SLI Mode</li></ul>
	High-level Shader Languages	<ul style="list-style-type: none"><li>• Optimized compiler for Cg and Microsoft HLSL</li><li>• OpenGL 2.1 and DirectX 10 support</li><li>• Open source compiler</li></ul>
	CUDA™ Parallel Processor Cores	192
	Power consumption	146 Watts

## Technical Specifications - Multimedia and Audio Devices

Integrated Intel/Realtek HD ALC262 Audio	Type	Integrated
	High Definition Codec	Yes
	FM Synthesis Support	Yes
	OPL3 FM Synthesis Support	Yes
	Sound Blaster Compatibility	Yes
	Meets Premium performance for Windows Logo Program 3.0	Yes
	Audio Jacks	Front panel microphone in and headphone out - fixed usage. Rear panel line in and line out jacks - jacks are retaskable One Line-In* (12-K ohm Input Impedance)* <b>NOTE:</b> External Speakers need to be powered externally.
	Sampling	3 stereo ADCs support 16/20-bit PCM format with 44.1K/48K/96kHz sample rate 2 stereo DAC supports 16/20/24-bit PCM format with 44.1K/48K/96K/192kHz sample rate
	Wavetable Syntheses (software)	Yes – GM and FM Midi Support, Direct Music and Down Loadable Soundset (4 Meg DLS Level 1 and 2 Support)
	3D Positional Sound	No
	Digital Audio	Yes
	Analog Audio	Yes
	DVD Audio	Yes
	Number of Channels on Line-Out	Stereo (Left & Right channels)
	Internal Audio Speaker Power Rating	1.5 W
	Internal Speaker	Yes
	Hardware Equalizer for Internal Speaker	No
	External Speaker Jack (Line-Out)	Yes



## Technical Specifications - Multimedia and Audio Devices

SoundBlaster (Creative Labs) X-Fi Titanium PCIe Audio Card	<b>24-bit Analog-to-Digital conversion of analog inputs</b>	96kHz sample rate
	<b>24-bit Digital-to-Analog conversion of digital sources</b>	96kHz to analog 7:1 speaker output
	<b>24-bit Digital-to-Analog conversion of stereo digital sources</b>	8, 11.025, 16, 22.05, 24, 32, 44.1, 48 and 96kHz
	<b>16-bit to 24-bit recording sampling rates</b>	16-bit/44.1kHz, 16-bit/48kHz, 24-bit/44.1kHz, 24-bit/48kHz and 24-bit/96kHz with direct monitoring
	<b>Enhanced SoundFont support</b>	Up to 24-bit resolution
	<b>Signal-to-Noise Ratio (20kHz Low-pass filter, A-Weighted)</b>	109dB
	<b>Total Harmonic Distortion + Noise at 1kHz (20kHz Low-pass filter)</b>	.004%
	<b>Frequency Response (-3dB, 24-bit/96kHz input)</b>	10Hz to 46kHz
	<b>Frequency Response (-3dB, 24-bit/192kHz input)</b>	10Hz to 46kHz
	<b>Speaker and Headphone connections</b>	Stereo to 7.1 (Line Out via three 3.5mm mini jacks)
	<b>Flexijack</b>	Line In/ Microphone In/Optical Out via shared 3.5mm mini jack
	<b>Front Panel Header</b>	Intel HD Audio Compatible (2x5 pin)
	<b>Operating System</b>	Microsoft Windows Vista Business 64 Microsoft Windows Vista Business 32 Microsoft® Windows® XP Professional SP2 Microsoft Windows XP Professional x64 Edition
<b>Minimum System Requirements</b>	<b>System RAM</b> 512MB <b>Operating System</b> Windows Vista 32-bit and 64-bit version or Windows XP 32-bit or 64-bit version	

## Technical Specifications - Optical and Removable Storage

**NOTE 1:** 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.

HP DVD-ROM Drive	<b>Description</b>	5.25-inch, half-height, tray-load	
	<b>Mounting Orientation</b>	Either horizontal or vertical	
	<b>Interface Type</b>	SATA/ATAPI	
	<b>Dimensions (WxHxD)</b>	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)	
	<b>Disc Capacity</b>	<b>DVD-ROM</b> Single layer: Up to 4.7 GB Double layer: Up to 8.5 GB	
	<b>Access Times</b>	<b>DVD-ROM Single Layer</b>	< 140 ms (typical)
		<b>CD-ROM Mode 1</b>	< 125 ms (typical)
		<b>Full Stroke DVD</b>	< 250 ms (seek)
		<b>Full Stroke CD</b>	< 210 ms (seek)
	<b>Power</b>	<b>Source</b>	SATA DC power receptacle
		<b>DC Power Requirements</b>	5 VDC $\pm$ 5%-100 mV ripple p-p 12 VDC $\pm$ 5%-200 mV ripple p-p
			<b>DC Current</b>
	<b>Operating Environmental</b> (all conditions non-condensing)	<b>Temperature</b>	41° to 122° F (5° to 50° C)
<b>Relative Humidity</b>		10% to 90%	
<b>Maximum Wet Bulb Temperature</b>		86° F (30° C)	
<b>Operating Systems Supported</b>		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) WS3, WS4, 5 Desktop/Workstation Novell SLES 9 & SLE 10 No driver is required for this device. Native support is provided by the operating system.	

\* Certain Windows Vista product features require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: <http://www.windowsvista.com/upgradeadvisor>. For Windows Vista system requirements, visit: <http://www.windowsvista.com/systemrequirements>.

## Technical Specifications - Optical and Removable Storage

HP DVD+/-RW Drive	<b>Description</b>	5.25-inch, half-height, tray-load			
	<b>Mounting Orientation</b>	Either horizontal or vertical			
	<b>Interface Type</b>	SATA/ATAPI			
	<b>Dimensions (WxHxD)</b>	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)			
	<b>Disc Formats</b>	DVD-RAM			
		DVD+R			
		DVD+RW			
		DVD+R DL			
		DVD-R DL			
		DVD-R			
		DVD-RW			
		CD-R			
		CD-RW			
		<b>Disc Capacity</b>	<b>DVD-ROM</b>	8.5 GB DL or 4.7 GB standard	
	<b>Full Stroke DVD</b>		< 250 ms (seek)		
	<b>Full Stroke CD</b>		< 210 ms (seek)		
	<b>Maximum Data Transfer Rates</b>	<b>CD ROM Read</b>	CD-ROM, CD-R Up to 40X CD-RW Up to 32X		
		<b>DVD ROM Read</b>	DVD-RAM	Up to 12X	
			DVD+RW	Up to 8X	
			DVD-RW	Up to 8X	
			DVD+R DL	Up to 8X	
			DVD-R DL	Up to 8X	
			DVD-ROM	Up to 16X	
DVD-ROM DL			Up to 8X		
DVD+R		Up to 16X			
DVD-R		Up to 16X			
<b>Power</b>		<b>Source</b>	SATA DC power receptacle		
		<b>DC Power Requirements</b>	5 VDC ± 5%-100 mV ripple p-p		
			12 VDC ± 5%-200 mV ripple p-p		
	<b>DC Current</b>	5 VDC -1000 mA typical, 1600 mA maximum 12 VDC -600 mA typical, 1400 mA maximum			
<b>Operating Environmental</b> (all conditions non-condensing)	<b>Temperature</b>	41° to 122° F (5° to 50° C)			
	<b>Relative Humidity</b>	10% to 90%			
	<b>Maximum Wet Bulb Temperature</b>	86° F (30° C)			
	<b>Operating Systems Supported</b>	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) WS3, WS4, 5 Desktop/Workstation Novell SLES 9 & SLE 10 No driver is required for this device. Native			

Technical Specifications - Optical and Removable Storage

support is provided by the operating system.

\* Certain Windows Vista product features require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: <http://www.windowsvista.com/upgradeadvisor>. For Windows Vista system requirements, visit: <http://www.windowsvista.com/systemrequirements>.

\* LightScribe functionality is not natively supported by Linux distributions. Customers may download LightScribe Linux drivers from: <http://www.lightscribe.com/downloadSection/linux/index.aspx>

**Kit Contents**

HP SATA SuperMulti LightScribe DVD Writer drive, LightScribe software, Roxio Easy Media Creator software, Intervideo WinDVD Software, installation guide, and DVD+R media.

HP Slot Load DVD+/-RW Drive	<b>Description</b>	Slim-Line, Slot-load		
	<b>Mounting Orientation</b>	Either horizontal or vertical		
	<b>Interface Type</b>	SATA		
	<b>Dimensions (WxHxD)</b>	5 x .5 x 5 in (12.7 x 1.2 x 12.9 cm) 0		
	<b>Disc Formats</b>	DVD-RAM DVD+R DVD+RW DVD+R DL DVD-R DL DVD-R DVD-RW CD-R CD-RW		
	<b>Disc Capacity</b>	<b>DVD-ROM</b>	5/9/10/18 G DVD-Single / Dual (PTP, OTP) (Read Only) 4.7G DVD±R/RW (Read & Write) DVD±R Dual (Read & Write) 80mm DVD DVD-RAM (Read & Write)	
		<b>CD-ROM</b>	650 MB CD-ROM (Read Only) 80mm CD 800/700/650/ CD-Recordable (Read & Write) 700/650MB CD-Rewritable (Read & Write) 700/650MB High Speed CD-Rewritable (Read & Write) 700/650MB Ultra & Ultra+ Speed CD-Rewritable (Read & Write)	
		<b>Full Stroke DVD</b>	< 270 ms (seek)	
		<b>Full Stroke CD</b>	< 250 ms (seek)	
	<b>Maximum Data Transfer Rates</b>	<b>CD ROM Read</b>	CD-ROM, CD-R and CD-RW Up to 24X	
	<b>DVD ROM Read</b>	DVD-RAM Up to 5X DVD Single layer Up to 8X DVD Dual Layer up to 6X		



Technical Specifications - Optical and Removable Storage

<b>Power</b>	<b>Source</b>	SATA DC power receptacle
	<b>DC Power Requirements</b>	5 VDC $\pm$ 5%-100 mV ripple p-p
	<b>DC Current</b>	5 VDC 40 mA typical, 800 mA maximum
<b>Operating Environmental</b> (all conditions non-condensing)	<b>Temperature</b>	41° to 122° F (5° to 50° C)
	<b>Relative Humidity</b>	10% to 90%
	<b>Operating Systems Supported</b>	Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows XP Professional or Windows XP Home 32*. Red Hat Enterprise Linux(RHEL) WS3, WS4, 5 Desktop/Workstation Novell SLES 9 & SLE 10 No driver is required for this device. Native support is provided by the operating system.
	<b>Kit Contents</b>	Factory integrated only. Not available as a kit.

HP Blu-Ray Writer

<b>Description</b>	5.25-inch, half-height, tray-load	
<b>Mounting Orientation</b>	Either horizontal or vertical	
<b>Interface Type</b>	SATA	
<b>Dimensions (WxHxD)</b>	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)	
<b>Disc Formats</b>	BD-ROM BD-R BD-RE DVD-RAM DVD+R DVD+RW DVD+R DL DVD-R DL DVD-R DVD-RW CD-R CD-RW	
<b>Disc Capacity</b>	<b>DVD-ROM</b>	8.5 GB DL or 4.7 GB standard
	<b>Blu-ray</b>	50 GB DL or 25 GB standard
	<b>Full Stroke DVD</b>	< 250 ms (seek)
	<b>Full Stroke CD</b>	< 210 ms (seek)
	<b>Blu-ray</b>	Blu-ray
	<b>Startup Time</b> (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



Technical Specifications - Optical and Removable Storage

		DVD-RAM	45S
		CD-ROM	45S
<b>Maximum Data Transfer Rates</b>	<b>CD ROM Read</b>	CD-ROM	Up to 40X
		CD-R	Up to 40X
		CD-RW	Up to 40X
	<b>DVD ROM Read</b>	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
		<b>Blu-Ray</b>	BD-ROM
	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
<b>Power</b>	<b>Source</b>	SATA DC power receptacle	
	<b>DC Power Requirements</b>	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 10%-100 mV ripple p-p	
	<b>DC Current</b>	5 VDC -900 mA typical, 1200 mA maximum 12 VDC -1000 mA typical, 1600 mA maximum	
<b>Operating Environmental</b> (all conditions non-condensing)	<b>Temperature</b>	41° to 122° F (5° to 50° C)	
	<b>Relative Humidity</b>	15% to 80%	
	<b>Maximum Wet Bulb Temperature</b>	86° F (30° C)	
	<b>Operating Systems Supported</b>	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) WS3, WS4, 5 Desktop/Workstation Novell SLES 9 & SLE 10	
	<b>Kit Contents</b>	No driver is required for this device. Native support is provided by the operating system. HP Blue Laser RW Drive, LightScribe software, Roxio Easy Media Creator software, Intervideo WinDVD Software, installation guide.	

## Technical Specifications - Optical and Removable Storage

<b>Disclaimer</b>	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.
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<b>HP 22-in-1 Media Card Reader</b>	<b>Description</b>	The Media Card Reader device uses the same physical form factor and mounting as a Floppy Disk Drive. The device connects to a 2x5 two-channel USB header on the motherboard of the system. There is no USB controller card provided. Please see the Disc Formats section below for a list of flash memory card formats that are supported.
	<b>Mounting Orientation</b>	The Media Card Reader can be mounted in a dedicated Floppy Drive bay (if the chassis provides one) or in an appropriate Optical Bay adapter. It will operate in any orientation.
	<b>Interface Type</b>	USB 2.0 (one channel dedicated to the separate USB port; one channel dedicated to the flash memory card slots)
	<b>Dimensions (WxHxD)</b>	4.9 x 4.0 x 1.0 in (124.5 x 101.6 x 25.4 mm)
	<b>Disc Formats</b>	xD-Picture Micro SD Micro SDHC SD SDHC Mini SD Mini SDHC MultiMediaCard (MMC) Reduced Size MultiMediaCard (RS MMC) MultiMedia Card 4.2 (MMC Plus, including MMC Plus HC) Reduced Size MultiMedia Card 4.2 (MMC Mobile, including MMC Mobile HC) CompactFlash Card Type I CompactFlash Card Type II MicroDrive Memory Stick (MS) MagicGate Memory Stick (MG) MagicGate Memory Stick Duo 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  Two additional formats are usable with adapters (not supplied): MMC Micro Memory Stick Micro (M2)

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## *Technical Specifications - Optical and Removable Storage*

HP DX115 Removable Drive Enclosure	<b>Interface Type</b>	Compatible with SAS or SATA controllers
	<b>Dimensions (WxHxL)</b>	5.81 x 1.62 x 8.08 in (147.6 x 41.1 x 205 mm)
	<b>Weight</b>	Frame and Carrier: 3.8 lbs (1.73 kg) Carrier: 1 lbs (0.45 kg)



### Technical Specifications - Controller Cards

HP FireWire/IEEE 1394a PCI Card	<b>Data Transfer Rate</b>	Burst Data Rate up to 400 Mbps
	<b>Device Interface Protocol</b>	IEEE-1394a
	<b>Devices Supported</b>	IEEE-1394 compliant devices
	<b>Bus Type</b>	PCI card with brackets for low profile and full height PCI slots.
	<b>Certification Level</b>	FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC
	<b>Ports</b>	Two IEEE 1394 6-Pin Connector (Rear)
	<b>Internal Connectors</b>	One 10-Pin (9 Contacts) Custom Connector
	<b>System Requirements</b>	Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*. No driver is required for this device. Native support is provided by the operating system.

\* Certain Windows Vista product features require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: <http://www.windowsvista.com/upgradeadvisor>. For Windows Vista system requirements, visit: <http://www.windowsvista.com/systemrequirements>.

Pentium II 266 or above  
128-MB RAM  
1-GB Hard Drive  
CD-ROM drive  
Built-in sound system  
Available PCI 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%

**Operating Systems  
Supported** Windows Vista Business 64\*, Windows Vista Business 32\*, Windows Vista  
Home Basic 32\*, Windows 2000, Windows XP Professional or Windows XP  
Home 32\*

\* Certain Windows Vista product features require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: <http://www.windowsvista.com/upgradeadvisor>. For Windows Vista system requirements, visit: <http://www.windowsvista.com/systemrequirements>.

## Technical Specifications - Controller Cards

HP IEEE 1394b FireWire PCIe Card	<b>Data Transfer Rate</b>	Supports up to 800 Mbps
	<b>Devices Supported</b>	IEEE-1394 compliant devices
	<b>Bus Type</b>	PCIe card full height PCIe slots
	<b>Ports</b>	Two IEEE-1394b bilingual 9-Pin Connector (Rear)
	<b>Internal Connectors</b>	One 10-Pin header Custom Connector
	<b>System Requirements</b>	Microsoft Windows XP Professional, Windows XP Home, Windows Vista. Not supported on Linux. Pentium® III or higher processor 128-MB RAM 1-GB Hard Drive CD-ROM drive Built in sound system Available PCI slot
	<b>Temperature – Operating</b>	50° to 131° F (10° to 55° C)
	<b>Temperature – Storage</b>	-22° to 140° F (-30° to 60° C)
	<b>Relative Humidity – Operating</b>	20% to 80%
	<b>Compliances</b>	FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC
	<b>Operating Systems Supported</b>	Microsoft Windows XP and Windows Vista

### Technical Specifications - Networking and Communications

**NOTE 1:** "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.

<b>Integrated Broadcom 5764 PCIe LOM Controller</b>	<b>Connector</b>	RJ45
	<b>Data Rates Supported</b>	10/100/1000BT
	<b>Bus Architecture</b>	PCIe X1
	<b>Alerting</b>	ASF 2.0

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<b>Broadcom (5761) NetXtreme Gigabit Ethernet Plus NIC</b>	<b>Connector</b>	RJ-45
	<b>Controller</b>	Broadcom 5761 PCI-Express LAN Controller
	<b>Memory</b>	8 MB NVRAM serial Flash
	<b>Data Rates Supported</b>	10/100/1000 Mbps
	<b>Compliance</b>	IEEE 802.1P, 802.1Q, 802.2, 802.3, 802.3AB, 802.3u, and 802.3x
	<b>Bus Architecture</b>	PCI-Express
	<b>Data Path Width</b>	Single Channel PCI-Express
	<b>Data Transfer Mode</b>	Bus Master DMA
	<b>Hardware Certifications</b>	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)
	<b>Power Requirement</b>	1.8W @ 3.3V
	<b>Boot ROM Support</b>	Yes
	<b>Network Transfer Mode</b>	Full-duplex Half-duplex (not available for the 1000BASE-T transceiver)
	<b>Network Transfer Rate</b>	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps
	<b>Operating Temperature</b>	32° to 131°F (0° to 55° C)
	<b>Operating Humidity</b>	131° F (55° C) with 5% to 95% non-condensing humidity
	<b>Dimensions</b>	2.75 in x 4.13 in (7 cm x 10.5 cm), low profile compatible
	<b>Operating System Driver Support</b>	Windows Vista 32-bit SP1, Windows Vista x64 SP1, Windows XP 32 bit professional, Windows XP x64 .
	<b>Management Capabilities</b>	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
	<b>Kit Contents</b>	Broadcom NetXtreme Gigabit Ethernet Plus NIC, Broadcom NetXtreme Gigabit Ethernet Plus NIC USB Cable Assembly, CD, drivers, quick install guide, product warranty statement

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## Technical Specifications - Networking and Communications

HP NC360T PCI Express Dual Port Gigabit NIC	Connector	Two RJ-45
	Controller	Intel 82571EB
	Memory	Integrated 96KB
	Data Rates Supported	10/100/1000 Mbps
	Compliance	802.3, 802.3u, 802.3x, 802.3ab, 802.3ad, 802.1p, 802.1Q
	Bus Architecture	PCI-E 1.0a
	Data Path Width	Four lane (x4) PCI Express compatible with x4, x8, and x16 PCI Express slots
	Data Transfer Mode	Bus-master DMA
	Hardware Certifications	FCC Class B, VCCI Class B, BSMI Class A, CISPR 22 Class B, EN 55022 Class B, EN55024-1, ICES-003 Class B, MIC Class B, ACA Class B, UL, Canada UL, EN60950
	Power Requirement	1280 mA @ 3.3V typical
	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	0% to 95% non-condensing
	Dimensions	5.1 x 2.7 in (12.95 x 6.8 cm)
	Operating System Driver Support	Windows Vista Business 64*, Windows Vista Business 32*, Windows XP Professional, Windows XP Professional x64 Edition. Red Hat Enterprise Linux(RHEL) WS4, 5 Desktop/Workstation Novell SLES 9 & SLE 10
		<p>* Certain Windows Vista product features require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: <a href="http://www.windowsvista.com/upgradeadvisor">http://www.windowsvista.com/upgradeadvisor</a>. For Windows Vista system requirements, visit: <a href="http://www.windowsvista.com/systemrequirements">http://www.windowsvista.com/systemrequirements</a>.</p>
	Management Capabilities	WOL , PXE 2.1
	Kit Contents	HP NC360T PCI Express Dual Port Gigabit NIC, low profile bracket, CD containing Intel PROset II NIC drivers, quick install guide, product warranty statement

## Technical Specifications - Networking and Communications

Intel Gigabit CT Desktop NIC	<b>Connector</b>	RJ-45
	<b>Controller</b>	Intel WG82574L Gigabit Ethernet Controller
	<b>Memory</b>	Integrated Dual 48K configurable transmit receive FIFO Buffers
	<b>Data Rates Supported</b>	10/100/1000 Mbps
	<b>Compliance</b>	IEEE 802.1P, 802.1Q, 802.2, 802.3, 802.3AB and 802.3u compliant, 802.3x flow control
	<b>Bus Architecture</b>	PCI-E 1.0a
	<b>Data Path Width</b>	X1, 250 MB/s, Bi-directional interface
	<b>Data Transfer Mode</b>	Bus-master DMA
	<b>Hardware Certifications</b>	FCC, B, CE, TUV- cTUVus Mark Canada and United States, TUV- GS Mark for European Union
	<b>Power Requirement</b>	Aux 3.3V, 3.0 Watts in 1000base-T and 2.0 Watts in 100Base-T
	<b>Boot ROM Support</b>	Yes
	<b>Network Transfer Rate</b>	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps
	<b>Operating Temperature</b>	32° to 131°F (0° to 55° C)
	<b>Operating Humidity</b>	85% at 131° F (55° C)
	<b>Dimensions</b>	4.75 x 2.25 x 0.8 in (12.1 x 5.7 x 2.0 cm)
	<b>Operating System Driver Support</b>	Windows Vista Business 64, Windows Vista Business 32, Windows XP Professional, Windows XP x64. Red Hat Enterprise Linux 4, Red Hat Enterprise Linux 5.
	<b>Management Capabilities</b>	WOL , PXE, DMI, WFM 2.0
	<b>Kit Contents</b>	Intel Gigabit CT Desktop NIC, low profile bracket, CD containing Intel PROset II NIC drivers, quick install guide, product warranty statement

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