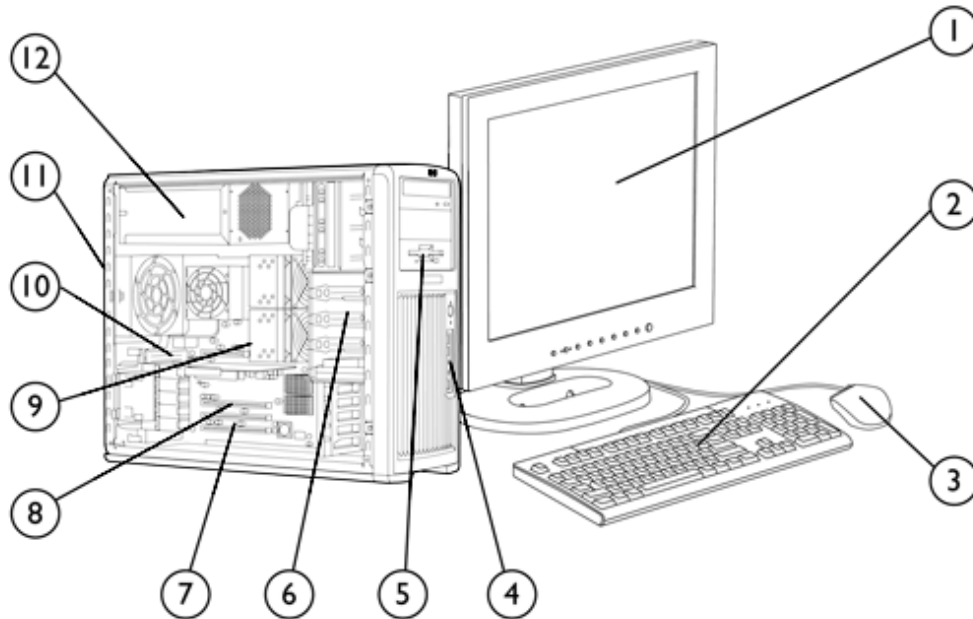


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## Overview



- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Monitor (sold separately)</li> <li>2. Standard Keyboard (USB or PS/2)</li> <li>3. Mouse (USB or PS/2)</li> <li>4. Front IO: 2 USB 2.0, IEEE-1394a (standard), headphone and microphone</li> <li>5. 5.25" external bay for optional diskette drive, optical drive or other 5.25"/3.5" device</li> <li>6. 5 internal 3.5" bays, 3 external 5.25" bays</li> </ol> | <ol style="list-style-type: none"> <li>7. 1 PCI slot, 1 PCI-X slot, 1 PCIe x1 or x8 (selectable), 2 PCIe x8 (x4 electrically)</li> <li>8. 2 PCI Express x16 Gen2 Graphics Bus</li> <li>9. Dual-Core or Quad-Core Intel® Xeon® Processors</li> <li>10. 8 DIMM slots (16 with riser) for DDR2 FB-DIMM memory</li> <li>11. 5 USB 2.0, 1 standard serial port, 2 PS/2, 2 RJ-45, audio line in, audio line out, and microphone in, microphone, 1 IEEE-1394a</li> <li>12. Choice of 800 or 1050 watt, 80 PLUS power supplies</li> </ol> |
|--|---|

<b>Form Factor</b>	Minitower
<b>Compatible Operating Systems</b>	Genuine Windows Vista® 32-bit downgrade to Genuine Microsoft® Windows® XP Professional 32-bit Genuine Windows Vista® 64-bit downgrade to Genuine Microsoft® Windows® XP Professional 64-bit Genuine Windows Vista® Business 32-bit Genuine Windows Vista® Business 64-bit HP Installer Kit for Linux (includes drivers for both 32-bit and 64-bit OS versions of Red Hat Enterprise Linux® WS4 and WS5 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><b>Available Processors</b></p>	<p>Quad-Core Intel Xeon Processor with Intel® 64 Architecture</p> <ul style="list-style-type: none"> <li>• Quad-Core Intel® Xeon® Processor E5405/ 2.00 GHz,1333 MHz FSB, 80 watt</li> <li>• Quad-Core Intel® Xeon® Processor E5410/ 2.33 GHz,1333 MHz FSB, 80 watt</li> <li>• Quad-Core Intel® Xeon® Processor E5420/ 2.50 GHz,1333 MHz FSB, 80 watt</li> <li>• Quad-Core Intel® Xeon® Processor E5430/ 2.66 GHz,1333 MHz FSB, 80 watt</li> <li>• Quad-Core Intel® Xeon® Processor E5440/ 2.83 GHz,1333 MHz FSB, 80 watt</li> <li>• Quad-Core Intel® Xeon® Processor X5450/ 3.00 GHz,1333 MHz FSB, 120 watt</li> <li>• Quad-Core Intel® Xeon® Processor X5460/ 3.16 GHz,1333 MHz FSB, 120 watt</li> <li>• Quad-Core Intel® Xeon® Processor X5470/ 3.33 GHz,1333 MHz FSB, 120 watt</li> <li>• Quad-Core Intel® Xeon® Processor X5472/ 3.00 GHz,1600 MHz FSB, 120 watt</li> <li>• Quad-Core Intel® Xeon® Processor X5482/ 3.20 GHz,1600 MHz FSB, 150 watt</li> <li>• Quad-Core Intel® Xeon® Processor X5492/ 3.40 GHz,1600 MHz FSB, 150 watt</li> </ul> <p>Dual-Core Intel Xeon Processors with Intel® 64 Architecture One or two Dual-Core Intel Xeon Processor 5200 Sequence (Note 1)</p> <ul style="list-style-type: none"> <li>• Intel Xeon E5205/ 1.86 GHz, 6 MB L2, 1066 MHz FSB, 65 watt</li> <li>• Intel Xeon E5240/ 3.00 GHz, 6 MB L2, 1066 MHz FSB, 65 watt</li> <li>• Intel Xeon X5260/ 3.33 GHz, 6 MB L2, 1333 MHz FSB, 80 watt</li> <li>• Intel Xeon X5270/ 3.5 GHz, 6 MB L2, 1333 MHz FSB, 80 watt</li> <li>• Intel Xeon X5272/ 3.40 GHz, 6 MB L2, 1600 MHz FSB, 80 watt</li> </ul>
<p><b>Available Processor Disclaimers</b></p>	<p>Note 1: When ordering two processors, the second processor must be the same as the first. Intel's numbering is 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/for_details">http://www.intel.com/products/processor_number/for_details</a>.</p> <p>64-bit computing on Intel architecture requires a computer system with a processor, chipset, BIOS, operating system, device drivers, and applications enabled for Intel® 64 architecture. Processors will not operate (including 32-bit operation) without an Intel® 64 architecture-enabled BIOS. Performance will vary depending on your hardware and software configurations. See: <a href="http://www.intel.com/info/em64t">http://www.intel.com/info/em64t</a> for more information.</p> <p>Quad-Core and Dual-Core 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><b>Additional Details</b></p>	<ul style="list-style-type: none"> <li>• 64-Bit Quad-Core Intel® Xeon® Processor 5400 Sequence (12 MB L2 cache) or Dual-Core Intel® Xeon® Processor 5200 Sequence (6 MB L2 cache)</li> <li>• Up to 1600 MHz Front Side Bus support</li> <li>• 4-channel 667/800 MHz FB-DIMM memory subsystem</li> <li>• Up to 128 GB memory capacity</li> <li>• PCI Express I/O and PCIe x16 Gen2 graphics</li> <li>• Dual integrated Broadcom 5755 Gigabit LAN on Motherboard (LoM)</li> <li>• 6 channels of Serial ATA (SATA) and 8 channels of Serial Attached SCSI (SAS) 3.0 Gb/s natively supported internally; SATA RAID level 0, 1, 5 and 10 and SAS RAID level 0, 1, 10 available on motherboard*</li> <li>• SATA optical drives</li> <li>• High Definition integrated audio with internal speaker</li> <li>• Choice of 800 or 1050 watt 80 PLUS power supply</li> <li>• ENERGY STAR 4.0 compliance with 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><b>Color</b></p>	<p>Carbonite/Alloy metallic</p>

<b>I/O Slots</b> (see system board section for more details)	<ul style="list-style-type: none"> <li>• 1 PCI 32bit/33MHz slot. (half-length, full-height)</li> <li>• 2 PCI Express Gen2 x16 slots (full-length, full-height)</li> <li>• 2 PCI Express x4 slots - with x8 connectors (full-length, full-height)</li> <li>• 1 PCI Express x8/x1 switchable. (full-length, full-height)</li> <li>• 1 PCI-X 133MHz 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)	<ul style="list-style-type: none"> <li>• Total Bays = 8</li> </ul>
<b>Internal Bays</b>	5 internal 3.5" bays (4 with acoustic dampening rail assemblies)
<b>External Bays</b>	3 external 5.25" bays*  *Third external 5.25" bay is not full-depth, bottom bay is limited to 200mm device depth.
<b>Front I/O</b>	2 USB 2.0, 1 headphone out, Microphone, and 1 IEEE 1394a
<b>Rear I/O</b>	1 IEEE-1394a, 5 USB 2.0, 1 standard serial port, PS/2 keyboard and mouse, 2 RJ-45 to integrated Gigabit LAN, 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
<b>Integrated USB</b>	1 USB 2.0 header (internal)
<b>Chassis Dimensions</b> (H x W x D)	17.9 x 8.3 x 20.7 inches; 45.4 x 21.0 x 52.5 cm
<b>System Weight</b>	Exact weights depend upon configuration Minimum config – 40 lb (19.5 kg) Standard config – 46 lb (21 kg) Maximum config – 62 lb (28 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>	Choice of: <ul style="list-style-type: none"> <li>• 800W 80+ Efficient wide-ranging, active Power Factor Correction</li> <li>• 1050W 80+ Efficient wide-ranging, active Power Factor Correction</li> </ul>
<b>Interfaces Supported</b>	6-channel SATA 3.0 Gb/s Interface (6 Serial-ATA connectors on the motherboard, , 2 channels are eSATA configurable for use with eSATA AMO Kit) 8-channel SAS interface (8 SAS connectors on the motherboard), 2 SAS connectors are capable of External SATA operation 1 EIDE interface (1 EIDE connector), IEEE 1394, USB 2.0
<b>Hard Drive Controllers Supported</b>	SATA and SAS controllers

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## Supported Components

### Processors

Factory Configured	Option Kit	Option Kit Part Number	Support Notes
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**Quad-Core Intel Xeon Processor 5400 Series with Intel® 64 Architecture**

Intel Xeon X5492/ 3.40 GHz, 12MB L2, 1600 MHz, FSB, 150W	Y	Y	FP477AA
Intel Xeon X5482/ 3.20 GHz, 12MB L2, 1600 MHz, FSB, 150W	Y	Y	KY114AA
Intel Xeon X5472/ 3.00 GHz, 12MB L2, 1600 MHz, FSB, 120W	Y	Y	KY115AA
Intel Xeon X5470/ 3.33 GHz, 12MB L2, 1333 MHz, FSB, 120W	Y	Y	FP478AA
Intel Xeon X5460/ 3.16 GHz, 12MB L2, 1333 MHz, FSB, 120W	Y	Y	GX575AA
Intel Xeon X5450/ 3.00 GHz, 12MB L2, 1333 MHz, FSB, 120W	Y	Y	KD215AA
Intel Xeon E5440/ 2.83 GHz, 12MB L2, 1333 MHz, FSB, 80W	Y	Y	GX573AA
Intel Xeon E5430/ 2.66 GHz, 12MB L2, 1333 MHz, FSB, 80W	Y	Y	GX572AA
Intel Xeon E5420/ 2.50 GHz, 12MB L2, 1333 MHz, FSB, 80W	Y	Y	GX571AA
Intel Xeon E5410/ 2.33 GHz, 12MB L2, 1333 MHz, FSB, 80W	Y	Y	GX570AA
Intel Xeon E5405/ 2.00 GHz, 12MB L2, 1333 MHz, FSB, 80W	Y	Y	GX569AA

**Dual-Core Intel Xeon Processors with Intel® 64 Architecture**

Intel Xeon X5272/ 3.40 GHz, 6 MB L2, 1600 MHz FSB, 80 watt	Y	Y	KY116AA
Intel Xeon X5270/ 3.50 GHz, 6 MB L2, 1333 MHz FSB, 80 watt	Y	Y	FP479AA
Intel Xeon X5260/ 3.33 GHz, 6 MB L2, 1333 MHz FSB, 80 watt	Y	Y	GX568AA
Intel Xeon E5240/ 3.00 GHz, 6 MB L2, 1333 MHz FSB, 65 watt	Y	Y	KY198AA
Intel Xeon E5205/ 1.86 GHz, 6 MB L2, 1066 MHz FSB, 65 watt	Y	Y	GX566AA

When ordering two processors, the second processor must be the same as the first. Intel's numbering is 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

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

Quad-Core and Dual-Core 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.

**Memory**

**NOTE:** Dual Channel is only supported when the system is configured with DDR2 symmetric memory (i.e., 2 x 256)

**Configure To Order (CTO)**

**Support Notes**

**PC2-5300F DDR2-667 ECC Full Buffered DIMM CTO**

HP 512MB (1x512) DDR2-667 ECC FBD RAM	
HP 1GB (2x512) DDR2-667 ECC FBD RAM	
HP 2GB (2x1GB) DDR2-667 ECC FBD RAM	
HP 4GB (4x1GB) DDR2-667 ECC FBD RAM	
HP 4GB (2x2GB) DDR2-667 ECC FBD RAM	
HP 8GB (4x2GB) DDR2-667 ECC FBD RAM	
HP 16GB (4x4GB) DDR2-667 ECC FBD RAM	
HP 16GB (8x2GB) DDR2-667 ECC FBD RAM	
HP 16GB(8x2GB)DDR2-667 ECC FBD RAM RISER	Supported ONLY w/dual processors.
HP 32GB (16x2GB) DDR2-667 ECC FBD RAM	Supported ONLY w/dual processors.
HP 64GB (16x4GB) DDR2-667 ECC FBD RAM	Supported ONLY w/dual processors.
HP 128GB (16x8GB) DDR2-667 ECC FBD RAM	Supported ONLY w/dual processors.
<b>PC2-6400F DDR2-800 RAM ECC Fully Buffered DIMM CTO</b>	
HP 4GB (4x1GB) DDR2-800 ECC FBD RAM	Supported ONLY w/dual processors 5272, 5472, 5482
HP 8GB (4x2GB) DDR2-800 ECC FBD RAM	Supported ONLY w/dual processors 5272, 5472, 5482
HP 16GB (8x2GB) DDR2-800 ECC FBD RAM	Supported ONLY w/dual processors 5272, 5472, 5482
HP 16GB(8x2GB)DDR2-800 ECC FBD RAM RISER	Supported ONLY w/dual processors 5272, 5472, 5482
HP 32GB (16x2GB) DDR2-800 ECC FBD RAM	Supported ONLY w/dual processors 5272, 5472, 5482 and 5492. Acoustics waiver required.
HP 32GB(8x4GB)DDR2-800 ECC FBD RAM RISER	Supported ONLY w/dual processors 5272, 5472, 5482
HP 64GB (16x4GB) DDR2-800 ECC FBD RAM	Supported ONLY w/dual processors 5272, 5472, 5482 and 5492. Acoustics waiver required.

**After Market Options (AMO)**

**Option Kit  
Part Number**

**PC2-5300F DDR2-667 ECC Fully Buffered DIMM AMO**

512 MB (1 x 512 MB)	EM159AA
1 GB (1 x 1 GB)	EM160AA
2 GB (1 x 2 GB)	EM161AA
4 GB (1 x 4 GB)	EM162AA
8 GB (1x 8 GB)	

**PC2-6400F DDR2-800 RAM ECC Fully Buffered DIMM AMO**

4GB (1x4GB) DDR2-800 ECC FBD RAM	FS376AA	Supported ONLY w/dual processors 5272, 5472, 5482 and 5492
1GB (1x1GB) DDR2-800 ECC FBD RAM	KY112AA	Supported ONLY w/dual processors 5272, 5472, 5482 and 5492.

2GB (1x2GB) DDR2-800 ECC FBD RAM

KY113AA

Supported ONLY w/dual processors 5272, 5472, 5482 and 5492.

**PCI Express Graphics**

	<b>Factory Configured</b>	<b>Option Kit</b>	<b>Option Kit Part Number</b>	<b>Support Notes</b>	<b>Supported Multi Mixed</b>
<b>Professional 2D</b>					
NVIDIA Quadro NVS 290 256 MB PCIe Graphics Card with 'DMS-59 to Dual DVI cable' included – for Workstations	Y	Y	GN502AA	See note 1	1
HP 'DMS-59 to Dual VGA' Cable Kit	Y	Y	GS567AA		1
NVIDIA Quadro NVS 440 256MB PCIe Graphics Card	N	Y	PT453A	See note 1	1
NVIDIA Quadro NVS 450 512 MB PCIe Graphics Card					
<b>Entry 3D</b>	Y	Y	FH519AA		1
NVIDIA Quadro FX 370 256 MB PCIe Graphics Card	Y	Y	GP528AA	See note 2	1
NVIDIA Quadro FX 570 256 MB PCIe Graphics Card	Y	Y	GR521AA	See note 2	1
<b>Mid-range 3D</b>					
NVIDIA Quadro FX 1700 512 MB PCIe Graphics Card	Y	Y	GP529AA	See note 2	1
ATI FireGL V5600 512 MB PCIe Graphics Card	Y	Y	GT346AA		1
<b>High-end 3D</b>					
NVIDIA Quadro FX 3700 512MB PCI-Express Graphics Card	Y	Y	KD506AA	See note 2	1
NVIDIA Quadro FX 4800 1.5GB PCIe Graphics Card	Y	Y	FQ138AA	See note 2	1
NVIDIA Quadro FX 5600 (PCI Express x16, 1.5 GB, Dual Dual-Link DVI, Stereo) Graphics Card	Y	Y	GU095AA	See note 2; * Requires 1050 watt power supply	1
NVIDIA Quadro FX 5800 4GB PCIe Graphics Card	Y	Y	FZ559AA	See note 2; * Requires 1050 watt power supply	1
NVIDIA Quadro CX – The Accelerator for Creative Suite	Y	Y			1
ATI FireGL V7700 512MB PCIe Graphics Card	Y	Y	KT979AA	See note 2	1

**NOTE 1:** 1 or 2 of these cards are supported - 2nd card can be NVS 440 (After Market Option only) or NVS 290)

**NOTE 2:** 1 or 2 of these cards are supported - 2nd card must match first

I/O card must also be Gen2 in order to realize PCI Express Base 2.0 Specification (also known as PCIe Gen2) graphics performance.

**SAS Hard Drives**      **Sub-Section Description/Notes:** 8 port SAS Controller included on the system board

	<b>Factory Configured</b>	<b>Option Kit</b>	<b>Option Kit Part Number</b>	<b>Support Notes</b>
<b>HP SAS (Serial Attached SCSI) Hard Drives for HP Workstations</b>				
73 GB SAS 10K rpm SFF HDD	Y	Y	GE259AA	
146 GB SAS 10K rpm SFF HDD	Y	Y	GE261AA	
73 GB SAS 15K rpm 3Gb/s HDD	Y	Y	EA329AA	
146GB SAS 15K rpm 3Gb/s 3.5" HDD	Y	Y	EA330AA	
300GB SAS 15K rpm 3Gb/s 3.5" HDD	Y	Y	EM174AA	
450GB SAS 15K rpm 3Gb/s 3.5" HDD	Y	Y	FM803AA	

**Sub-Section Description/Notes:** Up to 5 SATA drives, 5 SAS\* drives, or 6 SAS Small Form Factor (SFF)\* drives

If 1st drive is SATA, 2nd drive can be EITHER SATA or SAS

1 GB = 1 billion bytes. Actual formatted capacity is less. Up to 8 GB of hard drive (or system disk) is reserved for the system recovery software (XP and XP Pro). Up to 12 GB of system disk is reserved for system recovery software. (Vista)

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

80GB SATA 7200 rpm 3Gb/s 3.5" HDD	Y	Y	PY276AA	See note 1
160GB SATA 7200 rpm 3Gb/s 3.5" HDD	Y	Y	PV944A	See note 1
250GB SATA 7200 rpm 3Gb/s 3.5" HDD (for HP xw-Workstations)	Y	Y	EA788AA	See note 1
500GB SATA 7200 rpm 3Gb/s 3.5" HDD	Y	Y	PV943A	See note 1
1000GB (1TB) SATA 7200 rpm 3.0Gb/s 3.5" HDD	Y	Y	GE262AA	See note 1
80GB SATA 10K rpm SFF in 3.5" Frame HDD	Y	Y	EM172AA	See note 1
160GB SATA 10K rpm SFF in 3.5" Frame HDD	Y	Y	EW222AA	See note 1
300GB SATA 10K rpm SFF in 3.5" Frame HDD	Y	Y	FM802AA	

**Sub-Section Description/Notes:** Up to 5 SATA drives, 5 SAS\* drives, or 6 SAS Small Form Factor (SFF)\* drives

If 1st drive is SATA, 2nd drive can be EITHER SATA or SAS

1 GB = 1 billion bytes. Actual formatted capacity is less. Up to 8 GB of hard drive (or system disk) is reserved for the system recovery software (XP and XP Pro). Up to 12 GB of system disk is reserved for system recovery software. (Vista)

**NOTE 1:** NCQ (Native Command Queuing) not supported in Red Hat Enterprise Linux

**Hard Drive Controllers**

	<b>Factory Configured</b>	<b>Option Kit</b>	<b>Option Kit Part Number</b>	<b>Support Notes</b>
<b>Factory integrated RAID on motherboard for SATA drives</b>				
RAID 0 Configuration - Striped Array	Y	N		See note 1
RAID 0 Data Configuration -- Boot/OS Drive + 2 Drive Striped Array	Y	N		See note 2
RAID 1 Configuration - Mirrored Array	Y	N		See note 3
RAID 10 Configuration - Striped/Mirrored Array	Y	N		
RAID 5 Configuration - Parity Array	Y	N		See note 3

**Integrated SATA 3.0 Gb/s Controller**

Integrated SATA 3.0 Gb/s Controller, RAID 0, 1, 10, 5 supported Y Y

**Integrated LSI SAS 1068E Controller with RAID 0, 1, 1E/10E**

Integrated LSI SAS 1068E Controller with RAID 0 (IS), RAID 1(IM), RAID 10(IME) capability Y Y

**HP SAS Back Panel Connector kit**

HP SAS Back Panel Connector kit Y Y Must have 4 or fewer SAS hard drives to configure this option

**HP SAS Back Panel Bulkhead Connector Kit**

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

**LSI MegaRAID® SAS 888ELP Host Bus Adapter (HBA)**

LSI 888ELP 8-port SAS HW RAID Card Y Y GE258AA

All RAID arrays must be less than 2 TB in size

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

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

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

**NOTE 3:** 3 SATA or 3 SAS hard drives required. All hard drives must be identical (size/speed/type/bus/functional capabilities).

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

LSI RAID Definitions:

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

\*\* IM: Mirroring of 2 HDDs into a single logical volume

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

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

**Multimedia and Audio Devices**

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Thin USB Powered Speakers	Y	Y	RD628AA	
SoundBlaster X-Fi XtremeGamer Audio Card (PCI)	Y	Y	GE257AA	
Integrated Intel/Realtek HD ALC262 Audio	Y	Y		

**Optical and Removable Storage**

Factory Configured	Option Kit	Option Kit Part	Support Notes
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			<b>Number</b>	
1.44 MB Diskette Drive (1 only)	Y	Y	DY670A	See NOTE 1
HP 16X DVD-ROM SATA Drive	Y	Y	EW268AA	See NOTE 2
HP 16X DVD+-RW SuperMulti SATA Drive	Y	Y	EW269AA	See NOTE 3

**NOTE 1:** May only order one.

**NOTE 2:** Cannot be 2nd drive.

**NOTE 3:** LightScribe, is supported on Windows ONLY and creates a grayscale image similar to black and white photography. LightScribe media required and sold separately. 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.

Actual speeds may vary. Does not permit copying of commercially available DVD movies or other copy-right protected materials. Intended for creation and storage of your original material and other lawful uses.

**Networking and Communications**

	<b>Factory Configured</b>	<b>Option Kit</b>	<b>Option Kit Part Number</b>	<b>Support Notes</b>
Integrated DUAL Broadcom 5755 NetXtreme Gigabit Ethernet PCIe Controller	Y	N		
Intel Pro 1000 PT PCIe Gigabit NIC Card	Y	Y	EH352AA	
Broadcom 5751 NetXtreme Gigabit Ethernet PCIe NIC	Y	Y	EA833AA	

The term "10/100/1000" or "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.

**Controller Cards**

	<b>Factory Configured</b>	<b>Option Kit</b>	<b>Option Kit Part Number</b>	<b>Support Notes</b>
HP xw8/94 SAS Back Panel Connector Kit	Y	Y	EM164AA	
HP FireWire 800 IEEE-1394b 3-Port PCI Card	Y	Y	EA327AA	
HP FireWire/IEEE 1394a PCI Card	Y	Y	PA997A	

**Input Devices**

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

**Racking and Physical**

<b>Factory</b>	<b>Option</b>	<b>Option</b>	<b>Support</b>
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**Security**

	<b>Configured</b>	<b>Kit</b>	<b>Kit Part Number</b>	<b>Notes</b>
HP xw8/9 PCI Hold Down Kit, Bulk 10 Pack	Y	Y	EN764AA	
HP Business PC Security Lock Kit	Y	Y	PV606AA	
Security Cable with Kensington Lock	Y	Y	PC766A	
xw8400 Slide Rack Kit IT/Broadcast	Y	Y	DY664A	

**Monitors**

	<b>Factory Configured</b>	<b>Option Kit</b>	<b>Option Kit Part Number</b>	<b>Support Notes</b>
HP LP3065 30-inch Widescreen LCD Monitor	Y	Y	EZ320A4	
HP LP2465 24-inch Widescreen LCD Monitor	Y	Y	EF224A4	
HP LP2065 20-inch LCD Monitor	Y	Y	EF227A4	
HP LP1965 19-inch LCD Monitor	Y	Y	RA373AA	

**NOTE:** Supported by all Operating Systems available from HP

**Other Hardware**

	<b>Factory Configured</b>	<b>Option Kit</b>	<b>Option Kit Part Number</b>	<b>Support Notes</b>
HP Workstation Mouse Pad	Y	Y		
HP ENERGY STAR 4.0 Enabled Configuration	Y	Y		
Chassis Intrusion Switch	Y	Y		
HP Internal USB Port Kit	Y	Y	EM165AA	
HP SAS Back Panel Connector Kit	Y	Y	EM164AA	
HP Fan and Front Card Guide Kit	Y	Y	EM163AA	

**Software**

	<b>Factory Configured</b>	<b>Option Kit</b>	<b>Option Kit Part Number</b>	<b>Support Notes</b>
Alert Standard Format specification	Y	Y		Standard
HP Performance Tuning Framework	Y	Y		
Roxio Easy Media Creator (CD or DVD burner)	Y	Y		
Intervideo WinDVD with DVD player	Y	Y		
HP Backup and Recovery	Y	Y		
PDF Complete	Y	Y		
HP ProtectTools Quantity 500 Software	Y	Y		
Microsoft Office 2007 Small Business Edition	Y	Y		
Microsoft Office 2007 Trial Edition	Y	Y		
HP Client Manager Software v6.2 (optional download)	Y	Y		
HP ProtectTools Security	Y	Y		

**Operating Systems**

	<b>Support Notes</b>
Genuine Windows Vista® Business 32-bit with downgrade to Windows® XP Professional 32-bit custom installed	Certain Windows Vista product features require advanced or additional hardware. See <a href="http://www.microsoft.com/windowsvista/getready/hardwarereqs.aspx">http://www.microsoft.com/windowsvista/getready/hardwarereqs.aspx</a> and <a href="http://www.microsoft.com/windowsvista/getready/capable.aspx">http://www.microsoft.com/windowsvista/getready/capable.aspx</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> . (See para below which

also applies)

Genuine Windows Vista® Business 64-bit with downgrade to Windows® XP Professional x64 custom installed

(See paragraph above which also applies) Windows Vista Business disk also 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 32-bit

Genuine Windows Vista® Business 64-bit

HP Linux Installer Kit

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## System Technical Specifications

<b>System Board</b>	
<b>System Board Form Factor</b>	SSI-EEB (E-ATX 12" x 13")
<b>Processor Socket</b>	Dual LGA 771
<b>Chipset</b>	Intel® 5400
<b>Super I/O Controller</b>	SMSC SCH5327
<b>DIMM Connectors (FBD DDR2)</b>	8 (16 with Risers)
<b>Memory</b>	
<b>Maximum Memory</b>	<p>Supports up to 128 GB of DDR2 Fully Buffered DIMMs . Memory risers are required to support larger memory configurations (at launch, Configure-to-order HP xw8600 Workstations ordered with more than 16 GB of memory will require riser modules). Large capacity 8 GB DIMMs require the use of riser cards. No quad ranked DIMM should be used in the HP xw8600 without riser cards.</p>
	<p>The diagram illustrates five different DIMM configurations on a system board. From left to right:         <ul style="list-style-type: none"> <li><b>single DIMM configuration:</b> One DIMM module is installed in the first socket, labeled 'socket 1'.</li> <li><b>two DIMM configuration:</b> Two DIMM modules are installed in the first two sockets.</li> <li><b>four DIMM configuration:</b> Four DIMM modules are installed in the first four sockets.</li> <li><b>six DIMM configuration:</b> Six DIMM modules are installed in the first six sockets.</li> <li><b>eight DIMM configuration:</b> Eight DIMM modules are installed in all eight sockets.</li> </ul> </p>

	DIMM Size	Slot															
		Slot 1		Slot 2		Slot 3		Slot 4		Slot 5		Slot 6		Slot 7		Slot 8	
	512 MB (single channel performance configuration)	512 MB															
	1 GB	1 GB															
	1 GB	512 MB						512 MB									
	2 GB	1 GB						1 GB									
	2 GB	512 MB				512 MB				512 MB				512 MB			
	4 GB	1 GB				1 GB				1 GB				1 GB			
	4 GB	512 MB		512 MB		512 MB		512 MB		512 MB		512 MB		512 MB		512 MB	
	6 GB	1 GB		1 GB		1 GB		1 GB		1 GB		1 GB		1 GB		1 GB	
	8 GB	2 GB				2 GB				2 GB				2 GB		2 GB	
	8 GB	1 GB		1 GB		1 GB		1 GB		1 GB		1 GB		1 GB		1 GB	
	16 GB (riser)	8 GB						8 GB									
	16 GB	2 GB		2 GB		2 GB		2 GB		2 GB		2 GB		2 GB		2 GB	
	16 GB	4 GB				4 GB				4 GB				4 GB		4 GB	
	32 GB	4 GB		4 GB		4 GB		4 GB		4 GB		4 GB		4 GB		4 GB	
	32 GB (requires riser cards)	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB
	64 GB (requires riser cards)	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB
	128 GB (requires riser cards)	8 GB	8 GB	8 GB	8 GB	8 GB	8 GB	8 GB	8 GB	8 GB	8 GB	8 GB	8 GB	8 GB	8 GB	8 GB	8 GB
<b>Memory Configuration</b> (Supported)	Not all memory configurations possible are represented below. Also, 512 MB configurations are not supported for 64-Bit operating systems.																
<b>DDR2 ECC REGISTERED FB-DIMM MEMORY</b>	<p>Use only fully-buffered, PC2-5300F DIMMS (FB-DIMMs). Match DIMMs by size and type. With the exception of the single-DIMM configuration, all memory should be added in like pairs. Use HP memory only.</p> <p>If using only one DIMM, install in socket 1 (bottom DIMM slot when rear inputs/outputs of motherboard are facing left). If using 2 DIMMs, install in sockets 1 &amp; 5, matched by size and type. If using more than 2 DIMMs, pairs must be matched by size and type in sockets 1 and 3, 5 and 7, 2 and 4, and 6 and 8; this may require moving the DIMM in socket 5 to socket 3. If using 8 DIMMs, install in all sockets.</p>																
<b>PCI Express Connectors</b> (Gen2 Rev 0.7 connectors)	1 PCI Express x16 Gen2 graphics slot 75W+75W 1 PCI Express x16 Gen2 (x16 or x8 selectable) 75W+75W 1 PCI Express x8 (x8 or x1 selectable) 2 PCI Express x8 (x4 electrically)																
<b>PCI Connectors</b> (5.0V)	1 half-length/full-height 33 MHz 32-Bit 1 PCI-X 133MHz (full length/height)																
<b>Interfaces Supported</b>	<b>SATA</b>				6 SATA only connectors 2 of these SATA connectors (color coded red) can be used for External SATA (eSATA) with the appropriate eSATA After Market Option kit												
<b>Serial Attached SCSI Integrated RAID</b>	8 SAS connectors																
	Integrated SATA Raid <ul style="list-style-type: none"> <li>• RAID 0, 1, 10, 5</li> <li>• Supports one RAID array with 2-6 drives</li> <li>• RAID 0 configuration – striped array</li> <li>• RAID 0 configuration – data array</li> <li>• RAID 1 configuration – mirrored array</li> <li>• RAID 10 configuration – stripe of mirrors</li> </ul>																

	<ul style="list-style-type: none"> <li>RAID 5 configuration – parity striping</li> </ul> <p><b>Notes:</b> NOTE: 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.</p> <p>Integrated SAS Raid (LSI 1068X)</p> <ul style="list-style-type: none"> <li>RAID 0, 1, 10</li> <li>Support one RAID array with 2-5(6 using 2.5" drives) drives</li> <li>Supports two RAID arrays with 2 drives each</li> <li>RAID 0 Configuration – Striped Array</li> <li>RAID 1 Configuration – Mirrored Array</li> <li>RAID 10 Configuration – Stripe of Mirrors</li> <li>External RAID arrays possible</li> </ul> <p><b>Notes:</b> NOTE: Specific user-configured hardware SAS RAID configurations are supported on this Linux system. Please visit: <a href="http://www.hp.com/support/linux_hardware_matrix">http://www.hp.com/support/linux_hardware_matrix</a> for details.</p>	
<b>PCI-X Connectors</b>	1 full-length/full-height 133 MHz 64-Bit	
<b>PCI Card Guide</b>	Optional, tool-free support for all full-length cards with PCI extender	
<b>Integrated Gigabit Ethernet</b>	2 Broadcom BCM5755 A2	
<b>Wake on LAN</b>	Yes	
<b>Integrated Trusted Platform Module</b>	TPM 1.2	
<b>ASF 1.0 &amp; 2.0 (Alert Standard Format)</b>	Yes	
<b>IEEE 1394 Connector(s)</b>	<b>Front</b>	1 IEEE 1394a header for front connector (Not supported in Linux)
	<b>Rear</b>	1 IEEE 1394a rear connector
<b>USB Connector(s)</b>	<b>Front</b>	2 on header for front connectors
	<b>Rear</b>	5 rear
	<b>Internal</b>	1 internal
<b>HD Integrated Audio</b>	High Definition Integrated Realtek ALC262 Audio with Line in, Line Out, Microphone, Headphone	
<b>Flash ROM</b>	Yes	
<b>CPU Fan Header</b>	2	
<b>Chassis Fan Header</b>	2	
<b>CMOS Battery Holder - Lithium</b>	Yes	
<b>Power Supply Headers</b>	2x12 connector, 2x4 CPU connector, 2x3 memory connector	
<b>Power Switch, Power LED &amp; Hard Drive LED Header</b>	Power switch, power LED, and hard drive LED cables connect to the Control Panel connector. There is also a 2 pin header to connect a SCSI LED cable to the motherboard.	
<b>Clear Password Jumper</b>	Yes	
<b>Power Supply</b>	800W Custom PSU - (Wide Ranging, Active PFC) 1050W Custom PSU - (Wide Ranging, Active PFC)	
<b>Operating Voltage Range</b>	90 - 269 VAC	
<b>Rated Voltage Range</b>	100 - 240 VAC, 118 VAC	
<b>Rated Line Frequency</b>	50/60Hz, 400Hz	
<b>Operating Line Frequency Range</b>	47 - 66 Hz, 393 - 407 Hz	

This is the rated power to be used in Energy Star equipment

<b>Rated Input Current</b>	800W Custom PSU: 10.0A @ 100-127 VAC, 6A @ 200-240 VAC, 9.5A @ 118 VACC 1050W Custom PSU: 13.2A @ 100-127 VAC, 6.6A @ 200-240 VAC, 12.0A @ 118 VAC						
<b>Heat Dissipation</b>	800W Custom PSU: Typical 1530 btu/hr (386 kg-cal/hr), Maximum 2027 btu/hr (511 kg-cal/hr) 1050W Custom PSU: Typical 3136 btu/hr (791 kg-cal/hr), Maximum 4480 btu/hr (1129kg-cal/hr)						
<b>Power Supply Fan</b>	92x32 mm variable speed						
<b>ENERGY STAR® qualified</b> (Config Dependent)	NO (after June 30, 2009)						
<b>80 PLUS Compliant</b>	Yes						
<b>FEMP Standby Power Compliant 115V</b> (Wake-on LAN disabled) (<2W in S5 - Power Off)	Yes						
<b>Power consumption in sleep mode</b> (as defined by ENERGY STAR) - Suspend to RAM (S3)	800W Custom PSU: <20W 1050W Custom PSU: <25W						
<b>CD-ROM IN</b> (audio)	No						
<b>AUX IN</b> (audio)	Yes						
<b>Clear CMOS Button</b>	Yes						
<b>Chassis Speaker Header</b>	Yes						
<b>Multibay Header</b>	No						
<b>Integrated Gigabit Ethernet</b>	2 Broadcom BCM5755 A2						
<b>Hood Lock Header</b>	Yes						
<b>Hood Sensor Header</b>	Yes, as part of the front control panel header, connected by cable-to-switch. Cable/Switch assembly is a configure-to-order option.						
<b>System Configurations</b>							
<b>Example Configuration #1</b>	<b>Processor Info</b>	1x Xeon 5130 2.00GHz					
	<b>Memory Info</b>	4x1GB DR 667MHz					
	<b>Graphics Info</b>	1xFX1700					
	<b>Disks/Optical/Floppy</b>	1x160GB SATA/1 Optical/1 Floppy					
<b>Energy Consumption</b>		<b>115 VAC LAN Enabled</b>	<b>115 VAC LAN Disabled</b>	<b>230 VAC LAN Enabled</b>	<b>230 VAC LAN Disabled</b>	<b>100 VAC LAN Enabled</b>	<b>100 VAC LAN Disabled</b>
	<b>Windows Idle (S0)</b>	140.2W	140.2W	137.9W	137.9W	141.3W	141.3W
	<b>Windows Busy Typ(S0)</b>	190.3W	190.3W	182.7W	182.7W	192.3W	192.3W
	<b>Windows Busy Max (S0)</b>	203.1W	203.1W	201.8W	201.8W	200.8W	200.8W
	<b>Sleep (S3)</b>	6.26W	4.59W	6.53W	4.92	6.25W	4.61W
	<b>Off (S5)</b>	3.00W	1.39W	3.29W	1.68W	2.97W	1.36W
<b>Heat Dissipation</b>		<b>115 VAC LAN Enabled</b>	<b>115 VAC LAN Disabled</b>	<b>230 VAC LAN Enabled</b>	<b>230 VAC LAN Disabled</b>	<b>100 VAC LAN Enabled</b>	<b>100 VAC LAN Disabled</b>
	<b>Windows Idle (S0)</b>	478.5 btu/hr	478.5 btu/hr	470.6 btu/hr	470.6 btu/hr	482.3 btu/hr	482.3 btu/hr

	<b>Windows Busy Typ(S0)</b>	649.5 btu/hr	649.5 btu/hr	623.6 btu/hr	623.6 btu/hr	656.3 btu/hr	656.3 btu/hr
	<b>Windows Busy Max (S0)</b>	693.2 btu/hr	693.2 btu/hr	688.7 btu/hr	688.7 btu/hr	685.3 btu/hr	685.3 btu/hr
	<b>Sleep (S3)</b>	21.4 btu/hr	15.7 btu/hr	22.3 btu/hr	21.4 btu/hr	15.7 btu/hr	22.3 btu/hr
	<b>Off (S5)</b>	10.2 btu/hr	4.71 btu/hr	11.2 btu/hr	10.2 btu/hr	4.71 btu/hr	11.2 btu/hr
<b>Declared Noise Emissions (Entry-level)</b>							
<b>System Configuration (Entry level)</b>	<b>Processor Info</b>	Dual Intel Xeon E5440 2.83GHz CPUs					
	<b>Memory Info</b>	4 x 1GB FBD memory					
	<b>Graphics Info</b>	NVIDIA NVS 290 graphics, 800 W PSU					
	<b>Disks/Optical/Floppy</b>	One 250 GB 7200RPM SATA, Floppy, and DVD ROM optical					
<b>Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)</b>				<b>Sound Power (LWAd, bels)</b>		<b>Deskside Sound Pressure (LpAm, decibels)</b>	
	<b>Idle</b>			4.2		24	
	<b>SATA Hard drive Operating (random reads)</b>			4.2		24	
	<b>Floppy Drive Operating (continuous copy)</b>			4.5		28	
	<b>DVD-ROM Operating (sequential reads)</b>			5.1		36	
<b>System Configuration (High-end)</b>	<b>Processor Info</b>	Dual Intel Xeon E5460 3.16 GHz CPUs					
	<b>Memory Info</b>	4 x 1GB FBD memory					
	<b>Graphics Info</b>	nVidia FX4600 Graphics, 1050 W PSU					
	<b>Disks/Optical/Floppy</b>	Two 146 GB 15K RPM SAS, Floppy, and DVD ROM optical					
<b>Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)</b>				<b>Sound Power (LWAd, bels)</b>		<b>Deskside Sound Pressure (LpAm, decibels)</b>	
	<b>Idle</b>			4.7		29	
	<b>SATA Hard drive Operating (random reads)</b>			4.9		31	
	<b>Floppy Drive Operating (continuous copy)</b>			4.9		31	
	<b>DVD-ROM Operating (sequential reads)</b>			5.2		36	

<b>Physical Security and Serviceability</b>	
<b>Access Panel</b>	Tool-less, one-handed
<b>Optical Drive</b>	Tool-less
<b>Floppy Drive</b>	Drive requires screws to attach to bracket, once attached to mounting bracket, it latches tool-lessly to chassis
<b>Hard Drives</b>	Tool-less
<b>Expansion Cards</b>	Tool-less
<b>Green User Touch Points</b>	Yes, on tool-free internal chassis mechanisms
<b>Color-coordinated Cables and Connectors</b>	Yes
<b>Memory</b>	Tool-less, can be upgraded without removing any internal components
<b>Restore CD Set</b>	Restores the computer to its original factory shipping image - Can be obtained via HP Support

<b>Dual Function Front Power Switch</b>	Causes a fail-safe power off when held for 4 seconds
<b>Padlock Support</b>	Prevents entire system theft and discourages access panel removal. 7mm diameter padlock loop at rear of system. (optional)
<b>Cable Lock Support</b>	Kensington Cable Lock: Prevents entire system theft only. 3mm x 7mm slot at rear of system (optional)
<b>Universal Chassis Clamp Lock Support</b>	The version without a cable discourages access panel removal and prevents theft of IO devices. The version with a cable additionally prevents entire system theft and allows multiple systems to be secured with a single cable. (optional)
<b>Serial, Parallel, USB, Audio, Network, Enable/Disable Port Control</b>	Enables or disables serial, parallel, USB, audio, SAS and network ports
<b>Removable Media Write/Boot Control</b>	Prevents ability to boot from removable media on supported devices (and can disable writes to media)
<b>Power-On Password</b>	Prevents an unauthorized person from booting up the workstation
<b>Setup Password</b>	Prevents an unauthorized person from changing the workstation configuration
<b>CPUs and Heatsinks</b>	A torx driver is needed to remove the CPU heatsink before the CPU can be removed. CPU removal is tool-less
<b>OS CD (Restore OS CD)</b>	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.
<b>ASF 2.0 support (Alert Standard Format)</b>	Industry-standard specification for network alerting in operating system-absent environments
<b>Power Supply Fans</b>	92 mm x 32 mm
<b>CPU Heatsink Fan(s)</b>	80 mm x 15 mm (single or dual)
<b>Chassis Fans</b>	One 120 mm x 25 mm
<b>Memory Fans</b>	92 mm x 25 mm (for systems without memory risers)
<b>Insight Diagnostics</b>	<p>HP Insight Diagnostics Offline Edition</p> <p>The diagnostics utility enables you to perform testing and to view critical computer hardware and software configuration information from various sources. This utility enables you to:</p> <ul style="list-style-type: none"> <li>• Run diagnostics</li> <li>• View the hardware configuration of the system</li> </ul> <p>Key features and benefits</p> <p>HP 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>
<b>Access Panel Key Lock</b>	Prevents removal of the access panel and all internal components including optical and floppy drives

<b>BIOS</b>	
<b>BIOS 32-bit Services</b>	Standard BIOS 32-Bit Service Directory Proposal v0.4
<b>PCI 3.0 Support</b>	Full BIOS support for PCI Express through industry standard interfaces.
<b>ATAPI</b>	ATAPI Removable Media Device BIOS Specification Version 1.0



<b>BBS</b>	BIOS Boot Specification v1.01
<b>WMI Support</b>	WMI is Microsoft's implementation of Web-Based Enterprise Management (WBEM) for Windows. WMI is fully compliant with the Distributed Management Task Force (DMTF) Common Information Model (CIM) and WBEM specifications.
<b>BIOS Boot Spec 1.01+</b>	Provides more control over how and from what devices the workstation will boot.
<b>ROM Based Computer Setup Utility (F10)</b>	Review and customize BIOS settings
<b>System/Emergency ROM Flash Recovery with Video</b>	Recovers corrupted system BIOS
<b>Replicated Setup</b>	Saves BIOS settings to diskette or USB disk-on-key in human readable file. Repset.exe utility can then replicate these settings on machines being deployed without entering ROM-based F10 setup
<b>SMBIOS</b>	System Management BIOS 2.5, previously known as DMI BIOS, for system management information
<b>Boot Control</b>	Prevents ability to boot from removable media on supported devices (and can disable writes to media)
<b>Memory Change Alert</b>	Alerts management console if memory is removed or changed
<b>Thermal Alert</b>	Monitors the temperature state within the chassis. Three modes: <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>• 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> <li>• Supports ACPI 2.0 for full compatibility with 64-bit operating systems</li> </ul>
<b>Ownership Tag</b>	Allows user or MIS to set unique tag string in ROM
<b>Remote Wakeup/Remote Shutdown</b>	<ul style="list-style-type: none"> <li>• System administrators can power on, restart, and power off a client computer from a remote location.</li> <li>• Enables cost-effective power consumption when the administrator needs to distribute software, perform security management, or update the ROM.</li> </ul>
<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>	Identifies system BIOS revision level and reports in ROM-based F10 setup. Version is stored in an industry standard memory location (SMBIOS) so that management SW applications can use and report this information
<b>System board revision level</b>	Allows management SW to read the revision level of the system board
<b>Start-up Diagnostics (Power-on Self-Test)</b>	Review and customize BIOS settings

<b>Auto Setup when new hardware installed</b>	System automatically detects addition of new hardware
<b>Keyboard-less Operation</b>	The system can be operated without a keyboard
<b>Localized ROM Setup</b>	Common BIOS image supports configuration (Setup) in 12 languages, with local keyboard mappings
<b>Asset Tag</b>	Allows user or MIS to set unique tag string in ROM
<b>Per-slot Control</b>	Allows individual slot configuration (option ROM., latency)
<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 2.0c
<b>ASF</b>	Alert Standard Format Specification, Version 2.0
<b>ATA (IDE)</b>	AT Attachment 6 with Packet Interface (ATA/ATAPI-6), Revision 3b
<b>CD Boot</b>	"El Torito" Bootable CD-ROM Format Specification Version 1.0
<b>EDD</b>	<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>
<b>PCI</b>	<ul style="list-style-type: none"> <li>PCI Local Bus Specification, Revision 2.3</li> <li>PCI Power Management Specification, Revision 1.1</li> </ul>
<b>PCI Express</b>	PCI Express Base Specification, Revision 1.1
<b>PMM</b>	POST Memory Manager Specification, Version 1.
<b>SATA</b>	<ul style="list-style-type: none"> <li>Serial ATA Specification, Revision 1.0a</li> <li>Serial ATA 3 Gb/s: Extensions to Serial ATA 1.5 Gb/s, Revision 1.0</li> </ul>
<b>SPD</b>	PC SDRAM Serial Presence Detect (SPD) Specification, Revision 1.2B
<b>TPM</b>	Trusted Computing Group TPM Specification Version 1.2
<b>UHCI</b>	Universal Host Controller Interface Design Guide, Revision 1.1
<b>USB 1.1</b>	Universal Serial Bus Revision 1.1 Specification
<b>USB 2.0</b>	Universal Serial Bus Revision 2.0 Specification
<b>SMBIOS</b>	System Management BIOS Reference Specification, Version 2.5

<b>System Software Management and Updating</b>	
<b>HP Client Management Solutions</b>	Visit: <a href="http://www.hp.com/go/easydeploy">http://www.hp.com/go/easydeploy</a>
<b>Social and Environmental Responsibility</b>	
<b>Eco-Label Certifications &amp; Declarations</b>	<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>US Energy Star 4.0 (Not in Linux)</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</p>

	<p><b>Label System.'</b></p>
<p><b>Batteries</b></p>	<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>
<p><b>Restricted Material Usage</b></p>	<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>• Certain Azo Colorants</li> <li>• Certain Brominated Flame Retardants - may not be used as flame retardants in plastics</li> <li>• Cadmium</li> <li>• Chlorinated Hydrocarbons</li> <li>• Chlorinated Paraffins</li> <li>• Formaldehyde</li> <li>• Halogenated Diphenyl Methanes</li> <li>• Lead carbonates and sulfates</li> <li>• Lead and Lead compounds</li> <li>• Mercuric Oxide Batteries</li> <li>• Nickel - finishes must not be used on the external surface designed to be frequently handled or carried by the user.</li> <li>• Ozone Depleting Substances</li> <li>• Polybrominated Biphenyls (PBBs)</li> <li>• Polybrominated Diphenyl Ethers (PBDEs)</li> <li>• Polybrominated Biphenyl Oxides (PBBOs)</li> <li>• Polychlorinated Biphenyl (PCB)</li> <li>• Polychlorinated Terphenyls (PCT)</li> <li>• Polyvinyl Chloride (PVC), except for wires and cables and certain retail packaging, has been voluntarily removed from most applications.</li> <li>• Radioactive Substances</li> <li>• Tributyl Tinches (TBT), Triphenyl Tinches (TPT), Tributyl Tin Oxide (TBTO)</li> </ul>
<p><b>Packaging</b></p>	<p>HP follows these guidelines to decrease the environmental impact of product packaging:</p> <ul style="list-style-type: none"> <li>• Eliminate the use of heavy metals such as lead, chromium, mercury, and cadmium in packaging materials.</li> <li>• Eliminate the use of ozone-depleting substances (ODS) in packaging materials.</li> <li>• Design packaging materials for ease of disassembly.</li> <li>• Maximize the use of post-consumer recycled content materials in packaging materials.</li> <li>• Use readily recyclable packaging materials such as paper and corrugated materials.</li> <li>• Reduce 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>
<p><b>Longevity and Upgrading</b></p>	<ul style="list-style-type: none"> <li>• 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. Upgradability features contained in the product include:</li> <li>• Intel LGA775 processor sockets</li> <li>• 8 USB ports</li> <li>• 1 PCI 32-bit/33MHz slot, 1 PCI-X slot and 5 PCI Express slots</li> <li>• 8 expansion bays</li> </ul>

	<ul style="list-style-type: none"> <li>• 8 - 16 memory slots, depending on configuration</li> </ul>
<b>Packaging Materials</b>	
<b>External</b>	Cardboard carton and insert: 2.70 kg
<b>Internal</b>	LDPE Foam: 0.35 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>	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>
<b>Service, Support and Warranty</b>	On-site Warranty and Service ( <sup>Note 1</sup> ): This three-year, limited warranty and service offering delivers three years of on-site, next business-day ( <sup>Note 2</sup> ) service for parts and labor and includes free telephone support ( <sup>Note 3</sup> ) 8am - 5pm. Global coverage ( <sup>Note 2</sup> ) 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 <b>NOTE 1:</b> Terms and conditions may vary by country. Certain restrictions and exclusions apply. <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. <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.
<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> <li>• This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive - 2002/96/EC.</li> <li>• Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.</li> <li>• This product contains 0% recycled materials (by wt.)</li> <li>• This product is &gt;90% recycle-able when properly disposed of at end of life.</li> </ul>

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## Technical Specifications - Processors

<b>Processors</b>	Intel Xeon X5492/ 3.40 GHz, 12MB L2, 1600 MHz, FSB, 150W	FP477AA
	Intel Xeon X5482/ 3.20 GHz, 12MB L2, 1600 MHz, FSB, 150W	KY114AA
	Intel Xeon X5472/ 3.00 GHz, 12MB L2, 1600 MHz, FSB, 120W	KY115AA
	Intel Xeon X5470/ 3.33 GHz, 12MB L2, 1333 MHz, FSB, 120W	FP478AA
	Intel Xeon X5460/ 3.16 GHz, 12MB L2, 1333 MHz, FSB, 120W	GX575AA
	Intel Xeon X5450/ 3.00 GHz, 12MB L2, 1333 MHz, FSB, 120W	KD215AA
	Intel Xeon E5440/ 2.83 GHz, 12MB L2, 1333 MHz, FSB, 80W	GX573AA
	Intel Xeon E5430/ 2.66 GHz, 12MB L2, 1333 MHz, FSB, 80W	GX572AA
	Intel Xeon E5420/ 2.50 GHz, 12MB L2, 1333 MHz, FSB, 80W	GX571AA

Intel Xeon E5410/ 2.33 GHz, 12MB L2, 1333 MHz, FSB, 80W

GX570AA

Intel Xeon E5405/ 2.00 GHz, 12MB L2, 1333 MHz, FSB, 80W

GX569AA

## Introduction

The Quad-Core Intel® Xeon® Processor 5400 Series is a workstation processor utilizing four 45-nm Hi-k next generation Intel® Core™ microarchitecture cores. The processor is manufactured on Intel's 45 nanometer process technology combining high performance with the power efficiencies of a low-power microarchitecture. These processors maintain the tradition of compatibility with IA-32 software. Some key features include on-die, primary 32-kB instruction cache and 32-kB write-back data cache in each core and 12 MB (2 x 6MB) Level 2 cache with Intel® Advanced Smart Cache Architecture. The 1333 MHz Front Side Bus (FSB) is a quad-pumped bus running off a 333 MHz system clock making 10.66 GBytes per second data transfer rates possible. The 1600 MHz Front Side Bus (FSB) is a quad-pumped bus running off a 400 MHz system clock making 12.80 GBytes per second data transfer rates possible. Quad-Core Intel Xeon Processor 5400 Series supports Enhanced Intel SpeedStep® Technology\*. This technology enables the processor to switch between multiple frequency and voltage points, which results in platform power savings.

In addition, the Quad-Core Intel® Xeon® Processor 5400 Series supports the Execute Disable Bit functionality. When used in conjunction with a supporting operating system, Execute Disable allows memory to be marked as executable or non executable. This feature can prevent some classes of viruses that exploit buffer overrun vulnerabilities and can thus help improve the overall security of the system.

**NOTE:** When ordering two processors, the second processor must be the same as the first. Intel's numbering is 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.

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

Quad-Core and Dual-Core 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.

## Performance and Features

- Quad-core processing
  - Significantly increases performance headroom over previous generation dual-core processors
  - Helps boost an operating system's ability to multitask
- 1333 and 1600 MHz Front Side Bus
  - 12 MB shared L2 cache
  - Reduces latency and maximizes the use of main memory-to-processor bandwidth
  - Cache is dynamically allocated between cores, as needed
- Intel Extended Memory 64 Technology (EM64T)
- Enhanced Halt State (C1E)
- Demand Based Switching
- Enhanced Intel SpeedStep Technology
- Virtualization Technology
  - Supports software-based virtualization
  - Enables migration of 64-bit O/Ss and applications to virtual environments
- Smart Memory Access
- Intel Thermal Monitor 2

**NOTE:** Not supported on the E5405 processor.

## Service and Support

The Quad-Core Intel Xeon Processor 5400 Sequence has a one-year limited warranty or the remainder of the warranty of the HP product in which they are installed. Technical support is available seven days a week, 24 hours a day by phone, as well as online support forums. Certain restrictions and exclusions apply.

Speeds	System Bus Frequency	Cache Type
3.40 GHz	1600 MHz Front Side Bus	12MB shared L2 cache
3.20 GHz	1600 MHz Front Side Bus	12MB shared L2 cache
3.00 GHz	1600 MHz Front Side Bus	12MB shared L2 cache
3.33 GHz	1333 MHz	12MB L2
3.16 GHz	1333 MHz	12MB L2
3.00 GHz	1333 MHz	12MB L2
2.83 GHz	1333 MHz	12MB L2
2.66 GHz	1333 MHz	12MB L2
2.50 GHz	1333 MHz	12MB L2
2.33 GHz	1333 MHz	12MB L2
2.00 GHz	1333 MHz	12MB L2

<b>Maximum Virtual Memory</b>	Limited by OS
<b>SIMD Extensions Supported</b>	SSE2, SSE3 and SSE4.1

<b>Processors</b>	Intel Xeon E5205/ 1.86 GHz, 6 MB L2, 1066 MHz FSB, 65 watt	GX566AA
	Intel Xeon E5240/ 3.00 GHz, 6 MB L2, 1333 MHz FSB, 65 watt	KY198AA
	Intel Xeon X5260/ 3.33 GHz, 6 MB L2, 1333 MHz FSB, 80 watt	GX568AA
	Intel Xeon X5270/ 3.50 GHz, 6 MB L2, 1333 MHz FSB, 80 watt	FP479AA
	Intel Xeon X5272/ 3.40 GHz, 6 MB L2, 1600 MHz FSB, 80 watt	KY116AA

Speeds	System Bus Frequency	Cache Type
1.86 GHz	1066 MHz FSB	L2
3.00 GHz	1333 MHz FSB	L2
3.33 GHz	1333 MHz FSB	L2
3.50 GHz	1333 MHz FSB	L2
3.40 GHz	1600 MHz FSB	L2

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## Technical Specifications - Graphics

<b>NVIDIA Quadro NVS 290 256 MB PCIe Graphics Card</b>	<b>Form Factor</b>	Low Profile
	<b>Bus Type</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
<b>Option kit contents</b>	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.

<b>NVIDIA Quadro NVS 440 256 MB Graphics Controller</b>	<b>Form Factor</b>	ATX
	<b>Graphics Controller</b>	2 nv43 2D graphics processor units (GPUs)
	<b>VGA controller</b>	Integrated into the Quadro GPU
	<b>Bus Type</b>	PCI-E x16
	<b>RAMDAC</b>	Dual 350 MHz
	<b>Memory</b>	256 MB DDR frame buffer and Texture storage (128MB per GPU)
	<b>Connector</b>	Two DMS-59
	<b>Controller clock speed</b>	250 MHz
	<b>Color planes</b>	32-bit color buffer
	<b>Overlay planes</b>	1 16-bit Video overlay plane
	<b>Maximum pixel clock</b>	350 MHz
	<b>Multi-Monitor Support</b>	Up to 4 analog or digital monitors
	<b>Single DVI Support</b>	Yes
<b>Dual DVI Support</b>	Yes	

<b>High-definition Video Processor (HDVP)</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>Available graphics drivers</b>	Microsoft Windows Vista Business 32 or 64, Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Linux - Full Open GL implementation, complete with NVIDIA and ARB extensions. 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> .

<b>NVIDIA Quadro NVS 450 512 MB PCIe Graphics Card</b>	<b>Form Factor</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: <a href="http://download.nvidia.com/novell">http://download.nvidia.com/novell</a> or <a href="http://www.nvidia.com">http://www.nvidia.com</a>
	<b>Power consumption</b>	35 Watts

<b>NVIDIA Quadro FX 370 256 MB PCIe Graphics Card</b>	<b>Form Factor</b>	ATX
	<b>Bus Type</b>	PCI-Express x16
	<b>Memory</b>	256 MB 400MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
	<b>Connectors</b>	DVI-I (dual-link) and DVI-I (single-link)
	<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) and 3840x2400 (dual-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft® Windows®
	<b>RAMDAC</b>	Integrated dual 400MHz
<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) and 3840x2400 (dual-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft® Windows®	



<b>Shading Architecture</b>	Fully programmable GPU (OpenGL 2.1/DirectX 10 class) Vertex/Pixel Shader 4.0 Shading Support (HLSL, GLSL, CgFX)
<b>Supported Graphics APIs</b>	OGL 2.1 & SM4.0 and DirectX10 Support
<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) WS3, WS4 & 5 Desktop/Workstation 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>	High Resolution Anti-Aliasing PureVideo 2 engine supports AES 128-bit decryption GPU Computing (HW/SW including CUDA SDK) 3D Textures LightSpeed Memory Architecture II 128-bit color precision Hardware accelerated anti-aliased points and lines Hardware OpenGL overlay planes H/W accelerated pixel readback 3rd generation occlusion culling AA on scan-out
<b>Power consumption</b>	<50 W

<b>NVIDIA Quadro FX 570 256 MB PCIe Graphics Card</b>	<b>Form Factor</b>	ATX
	<b>Bus Type</b>	PCI-Express x16
	<b>Memory</b>	256 MB 400MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
	<b>Connectors</b>	DVI-I (dual-link) and DVI-I (dual-link)
	<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) and 3840x2400 (dual-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft® Windows®
	<b>RAMDAC</b>	Integrated dual 400MHz
	<b>Shading Architecture</b>	Fully programmable GPU (OpenGL 2.1/DirectX 10 class) Vertex/Pixel Shader 4.0 Shading Support (HLSL, GLSL, CgFX)
	<b>Supported Graphics APIs</b>	OGL 2.1 & SM4.0 and DirectX10 Support
	<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) WS3, WS4 & 5 Desktop/Workstation 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>	High Resolution Anti-Aliasing PureVideo 2 engine supports AES 128-bit decryption GPU Computing (HW/SW including CUDA SDK) 3D Textures LightSpeed Memory Architecture II 128-bit color precision

	Hardware accelerated anti-aliased points and lines
	Hardware OpenGL overlay planes
	H/W accelerated pixel readback
	3rd generation occlusion culling
	AA on scan-out
<b>Option kit contents</b>	PCA with ATX bracket, DVI to VGA converters, HDTV dongle, CD and manual.
<b>Power consumption</b>	<60 W

**NVIDIA Quadro FX 1700 512 MB PCIe Graphics Card**

<b>Form Factor</b>	ATX
<b>Bus Type</b>	PCI Express x16
<b>Memory</b>	512 MB 400 MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
<b>Connectors</b>	DVI-I (dual-link) and DVI-I (dual-link) and HD-out (a separate cable - not included - is required to use HD TV monitors)
<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) and 3840x2400 (dual-link).
<b>RAMDAC</b>	Integrated dual 400MHz
<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) and 3840x2400 (dual-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft® Windows®
<b>Shading Architecture</b>	Fully programmable GPU (OpenGL 2.1/DirectX 10 class) Vertex/Pixel Shader 4.0 Shading Support (HLSL, GLSL, CgFX)
<b>Supported Graphics APIs</b>	OGL 2.1 & SM4.0 and DirectX10 Support
<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) WS3, WS4 & 5 Desktop/Workstation 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>	High Resolution Anti-Aliasing PureVideo 2 engine supports AES 128-bit decryption GPU Computing (HW/SW including CUDA SDK) 3D Textures LightSpeed Memory Architecture II 128-bit color precision Hardware accelerated anti-aliased points and lines Hardware OpenGL overlay planes H/W accelerated pixel readback 3rd generation occlusion culling AA on scan-out
<b>Option kit contents</b>	PCA with ATX bracket, DVI to VGA converters, CD and manual.
<b>Power consumption</b>	<75 W

**ATI FireGL V5600 512 MB PCIe Graphics Card**

<b>Form Factor</b>	ATX
<b>Graphics Controller</b>	R520
<b>Bus Type</b>	PCI Express x16

<b>Memory</b>	512 MB unified frame buffer, Z-buffer and Texture storage and a 128-bit Ring-Bus memory controller
<b>Connectors</b>	Two dual-link DVI connectors with analog/digital outputs
<b>Maximum Resolution</b>	Dual Link digital support for 3840 x 2400 @ 60Hz. Ideal for 30-inch widescreen displays.
<b>RAMDAC</b>	Dual 10-bit per channel 400MHz
<b>Ring Bus Memory Controller</b>	512-bit internal ring bus for highly efficient memory reads Programmable intelligent arbitration logic
<b>Display Output</b>	Up to 16-bit per RGB color component High Dynamic Range output (HDR) Programmable piecewise linear gamma correction, color correction, and color space conversion (10-bits per color)
<b>Shading Architecture</b>	Supports Full Shader Model 4.0 120 shader processing unit
<b>Supported Graphics APIs</b>	DirectX 10 and OpenGL 2.1 advanced
<b>Available Graphics Drivers</b>	Microsoft Windows XP Professional 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> . HP-tested Windows XP and Microsoft Windows Vista 32 and 64, Microsoft Windows XP. 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> .
<b>Option kit contents</b>	PCA with ATX bracket, DVI to VGA converters, CD and manual.

**NVIDIA Quadro FX 3700 Graphics Card**

<b>Form Factor</b>	ATX
<b>Graphics Controller</b>	NVIDIA NV71GL-U
<b>Bus Type</b>	PCI Express x16
<b>Memory</b>	512MB 700MHz GDDR3 SDRAM unified frame buffer, Z-buffer and Texture storage
<b>Connectors</b>	2 dual-link DVI-I + 3-pin Mini DIN stereo output
<b>Maximum Resolution</b>	Dual DVI-I output - drives dual digital displays at resolutions up to 2560x1600 @ 60Hz Internal 400MHz RAMDACs - drives dual analog displays up to 2048x1536 @ 85Hz each
<b>RAMDAC</b>	Dual 400MHz integrated
<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 2560x1600 @ 60Hz. NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft® Windows®
<b>Shading Architecture</b>	Fully programmable GPU (OpenGL 2.0/DirectX 9.0c class) Long fragment programs (unlimited instructions) Long vertex programs (unlimited instructions) Looping and subroutines (up to 256 loops per vertex program) Dynamic flow control Conditional execution
<b>Supported Graphics APIs</b>	OpenGL 2.1 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) WS3, WS4 & 5 Desktop/Workstation Qualified drivers may be preloaded or available from the HP support

Web site: [http://welcome.hp.com/country/us/eng/software\\_drivers.html](http://welcome.hp.com/country/us/eng/software_drivers.html)

Novell SUSE Linux Enterprise drivers may be obtained from: <ftp://download.nvidia.com/novell> or <http://www.nvidia.com>

<b>High-Resolution AntiAliasing</b>	256-bit memory interface 128-bit IEEE floating-point precision graphics pipeline 128-bit color precision 32x FSAAs dramatically reduces visual aliasing artifacts at resolution up to 1920x1200 Hardware accelerated anti-aliased points and lines Hardware OpenGL overlay planes Hardware accelerated two-sided lighting Hardware accelerated clipping planes 3rd generation occlusion culling 3D volumetric texture support Quad-buffered stereo Dual Link DVI enabling driving digital displays up to 2560x1600 @ 60Hz SLI Link
<b>Option kit contents</b>	PCA with ATX bracket, DVI to VGA converters, CD and manual

<b>NVIDIA Quadro FX 4800 1.5GB PCIe Graphics Card</b>	<table border="0"> <tr> <td style="vertical-align: top;"><b>Form Factor</b></td> <td>4.36" (H) x 10.5" (L) Dual slot card</td> </tr> <tr> <td style="vertical-align: top;"><b>Graphics Controller</b></td> <td>NVIDIA Quadro FX 4800 graphics board</td> </tr> <tr> <td style="vertical-align: top;"><b>Bus Type</b></td> <td>PCI Express x16, Generation 2.0</td> </tr> <tr> <td style="vertical-align: top;"><b>Memory</b></td> <td>1.5 GB GDDR3 SDRAM unified graphics memory</td> </tr> <tr> <td style="vertical-align: top;"><b>Connectors</b></td> <td>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)</td> </tr> <tr> <td style="vertical-align: top;"><b>Maximum Resolution</b></td> <td> <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> </td> </tr> <tr> <td style="vertical-align: top;"><b>Shading Architecture</b></td> <td> <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> </td> </tr> <tr> <td style="vertical-align: top;"><b>Supported Graphics APIs</b></td> <td>OpenGL 3.0 Direct X 10.0</td> </tr> <tr> <td style="vertical-align: top;"><b>Available Graphics Drivers</b></td> <td>                 Genuine Windows Vista Business (64-bit and 32-bit)                  Microsoft Windows XP Professional (64-bit and 32-bit)                  Red Hat Enterprise Linux(RHEL) WS4 &amp; 5 Desktop/Workstation                  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> </td> </tr> <tr> <td style="vertical-align: top;"><b>High-Resolution AntiAliasing</b></td> <td> <ul style="list-style-type: none"> <li>• Rotated Grid Full-Scene Antialiasing (RG FSAAs)</li> <li>• 32xFSAAs dramatically reduces visual aliasing artifacts or "jaggies" at resolution up to 1920 x 1200</li> </ul> </td> </tr> </table>	<b>Form Factor</b>	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 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>	<ul style="list-style-type: none"> <li>• Rotated Grid Full-Scene Antialiasing (RG FSAAs)</li> <li>• 32xFSAAs dramatically reduces visual aliasing artifacts or "jaggies" at resolution up to 1920 x 1200</li> </ul>
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- 64x FSAA SLI Mode
- Optimized compiler for Cg and Microsoft HLSL
- OpenGL 2.1 and DirectX 10 support
- Open source compiler

**Power consumption** 146 Watts

**NVIDIA Quadro FX 5600 PCIe Graphics Card**

<b>Graphics Controller</b>	NVIDIA Quadro FX 5600 graphics card
<b>Bus Type</b>	PCI Express x16
<b>Memory</b>	1.5 GB GDDR3 SDRAM unified graphics memory
<b>Connectors</b>	2 Dual-Link DVI-I analog/digital monitor outputs, 1 3-pin Mini DIN stereo output
<b>Maximum Resolution</b>	2560x1600 @ 60Hz
<b>RAMDAC</b>	Dual 400 MHz integrated
<b>Image Quality Features</b>	12-bit subpixel sampling precision enhances AA quality Rotated-grid full-scene antialiasing (RG FSAA) 32x FSAA dramatically reduces visual aliasing artifacts or "jaggies" at resolution up to 1920x1200
<b>Avivo Video and Display Platform</b>	nView Architecture - Advanced multi-display desktop & application management seamlessly integrated into Microsoft Windows®
<b>Display Output</b>	Dual dual-link DVI-I outputs support two digital displays at up to 2560x1600 @ 60Hz Internal 400 MHz DACs - Two analog displays up to 2560x1600 @ 60Hz
<b>Shading Architecture</b>	Fully programmable GPU (OpenGL 2.1/DirectX 10 class) Long fragment programs (unlimited instructions) Long vertex programs (unlimited instructions) Looping and subroutines (up to 256 loops per vertex program) Dynamic flow control Conditional execution
<b>Supported Graphics APIs</b>	OpenGL 2.1 ICD with immediate mode support for all OGL primitive types DirectX 10
<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) 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/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>	The NVIDIA Quadro FX 5600 Architecture includes: 128-bit color precision Unlimited fragment instruction Unlimited vertex instruction 3D volumetric texture support Single-system powerwall 12 pixels per clock rendering engine Hardware accelerated antialiased points & lines Hardware OpenGL overlay planes Hardware accelerated two-sided lighting Hardware accelerated clipping planes 3rd-generation occlusion culling 16 textures per pixel in fragment programs

	<b>High-level Shader Languages</b>	<p>Window ID clipping functionality                      Hardware accelerated line stippling                      Optimized compiler for Cg and Microsoft® HLSL                      OpenGL 2.1 and DirectX 10 support                      Open source compiler</p>
<b>NVIDIA Quadro FX 5800 4GB Graphics Card</b>	<b>Form Factor</b>	4.36" (H) x 10.5" (L), Dual Slot
	<b>Graphics Controller</b>	NVIDIA Quadro FX 5800 Graphics Board
	<b>Bus Type</b>	PCI Express x16, Generation 2.0
	<b>Memory</b>	4GB GDDR3 SDRAM unified graphics memory
	<b>Connectors</b>	2 Dual-Link DVI-I, 1 DisplayPort, 1 3-pin Mini DIN stereo output Two DVI to VGA 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>• Two dual-link DVI-I outputs drive two digital displays at resolutions up to 2560 x 1600 @ 60Hz</li> <li>• One DisplayPort output drives an ultra-high-resolution panel (up to 2560 x 1600)</li> <li>• Internal 400 MHz DACs-Two analog displays 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>	<p>Genuine Windows Vista Business (64-bit and 32-bit)                      Microsoft Windows XP Professional (64-bit and 32-bit)                      Red Hat Enterprise Linux(RHEL) WS4 &amp; 5 Desktop/Workstation</p> <p>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></p> <p>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></p>
<b>High-Resolution AntiAliasing</b>	<ul style="list-style-type: none"> <li>• Rotated Grid Full-Scene Antialiasing (RG FSAA)</li> <li>• 32x FSAA dramatically reduces visual aliasing artifacts or "jaggies" at resolution up to 1920x1200</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>	240	
<b>Power consumption</b>	225 Watts	
<b>NVIDIA Quadro CX</b>	<b>Form Factor</b>	4.36" (H) x 10.5" (L) Dual slot card
	<b>Graphics Controller</b>	NVIDIA Quadro CX 1.5GB Graphics Card

<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>RAMDAC</b>	400MHz
<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 2.1 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) 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>
<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>Power consumption</b>	146 Watts

**ATI FireGL V7700  
512MB PCIe Graphics  
Card**

<b>Form Factor</b>	ATX
<b>Graphics Controller</b>	RV670
<b>Bus Type</b>	PCI Express x16 (PCI 2.0)
<b>Memory</b>	512 MB unified frame buffer, Z-buffer and Texture storage and a 256-bit Ring-Bus memory controller
<b>Connectors</b>	One DisplayPort Output One dual-link DVI connector One stereo 3D Output
<b>Maximum Resolution</b>	Dual Link digital support for 2560 x 1600 @ 60Hz. Ideal for 30-inch widescreen displays.
<b>RAMDAC</b>	Dual 10-bit per channel 400MHz
<b>Ring Bus Memory Controller</b>	512-bit internal ring bus for highly efficient memory reads Programmable intelligent arbitration logic
<b>Display Output</b>	Up to 16-bit per RGB color component High Dynamic Range output (HDR) Programmable piecewise linear gamma correction, color correction,

	and color space conversion (10-bits per color)
<b>Shading Architecture</b>	Supports Full Shader Model 4.0 320 shader processing unit
<b>Supported Graphics APIs</b>	DirectX 10.1 and OpenGL 2.1 advanced
<b>Available Graphics Drivers</b>	Microsoft Windows Vista 32 and 64, Microsoft Windows XP 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> .
<b>Option kit contents</b>	PCA with ATX bracket, DVI to VGA converters, CD and manual.

*contents*

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[Technical Specifications - Optical and Removable Storage](#)   [Technical Specifications - Networking and Communications](#)   [Technical](#)

## Technical Specifications - Hard Drives

<b>HP SAS (Serial Attached SCSI) Hard Drives for HP Workstations</b>	<b>450GB SAS 15K rpm 3Gb/s 3.5" HDD</b>	<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			
		<b>Seek Time (typical reads, includes controller overhead, including settling)</b>	<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)			
			<b>300GB SAS 15K rpm 3Gb/s 3.5" HDD</b>	<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)		
<b>146GB SAS 15K rpm 3Gb/s 3.5" HDD</b>	<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</b> (typical reads, includes controller overhead, including settling)	<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)		
	<b>73 GB SAS 15K rpm 3Gb/s HDD</b>	<b>Capacity</b>	73 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 Mbytes		
<b>Seek Time</b> (typical reads, includes controller overhead, including settling)		<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>		143,374,738 - 512 byte blocks		
<b>Operating Temperature</b>		50 to 95 F (10 to 35 C)		
<b>146 GB SAS 10K rpm SFF HDD</b>		<b>Capacity</b>	146 GB	
	<b>Height</b>	0.583 in; 1.5 cm		
	<b>Width</b>	<b>Media Diameter</b>	2.5 in; 6.36 cm	
		<b>Physical Size</b>	2.76 in; 7 cm	
	<b>Interface</b>	SAS		
	<b>Synchronous Transfer Rate (Maximum)</b>	1.5 Gb/s		
	<b>Buffer</b>	16 Mbytes		
	<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b>	0.4 ms	
		<b>Average</b>	<4.0 ms	
		<b>Full Stroke</b>	<8.2 ms	
<b>Rotational Speed</b>	10,000 rpm			

	<b>Logical Blocks</b>	286,749,488 - 512 byte blocks		
	<b>Operating Temperature</b>	50 to 95 F (10 to 35 C)		
<b>73 GB SAS 10K rpm SFF HDD</b>	<b>Capacity</b>	73 GB		
	<b>Height</b>	0.583 in; 1.5 cm		
	<b>Width</b>	<b>Media Diameter</b>	2.5 in; 6.36 cm	
		<b>Physical Size</b>	2.76 in; 7 cm	
	<b>Interface</b>	SAS		
	<b>Synchronous Transfer Rate (Maximum)</b>	1.5 Gb/s		
	<b>Buffer</b>	16 Mbytes		
	<b>Seek Time (typical reads, includes controller overhead, including settling)</b>	<b>Single Track</b>	0.4 ms	
		<b>Average</b>	4.0 ms	
		<b>Full Stroke</b>	8.2 ms	
	<b>Rotational Speed</b>	10,000 rpm		
<b>Logical Blocks</b>	143,374,738 - 512 byte blocks			
<b>Operating Temperature</b>	50 to 95 F (10 to 35 C)			

<b>SATA (Serial ATA) Hard Drives for HP Workstations</b>	<b>300GB SATA 10K rpm SFF in 3.5" Frame HDD</b>	<b>Capacity</b>	300,069,052,416 bytes		
		<b>Height</b>	1 in; 2.54 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 (3.0 Gb/s), Native Command Queuing enabled		
		<b>Synchronous Transfer Rate (Maximum)</b>	Up to 300 MB/s		
		<b>Cache</b>	16 MB		
	<b>Seek Time (typical reads, includes controller overhead, including settling)</b>	<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>160GB SATA 10K rpm SFF in 3.5" Frame HDD</b>	<b>Capacity</b>	160,041,885,696 bytes		
		<b>Height</b>	1 in; 2.5 cm		
		<b>Width</b>	<b>Media Diameter</b>	2.5 in; 6.36 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 (Maximum)</b>	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>		312,581,808
	<b>Operating Temperature</b>		41° to 131° F (5° to 55° C)
<b>80GB SATA 10K rpm SFF in 3.5" Frame HDD</b>	<b>Capacity</b>		80,026,361,856 bytes
	<b>Height</b>		1 in; 2.5 cm
	<b>Width</b>	<b>Media Diameter</b>	2.5 in; 6.36 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 300 MB/s
	<b>Buffer</b>		16 Mbytes
	<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>	19.5 ms
	<b>Rotational Speed</b>		10,000 rpm
	<b>Logical Blocks</b>		156,301,488
	<b>Operating Temperature</b>		41° to 131° F (5° to 55° C)
<b>1000GB (1TB) SATA 7200 rpm 3.0Gb/s 3.5" HDD</b>	<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)
<b>500GB SATA 7200 rpm 3Gb/s 3.5" HDD</b>	<b>Capacity</b>		500,107,862,016 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)	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)
<b>250GB SATA 7200 rpm 3Gb/s 3.5" HDD (for HP xw-Workstations)</b>	<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</b> (Maximum)	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)
<b>160GB SATA 7200 rpm 3Gb/s 3.5" HDD</b>	<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</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 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>80GB SATA 7200 rpm 3Gb/s 3.5" HDD</b>	<b>Capacity</b>	80,026,361,856 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)	
	<b>Synchronous Transfer Rate (Maximum)</b>	300 MB/s	
	<b>Buffer</b>	8 MB	
	<b>Seek Time (typical reads, includes controller overhead, including settling)</b>	<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>	156,301,488	
	<b>Operating Temperature</b>	41° to 131° F (5° to 55° C)	

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## Technical Specifications - Hard Drive Controllers

<b>Integrated LSI SAS 1068E Controller with RAID 0, 1, 1E/10E</b>	<b>PCI Bus</b>	PCI-Express x8 lanes
	<b>PCI Modes</b>	Bus Master DMA
	<b>RAID Levels</b>	RAID 0, 1, 1E and 10E
	<b>PCI Data Burst Transfer Rate</b>	8 PCI-Express lanes at 2.5Gbps in each direction for a total bandwidth of 5.0Gbps for each full duplex lane. Total aggregate bandwidth of up to 4GBps possible.
	<b>Full Duplex</b>	LSI's SAS1068E 8-port SAS/SATA controller supports 1.5 and 3.0Gb/s per port data transfer rates.
	<b>PCI Card Type</b>	N/A
	<b>PCI Voltage</b>	N/A
	<b>PCI Power</b>	N/A
	<b>Bracket</b>	N/A
	<b>Certification Level</b>	PCI-Express 1.0a
	<b>IO Bus</b>	Eight 3Gb/s SAS/SATA ports
	<b>SAS Processor</b>	LSISAS1068E
	<b>Internal Connectors</b>	Four- SATA x1 connectors
	<b>External Connectors</b>	None
	<b>Maximum Number of SCSI Devices</b>	32
	<b>LED Indicators</b>	On-board activity and fault LEDs
<b>Integrated Mirroring</b>	Integrated Mirroring option available	

<b>LSI MegaRAID® SAS 8888ELP Host Bus Adapter (HBA)</b>	<b>PCI Bus</b>	PCI-Express x8 lanes
	<b>PCI Modes</b>	Bus Master DMA
	<b>RAID Levels</b>	RAID 0, 1, and 5 RAID spans 10 and 50
	<b>PCI Data Burst Transfer Rate</b>	Up to 3Gb/s per port
	<b>Full Duplex</b>	Up to 1.5 GB/s
	<b>PCI Voltage</b>	+3.3V Add-in Card
	<b>PCI Power</b>	7.5 Watts
	<b>Certification Level</b>	PCI-Express 1.0a
	<b>IO Bus</b>	Eight 3Gb/s SAS/SATA ports
	<b>Internal Connectors</b>	Two SAS SFF8087 x4
	<b>External Connectors</b>	Two SAS SFF8088 x4
	<b>Maximum Number of SCSI DeviceS</b>	32
	<b>LED Indicators</b>	Connector LEDs indicate whether the internal or external connector is active for ports 0-3 and 4-7

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## Technical Specifications - Multimedia and Audio Devices

<b>Integrated Intel/Realtek HD ALC262 Audio</b>	<b>Type</b>	Integrated
	<b>High Definition Codec</b>	Yes
	<b>FM Synthesis Support</b>	Yes
	<b>OPL3 FM Synthesis Support</b>	Yes
	<b>Sound Blaster Compatibility</b>	Yes
	<b>Meets Premium performance for Windows Logo Program 3.0</b>	Yes
	<b>Audio Jacks</b>	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: External Speakers need to be powered externally.</b>
	<b>Sampling</b>	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
	<b>Wavetable Syntheses (software)</b>	Yes – GM and FM Midi Support, Direct Music and Down Loadable Soundset (4 Meg DLS Level 1 and 2 Support)
	<b>3D Positional Sound</b>	No
	<b>Digital Audio</b>	Yes
	<b>Analog Audio</b>	Yes

<b>DVD Audio</b>	Yes
<b>Number of Channels on Line-Out</b>	Stereo (Left & Right channels)
<b>Internal Audio Speaker Power Rating</b>	1.5 W
<b>Internal Speaker</b>	Yes
<b>Hardware Equalizer for Internal Speaker</b>	No
<b>External Speaker Jack (Line-Out)</b>	Yes

**SoundBlaster X-Fi XtremeGamer Audio Card (PCI)**

<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</b> (20kHz Low-pass filter, A-Weighted)	Stereo Output 109dB Front and Rear Channels 109dB Center, Subwoofer and Side Channels 109dB
<b>Total Harmonic Distortion + Noise at 1kHz</b> (20kHz Low-pass filter)	0.004%
<b>Frequency Response</b> (-3dB, 24-bit/96kHz input)	10Hz to 46kHz
<b>Frequency Response</b> (-3dB, 24-bit/192kHz input)	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 Outi via shared 3.5mm mini jack
<b>Auxiliary Line Level Input</b>	4-pin molex connector
<b>Front Panel Header</b>	Intel HD Audio Compatible (1x10 pin)
<b>Operating System</b>	EntMicrosoft Windows Vista Business 64 Microsoft Windows Vista Business 32 Microsoft® Windows® XP Professional SP2 Microsoft Windows XP Professional x64 Edition

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## Technical Specifications - Optical and Removable Storage

<b>HP DVD+/-RW Drive</b>	<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 (all conditions non-condensing)</b>	<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>.

\* 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.

<b>HP DVD-ROM Drive</b>	<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>DVD-ROM Single Layer</b>	< 140 ms (typical)	
	<b>Access Times</b>	<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 ± 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 support is provided by the operating system.		

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the tool, visit: <http://www.windowsvista.com/upgradeadvisor>. For Windows Vista system requirements, visit: <http://www.windowsvista.com/systemrequirements>.

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## Technical Specifications - Networking and Communications

<b>Intel Pro 1000 PT PCIe Gigabit NIC Card</b>	<b>Connector</b>	RJ-45
	<b>Controller</b>	Intel 82572EI 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>	6.4 x 2.6 x 0.8 in (16.3 x 6.6 x 1.9 cm)
	<b>Operating System</b>	Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*.
	<b>Driver Support</b>	Red Hat Enterprise Linux(RHEL) 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: <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> .
	<b>Management Capabilities</b>	ASF, WOL , PXE, DMI, WFM 2.0
	<b>Kit Contents</b>	Intel Pro 1000 PT PCIe Gigabit NIC Card , low profile bracket, CD containing Intel PROset II NIC drivers, quick install guide, product warranty statement.

<b>Broadcom 5751 NetXtreme Gigabit Ethernet PCIe NIC</b>	<b>Connector</b>	RJ-45
	<b>Controller</b>	Broadcom 5751 PCI-Express LAN Controller
	<b>Memory</b>	Integrated 96Kb frame buffer memory
	<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
	<b>Data Path Width</b>	Single channel, PCI-E
	<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>	3.1 watts @ +3.3V AUX supply with 5V tolerance
	<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>	85% at 131° F (55° C)
	<b>Dimensions</b>	4.4 x 2.2 x 0.08 in (11.2 x 5.5 x 2 cm)
	<b>Operating System Driver Support</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.
		<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>
	<b>Management Capabilities</b>	ACPI, WOL and DMI 2.0, PXE 2.0, WfM 2.0, Broadcom mgmt utility
	<b>Kit Contents</b>	Broadcom 5751, CD, Broadcom 5751 Netxtreme Gigabit PCIe NIC, drivers, quick install guide, product warranty statement

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## Technical Specifications - Controller Cards

<b>HP xw8/94 SAS Back</b>	<b>Dimensions (HxD)</b>	Plug only 0.55 x 1.54 x 2.24 in (14 x 39 x 57 mm)
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<b>Panel Connector Kit</b>	<b>Ports</b>	4 SATA, 1 MiniSAS 4x
<b>HP FireWire® 800 IEEE-1394b 3-Port PCI Card</b>	<b>Data Transfer Rate</b>	Supports up to 800 Mb/s
	<b>Devices Supported</b>	IEEE-1394 compliant devices
	<b>Bus Type</b>	PCI card with brackets for low profile and full height PCI slots
	<b>Ports</b>	Two IEEE-1394b bilingual 9-Pin Connectors (Rear)
	<b>Internal Connectors</b>	One 10-Pin header Custom Connector
	<b>System Requirements</b>	Microsoft® Windows® XP Professional, Windows XP Home 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 Only
<b>HP FireWire/IEEE 1394a PCI Card</b>	<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: <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> .
		Pentium II 266 or above 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>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*

\* 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>.

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